# University of Southampton

Faculty of Medicine

Primary Care, Population Sciences and Medical Education

**Community pharmacy alcohol-related liver disease risk identification and linkage to care through development of a complex intervention**

by

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Thesis for the degree of Doctor of Philosophy

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# University of Southampton

## Abstract

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Liver disease is one of the leading causes of premature mortality in the United Kingdom. Alcohol-related liver disease (ArLD) causes the majority of these deaths. Morbidity and mortality from ArLD can be reduced if it is diagnosed earlier. Earlier diagnosis can be achieved by testing for ArLD in people who are at risk of it due to their alcohol consumption. Local liver disease pathways exist to facilitate earlier diagnosis in primary care. There is a drive to widen their reach by using novel community settings to identify ArLD. Community pharmacies represent an accessible setting with evidence indicating harmful alcohol use can be identified by pharmacists through alcohol screening and brief intervention (SBI) services. This PhD explores the development of a complex intervention that can enable community pharmacy to utilise this accessibility and SBI experience to identify patients at risk of ArLD and link them with ArLD pathways of care. The work in this PhD is underpinned by the Medical Research Council guidance on complex intervention development and undertaken in four work packages.

Firstly, to gain understanding of context and the wider system, an interrupted time series study examined the effect of implementing a local liver disease pathway to identify ArLD (the Southampton primary care liver pathway - SLP) on referrals to secondary care. This found the SLP was associated with a statistically significant gradual reduction in referrals, demonstrating the potential impact of a community ArLD liver disease intervention and a method of evaluating such interventions.

Secondly, a review of existing evidence using a qualitative evidence synthesis of nine studies of SBI in community pharmacy was undertaken. This generated understanding of the barriers and facilitators experienced in the delivery of SBI so that these can be addressed in intervention design. Facilitators included non-confrontational communication skills, aligning SBI with existing pharmacy services and pharmacist role legitimacy. Barriers included multiple demands on staff time, a lack of staff experience with screening tools, and staff concerns of causing offence.

Thirdly, new primary research was conducted as semi-structured interviews with stakeholders (n=26). This explored perceptions of a role for community pharmacists in ArLD identification, perceived challenges to such a role, and potential features of the intervention. Stakeholders included patients with ArLD, members of the public, pharmacists and pharmacy assistants, hepatology professionals and general practitioners.

Finally, the intervention was designed and refined using theory and stakeholder review. The behaviour change wheel was applied to earlier findings to guide the design of the intervention. This was then refined through a co-design workshop with key stakeholders. The outcome of this work was 23 described key components and a structure of a community pharmacy complex intervention anticipated to have the best chance of being implementable and suitable for assessment in feasibility and pilot testing in future work.

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# List of Accompanying Materials

Publications (provided in Appendix O):

1. Smith A, Glyn-Owen, K, Buchanan R. Comment on 'Does Advice Based on Biomarkers of Liver Injury or Non-Invasive Tests of Liver Fibrosis Impact High-Risk Drinking Behaviour: A Systematic Review and Meta-Analysis.' Alcohol Alcohol. 2021 Aug 30;56(5):625–625. https://doi.org/10.1093/alcalc/agab023
2. Smith A, Parkes J, Crockford D, Buchanan R. Building on hepatitis C testing: the potential to identify alcohol-related liver disease through community pharmacy. Pharm J. 2021;307(7953). https://doi.org/10.1211/PJ.2021.1.104664
3. Buchanan RM, Smith A, Rowe I. The role of natural experiments in hepatology research: filling the gap between clinical trials and service evaluations. Hepatol Commun. 2023 May;7(5). https://doi.org/10.1097/HC9.0000000000000121
4. Smith A, Parkes J, Patel J, Thayakaran R, Buchanan R. O5 A primary care liver pathway reduces referrals to hepatology outpatient clinics – a controlled interrupted time series analysis. Gut. 2023 Sep 20;72:A4–5. https://doi.org/10.1136/gutjnl-2023-BASL.5
5. Smith A, Buchanan R, Parkes J, Stone H, Tan QY, Ibrahim K. Barriers and facilitators experienced in delivering alcohol screening and brief interventions in community pharmacy: a qualitative evidence synthesis. Int J Pharm Pract. 2023 Nov 4;1–16. https://doi.org/10.1093/ijpp/riad071
6. Smith A, Buchanan RM, Parkes J, Ibrahim K. Exploring a role for community pharmacists in the identification of alcohol-related liver disease: a qualitative interview study with professionals, patients, and the public. Alcohol and Alcoholism. 2024 Nov;59(6):agae069. https://doi.org/10.1093/alcalc/agae069

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# Research Thesis: Declaration of Authorship

Print name: Alexander Smith

Title of thesis: Community pharmacy alcohol-related liver disease risk identification and linkage to care through development of a complex intervention

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

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2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
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7. Parts of this work have been published as:-

- Smith A, Parkes J, Crockford D, Buchanan R. Building on hepatitis C testing: the potential to identify alcohol-related liver disease through community pharmacy. Pharm J. 2021;307(7953). https://doi.org/10.1211/PJ.2021.1.104664
- Smith A, Parkes J, Patel J, Thayakaran R, Buchanan R. O5 A primary care liver pathway reduces referrals to hepatology outpatient clinics – a controlled interrupted time series analysis. Gut. 2023 Sep 20;72:A4–5. https://doi.org/10.1136/gutjnl-2023-BASL.5
- Buchanan RM, Smith A, Rowe I. The role of natural experiments in hepatology research: filling the gap between clinical trials and service evaluations. Hepatol Commun. 2023 Apr 14;7(5):e0121. https://doi.org/10.1097/HC9.0000000000000121
- Smith A, Buchanan R, Parkes J, Stone H, Tan QY, Ibrahim K. Barriers and facilitators experienced in delivering alcohol screening and brief interventions in community pharmacy: a qualitative evidence synthesis. Int J Pharm Pract. 2023 Nov 4;1–16. https://doi.org/10.1093/ijpp/riad071
- Smith A, Buchanan RM, Parkes J, Ibrahim K. Exploring a role for community pharmacists in the identification of alcohol-related liver disease: a qualitative interview study with professionals, patients, and the public. Alcohol and Alcoholism. 2024 Nov;59(6):agae069. https://doi.org/10.1093/alcalc/agae069

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# Definitions and Abbreviations

ABI..... Alcohol brief intervention

AUD ..... Alcohol use disorder

AUDIT ..... Alcohol use disorder identification test

AUDIT-C..... AUDIT-Consumption. A shortened version of the AUDIT

ArLD ..... Alcohol-related liver disease

ALP ..... Alkaline phosphatase

ALT ..... Alanine transaminase

ArLD ..... Alcohol-related liver disease

AST ..... Aspartate aminotransferase

BI..... Brief intervention

BCW ..... Behaviour change wheel

C&I ..... Camden and Islington

CCG ..... Clinical commissioning group

CI ..... Confidence interval

CITS..... Controlled interrupted time series

COM-B model ..... Capability-Opportunity-Motivation-Behaviour model

CPCF ..... Community pharmacy contractual framework

CPCS..... Community pharmacy consultation service

CPSC..... Community pharmacy south central

CSPH..... Clinically significant portal hypertension (CSPH)

DSM..... Diagnostic and Statistical Manual of Mental Disorders

ELF test..... Enhanced Liver Fibrosis test

FAST ..... Fast Alcohol Screening Test

GF ..... Graduated-frequency. A method for quantifying a person's alcohol consumption

GGT ..... Gamma-glutamyl transpeptidase

GP ..... General practitioner

HCC ..... Hepatocellular carcinoma

HCV..... Hepatitis C virus

HLP ..... Health Living Pharmacy

IBA..... Identification and brief advice

ICD ..... International classification of diseases

Ig ..... Immunoglobulin

INDEX ..... Identifying and assessing different approaches to developing complex interventions

ITS ..... Interrupted time series

kPa ..... Kilopascals

LPC..... Local pharmaceutical committee

MRC ..... Medical Research Council

NAFLD ..... Non-alcoholic fatty liver disease

Natural experiment ..... events, interventions or policies which are not under the control of researchers, but which are amenable to research which uses the variation in exposure that they generate to analyse their impact

NEAR ..... Normal, easy, attractive, routine

NES ..... Natural experiment study

NICE ..... National Institute of Health and Care Excellence

NHS..... National Health Service

NIHR..... National Institute for Health and Care Research

NILS..... Non-invasive liver screen

NILT ..... Non-invasive liver fibrosis test

NPT..... Normalization Process Theory

NSBB ..... Non-selective beta-blockers

OHID ..... Office for Health Improvement and Disparities

PCP ..... Primary care practitioner

PPI..... Patient and public involvement

QALY ..... Quality-adjusted life years

QES ..... Qualitative evidence synthesis

QF ..... Quantity-frequency. A method for quantifying a person's alcohol consumption

QFBS ..... Quantity-frequency beverage-specific. A method for quantifying a person's alcohol consumption

RCT..... Randomised control trial

RETREAT criteria..... Review question, epistemology, time, resources, expertise, audience, type of data. Criteria to guide selection of method for a qualitative evidence synthesis

RR..... Relative risk

SBI..... Screening and brief intervention

BRC ..... Biomedical research centre

SCCG ..... Southampton City clinical commissioning group

SLP ..... Southampton primary care liver pathway

TDF..... Theoretical domains framework

TE ..... Transient elastography (synonymous with trade name Fibroscan®)

UHS..... University Hospital Southampton

ULN ..... Upper limit of normal

UK ..... United Kingdom

WHCCG..... West Hampshire clinical commissioning group

WHO..... World Health Organization

# Chapter 1 Background

## 1.1 The scale of the problem being addressed

Alcohol is described by the World Health Organization (WHO) as one of the leading risk factors for population health in the world.(1) Based on 2016 data, the WHO estimates that 3 million deaths worldwide are a consequence of harmful alcohol use, corresponding to 5.3% of all deaths.(1) Europe accounts for nearly one third of these (the largest share of any WHO region) with 1 in every 10 deaths in Europe due to alcohol.(2) In the European union, 19.9% of all alcohol-related deaths are due to liver cirrhosis, second only to cancer (29.4%).(3) In England, alcohol misuse is the single biggest risk factor for early mortality, ill health and disability in people aged 15-49 years.(4)

Alcohol also has enormous negative socioeconomic impacts in the United Kingdom (UK). In the most recent statistical release by Public Health England (examining the year 2018) 180,000 working years of life were lost to alcohol, the highest since 2011 and more than for the 10 most common cancers combined.(5) Working years of life lost are the number of years between the death of a person aged 16-64 and the age of 65 years i.e. a person who died at the age of 50 would have 15 working years of life lost. The majority of working years of life lost to alcohol in the UK are a result of alcohol-related liver disease.(5) When considering all ages, alcohol-related liver disease is the cause of over 80% of all alcohol-specific deaths in England.(6)

Globally, the mortality rate from chronic liver disease has risen over the last 20 years such that it is now the 11th commonest cause of death worldwide.(7) Alcohol is the leading cause of chronic liver disease worldwide(7) and 48% of all global deaths from chronic liver disease are attributable to alcohol.(8) Liver disease affects those of working age with liver cirrhosis being the eight leading cause of premature mortality in western Europe. (9)

Mortality from liver disease from all causes has increased by 400% in the UK since 1970 primarily due to alcohol-related liver disease (ArLD).(10) According to the most recent data from the Office of National Statistics, liver disease is now the 5$^{th}$ leading cause for premature mortality (death under 75 years of age) in England, and the 2$^{nd}$ leading cause of mortality in the 35-49 age group.(11) What is more the problem of ArLD has been exacerbated in the COVID-19 pandemic. The year 2020 saw a 20.8% increase in deaths from alcohol-related liver disease compared to 2019. By comparison the increase from 2018 to 2019 was 2.5%.(12)

At a local level in the southeast of England, Southampton and Portsmouth have the two highest mortality rates from alcohol-related liver disease. These areas also have the second and third highest alcohol-specific mortality respectively and the highest percentage of people living in the 20% most deprived areas in the southeast of England.(13) This latter fact is of particular relevance as deprivation is well known to impact alcohol-related harm, with increasing levels of deprivation associated with increased alcohol-related disease and mortality(10,14–16)

To further understand the problem, the following sections provide an overview of alcohol use and alcohol-related liver disease and then examine evidence on how to address it.

## 1.2 Alcohol misuse and at-risk drinking

The terms used to describe people who drink 'too much' alcohol vary and have seen changes over the years, not least due to changes in thresholds of what is deemed 'too much'.(17) What has become clear is that when considering all aspects of health, any amount of alcohol consumption confers some degree of risk to physical and/or mental health.(18)

In the UK this has been reflected in national guidance where reference is to 'low risk drinking' and not 'no risk'.(17) Along with this comes the term 'drinking at increasing risk' i.e. above low risk drinking levels, also often referred to as alcohol misuse.(19)

Since 2016 the threshold for low risk drinking in the UK has been 14 units per week for men and women, having previously been the same for women but 21 units per week for men.(17) This threshold varies internationally(20) as does the definition of a unit of alcohol, typically referred to as a 'standard drink' in other countries and measured in grams of pure alcohol. A UK unit of alcohol is 10 millilitres or 8 grams of pure alcohol(21) whereas a standard drink in most other countries is 10-14 grams of pure alcohol.(20) What constitutes 'drinking at increasing risk' therefore has some variation internationally if using a numeric threshold based on units or standard drinks.

The World Health Organization (WHO) applies different terminology without using a numeric threshold of alcohol intake, using the terms hazardous alcohol use and harmful alcohol use. The WHO defines hazardous alcohol use as that which increases the risk of harmful health consequences and harmful alcohol use is defined as that is causing (or has caused) damage to health.(22) Hazardous alcohol use is classed by the WHO as a 'health risk factor' whereas harmful alcohol use is a formal diagnosis.(23)

These terms are also used in guidance produced by the National Institute of Health and Care Excellence (NICE) in the UK, where hazardous is also described as 'increased risk' and harmful as 'high-risk'.(24) Further to this, NICE also provides associated unit per week thresholds

matching these terms. Hazardous/increasing risk drinking is defined as drinking 14-35 units per week for women and 14-50 units per week for men. Harmful/high risk drinking is drinking above these ranges.

### 1.2.1 Alcohol use disorder and alcohol dependence

Alongside definitions relating to risk is the term Alcohol Use Disorder (AUD). AUD is a psychiatric condition, the definition of which is from the Diagnostic and Statistical Manual of Mental Disorders (DSM) where it is defined as 'a problematic pattern of alcohol use leading to clinically significant impairment or distress' and has criteria for its diagnosis and severity.(25)

AUD has replaced the terms alcohol abuse, alcoholic and alcohol dependence(26), although alcohol dependence is still a recognised WHO diagnosis in the most recent international classification of diseases (ICD-11).(27) Whilst its official definition is a psychiatric condition, 'alcohol use disorder' is widely used to describe anyone who is drinking at hazardous or harmful levels in the same way 'alcohol misuse' is used.(24,26)

### 1.2.2 Assessing alcohol use

#### 1.2.2.1 Alcohol use screening tests

The WHO-approved Alcohol Use Disorder Identification Test (AUDIT) is regarded as the gold standard alcohol use screening tool and is the most widely used tool in primary care.(26,28,29) The AUDIT contains 10 multiple choice questions that ask about a person's alcohol intake, potential dependence on alcohol and experience of alcohol-related harm. Each question is scored individually and the sum of the 10 answers gives the total AUDIT score, ranging from 0 to 40.

The AUDIT-Consumption (AUDIT-C) score is an abbreviated version of the AUDIT that uses the first three questions of the AUDIT score (see Table 1.1). The Fast Alcohol Screening Test (FAST) is a recognised alternative alcohol use screening test that uses four questions taken from the AUDIT (see Table 1.1) although has largely been replaced by the AUDIT-C. A FAST score of ≥3 is 'positive' and should then prompt completion of the remaining AUDIT questions. The AUDIT questions and how they are scored are shown in Table 1.1.

The scores from both the AUDIT and AUDIT-C can be used to identify potential hazardous or harmful alcohol use and also alcohol dependence as shown in Table 1.2. The AUDIT-C has been shown to be equivalent to the full AUDIT in predicting identification of alcohol use disorder.(30)

Table 1.1 World Health Organization approved Alcohol Use Disorder Identification Test (AUDIT)

| Question | Score |
|---|---|
| **1. How often do you have a drink containing alcohol?*** | |
| • Never | 0 |
| • Monthly or less | 1 |
| • 2-4 times a month | 2 |
| • 2-3 times a week | 3 |
| • 4 or more times a week | 4 |
| **2. How many units of alcohol do you drink on a typical day when you are drinking?*** | |
| • 1 or 2 | 0 |
| • 3 or 4 | 1 |
| • 5 or 6 | 2 |
| • 7 to 9 | 3 |
| • 10 or more | 4 |
| **3. How often have you had 6 or more units if female, or 8 or more if male, on a single occasion in the last year?*^** | |
| • Never | 0 |
| • Less than monthly | 1 |
| • Monthly | 2 |
| • Weekly | 3 |
| • Daily or almost daily | 4 |
| **4. How often during the last year have you found that you were not able to stop drinking once you had started?** | |
| • Never | 0 |
| • Less than monthly | 1 |
| • Monthly | 2 |
| • Weekly | 3 |
| • Daily or almost daily | 4 |
| **5. How often during the last year have you failed to do what was normally expected from you because of your drinking?^** | |
| • Never | 0 |
| • Less than monthly | 1 |
| • Monthly | 2 |
| • Weekly | 3 |
| • Daily or almost daily | 4 |
| **6. How often during the last year have you needed an alcoholic drink in the morning to get yourself going after a heavy drinking session?** | |
| • Never | 0 |
| • Less than monthly | 1 |
| • Monthly | 2 |
| • Weekly | 3 |
| • Daily or almost daily | 4 |
| **7. How often during the last year have you had a feeling of guilt or remorse after drinking?** | |
| • Never | 0 |
| • Less than monthly | 1 |
| • Monthly | 2 |
| • Weekly | 3 |
| • Daily or almost daily | 4 |
| **8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?^** | |
| • Never | 0 |
| • Less than monthly | 1 |
| • Monthly | 2 |
| • Weekly | 3 |
| • Daily or almost daily | 4 |
| **9. Have you or somebody else been injured as a result of your drinking?** | |
| • No | 0 |
| • Yes, but not in the last year | 2 |
| • Yes, during the past year | 4 |
| **10. Has a relative or friend, doctor or other health worker been concerned about your drinking or suggested that you cut down?^** | |
| • No | 0 |
| • Yes, but not in the last year | 2 |
| • Yes, during the past year | 4 |
| *Questions contained in the AUDIT-C, ^Questions contained in the Fast Alcohol Screening Test (FAST) | |

Table 1.2 Different criteria for categories of alcohol use

| Measure | Criteria for hazardous (increasing risk) alcohol use | Criteria for harmful (higher risk) alcohol use | Alcohol Dependence |
|---|---|---|---|
| UK units per week(24) | Female 14-35 Male 14-50 | Female >35 Male >50 | No criterion |
| AUDIT-C score(31) | 5-7 | 8-10 | ≥ 11 |
| AUDIT score (32) | 8-15 | 16-19 | 20+ |

#### 1.2.2.2 Quantifying alcohol intake

The AUDIT, AUDIT-C and FAST do not quantify the amount a person drinks. It is important to understand how to quantify a person's alcohol consumption given the inclusion of unit thresholds in definitions of hazardous and harmful drinking (as shown in Table 1.2) as well as in definitions of ArLD (see section 1.3.1). However, there is no definitive gold standard to quantify a person's alcohol consumption.(33,34) Almost all methods rely on self-reporting and there is debate in both health and market research about what the optimal method is.(33,35,36)

The quantity-frequency (QF) measure is the most widely used method in research.(37) This asks the average frequency of drinking and the average amount consumed when drinking i.e. the first two AUDIT/AUDIT-C questions (see Table 1.1). The amount consumed is then calculated by multiplying the two values.(37) The QF measure is quick and simple to perform.(33) It has also been adapted into the quantity-frequency beverage-specific (QFBS) method. This asks the QF questions separately for each type of drink (beer, wine, spirits) and is currently used in the Health Survey for England.(38)

The graduated-frequency (also called the graduated quantity-frequency) method (GF) is an alternative method recommended by the WHO.(39) This asks the frequency of consuming a high quantity (e.g. more than 12 units a day) and then sequentially the frequency of progressively smaller quantities (i.e. 8-11units, 5-7units, 3-4units, 1-2 units).(33) The total quantity is then calculated by combining the QF calculations for each amount asked. The main advantage of the GF method is that it can identify drinking variability, particularly those who have intermittent periods of (rather than persistent) higher-risk drinking.(40)

Two other methods are short term recall and diary methods, which ask consumption for each day over a short period (e.g. 1 week) so that the respondent is likely to accurately remember what they consumed.(37) The diary method can be completed prospectively. The main

limitation of these methods is that people who have periods of abstinence or drink infrequently may be wrongly identified as abstainers or have their alcohol consumption vastly underestimated.(37)

A recent systematic review demonstrated that even within each of the discussed methods there is variation in their application e.g. the recall period, the measure of consumption (grams of alcohol, drinks, units).(41) A further systematic review could not find a consensus on which method is most reliable and valid but the authors suggest the QF method (and adaptions of it e.g. QFSB) may be the current best existing method.(34)

## 1.3 Alcohol-related liver disease

Having considered definitions and concepts in assessing alcohol use it follows to discuss how alcohol use can lead to alcohol-related liver disease (ArLD).

### 1.3.1 Defining alcohol-related liver disease

In simple terms ArLD describes a spectrum of liver injury as a result of alcohol use.(26,42) The spectrum of the disease has a recognised pattern of progressive stages in the setting of ongoing alcohol use: the initial development of fatty liver, development of liver inflammation and injury called steatohepatitis, which if chronic can lead to progressive fibrosis of the liver and eventual cirrhosis. In a cirrhotic stage there is risk of subsequent development of hepatocellular carcinoma.(43) This process is shown in Figure 1.1.

In some patients who are drinking at harmful levels (see Table 1.2) a rapidly progressive steatohepatitis can occur, including in those who have already developed cirrhosis. This presents acutely as the condition alcohol-related hepatitis and when severe has an associated 28-day mortality of 17-38%.(44,45)

During the course of my PhD the definition and nomenclature of ArLD and fatty liver disease has changed. European guidelines issued in 2018 stated that ArLD should be suspected in the setting of liver injury (such as fatty liver on imaging or abnormal liver function tests) and a regular alcohol intake of >20grams/day in women (17.5 UK units per week) and >30grams/day in men (26 UK units per week).(26) Where fatty liver was identified in the absence of this level of alcohol intake a diagnosis of non-alcoholic fatty liver disease (NAFLD) could be made.

In 2023 an international multi-association consensus recommended new nomenclature in fatty liver disease.(46) NAFLD is replaced with the term metabolic dysfunction-associated steatotic liver disease (MASLD) and the alcohol threshold for ArLD has risen to >50grams/day in women (43.5 UK units per week) and >60grams/day in men (52.5 UK units per week). A new third

category of fatty liver disease is described - metabolic dysfunction and alcohol associated steatotic liver disease (MetALD). This describes drinking alcohol above the 2018 threshold that defined ArLD but below the new threshold in conjunction with having one or more metabolic risk factors that define MASLD.

Throughout this PhD I have continued to use the previous 2018 definition of ArLD, as well as the term NAFLD, given this terminology is used in the vast majority of research relevant to this PhD and these were the contemporaneous definitions during my data collection.

### 1.3.2 Risk of developing alcohol-related liver disease

Virtually all heavy drinkers will develop fatty liver but the percentage of patients who progress to more advanced stages varies as shown in Figure 1.1.(47) Perhaps unsurprisingly the amount of alcohol consumed increases risk of progressing to more advanced stages of ArLD.(48) A number of other factors are also known to increase this risk including: female sex(49), being overweight(50), smoking(51), concomitant liver diseases, and a number of genetic factors.(43)

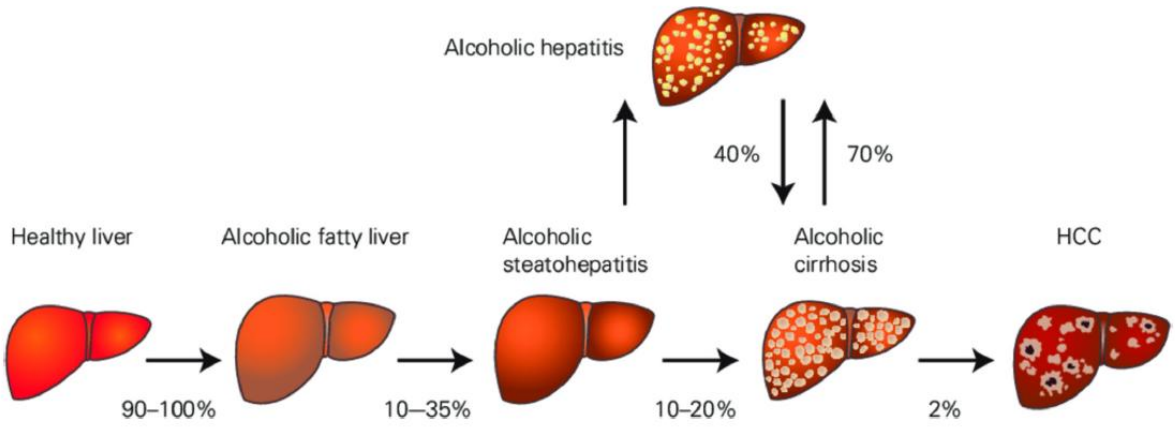



Figure 1.1 Stages of alcohol-related liver disease taken from Avila et al.(47)

The evidence for genetic predisposition has been demonstrated by research in twins showing that monozygotic (identical) twins have a higher prevalence of ArLD cirrhosis than dizygotic (non-identical) twins.(52) Numerous genes have been examined in relation to risk and severity of ArLD but with varying evidence for the association of most of the genes thus far studied.(53) The strongest evidence appears to be for patatinlike phospholipase domain-containing protein 3 (PNPLA3) with the variant rs738409 being associated with susceptibility to ArLD in multiple genome studies although the exact mechanism remains unclear.(53)

In relation to genetic risk, the question of ethnicity as a risk factor for ArLD is complex. Studies have shown there is variation in the prevalence and incidence of ArLD depending on ethnicity as well as severity of ArLD at presentation.(54–56) However, research to date has not established

whether these differences reflect different genetic risk to ArLD or are a consequence of differences in other risk factors present in different ethnicities e.g. amount of alcohol consumed, concomitant liver diseases, obesity.(54)

When considering the amount of alcohol consumed the question of how much is enough to cause liver disease can be posed. This was examined in a 2010 systematic review and meta-analysis by Rehm et al.(48) 17 studies (cohort or case-control) were included in the meta-analysis. Both cirrhosis morbidity and mortality were examined in the meta-analysis. The finding was of a clear dose-response relationship between alcohol consumption and relative risk (RR) of liver cirrhosis morbidity and mortality, with a greater effect on mortality risk.

A threshold effect was also demonstrated for liver cirrhosis morbidity. For men the RR of developing liver cirrhosis (as compared to a lifetime abstainer) exceeded one at a consumption level in the range 36-48 grams/day, where the RR was 2.0 (CI 1.5-2.7, $p<0.001$). For women the consumption level where RR exceeded one was lower at 24-36grams/day (RR 1.9, CI 1.4-2.6, $P<0.001$). The RR for cirrhosis mortality for these same consumption levels were 10.1 for women (CI 7.5-13.5, $p<0.001$) and 5.6 for men (CI 4.5-7.0, $p<0.001$).

In UK units per week these thresholds for cirrhosis morbidity convert to 31-42 units per week for men and 21-31.5 units per week for women.(21) It is interesting to compare these thresholds with the earlier discussed thresholds of 50 units per week(men) and 35 units per week (women) used by NICE to define harmful/high-risk alcohol intake.(24) As discussed, harmful drinking refers to any physical or mental health problem due to alcohol rather than being specific for liver disease but raises the question of these thresholds being too high. The origin of the thresholds used by NICE are from a 1986 report by the Royal College of Psychiatrists stating ‘evidence suggests that the potential for personal harm increases greatly above these limits’ but there is no reference given for this evidence and no mention of risk of liver disease.(57)

A 2021 retrospective single centre cohort study of 762 patients referred by GPs to liver services with suspected ArLD or non-alcoholic fatty liver disease (NAFLD) examined the NICE thresholds in relation to identifying liver disease. (58) Patients were grouped into one of four alcohol consumption (units per week) categories: 0-35, 36-50, 51-100, over 100. Compared to the 0-35 group, those drinking 36-50 units per week had double the odds of having advanced liver fibrosis (OR 2.173, 95% CI 1.119 to 4.219, $p=0.022$) and those drinking over 100 units a week had five times greater odds (OR 5.044, 95% CI 3.071 to 8.284, $p<0.001$). When analysed by sex, drinking over 35 units per week remained associated with increased odds of having advanced fibrosis for women (OR 5.155, 95% CI 1.306 to 20.030, $p=0.019$). For men, it was the higher threshold of drinking over 50 units per week that was significantly associated with increased odds of having advanced fibrosis (OR 2.743, 95% CI 1.506 to 4.998, $p=0.001$). It is important to note that the

comparator was people drinking up to 35 units a week. Based on the aforementioned systematic review by Rehm et al.(48) people in this comparator group would have been at increased risk of ArLD cirrhosis compared to a group of people who were lifelong abstinent. As such the effect size for higher drinking thresholds will likely be underestimated than if a lifelong abstinent group was the comparator.

#### 1.3.2.1 Deprivation and risk of alcohol harm

Many studies both in the UK and internationally have identified the phenomenon that people from more deprived communities experience a greater degree of alcohol-related harm (including for ArLD) compared to less deprived communities despite drinking similar amounts of alcohol.(59,60) This has been termed the 'alcohol harm paradox'.

The exact reason for the paradox remains unclear. It was suggested the observed difference may be an artefact as a consequence of underreporting of alcohol consumption in deprived communities.(59) However there has been no evidence to support this and recent systematic review has indicated if anything there may be more underreporting in less deprived communities.(16)

Potential explanations have been explored in the literature. It has been shown that there are more concomitant health risk factors in those from deprived communities, notable smoking and obesity and poor diet that may act synergistically to cause greater harm to health.(59,60) Additionally, patterns of drinking may explain the harm, with deprived communities tending to drinking the same amount but in fewer sessions i.e. occasional heavy drinking or binge drinking, which is known to increase risk of injury and negate any potential cardiovascular benefit of drinking. However, this difference could only account for slight differences in harm at most.(60) A further theory is that poorer access to primary care e.g. due to geographic distribution or affording transport to access care may contribute to greater harms from alcohol in deprived groups.(61)

However, as highlighted in a recent systematic review, there is no research that has provided causal evidence to explain the alcohol harm paradox, recognising the complexity of the phenomenon makes producing such evidence challenging.(16)

### 1.3.3 How does alcohol cause liver disease

The mechanisms by which alcohol leads to the spectrum of liver disease are complex.(42,47,62) The metabolism of alcohol in the human body occurs in the liver where alcohol is metabolised to acetaldehyde and then acetaldehyde metabolised to acetate. The acetate is then secreted into the bloodstream and metabolised to carbon dioxide elsewhere in the body.(63) Steatosis

(fatty liver) develops from chronic alcohol use due to the effect of alcohol on transcription factors involved in fatty acid regulation pathways, consequently increasing fatty acid synthesis and decreasing fatty acid oxidation.(42) Liver damage is a consequence of the direct toxic effects of acetaldehyde and additional reactive oxygen species (formed by alcohol-induced oxidative stress) on hepatocytes (liver cells). Heavy chronic alcohol use upregulates the enzymes that form these toxins, thus exacerbating the hepatocyte injury.(43)

The liver inflammation (steatohepatitis) that can occur is a result of the immune response to the hepatocyte injury as well as bacterial translocation from the gut.(43) There is subsequently a natural 'wound healing' fibrogenesis response to this inflammation and damage through the activation of hepatic stellate cells (HSC). HSC activation (further driven by alcohol and acetaldehyde) results in extracellular matrix protein deposition and resultant liver fibrosis. If this continues the liver cellular structure becomes progressively disrupted until eventually a predominance of fibrotic tissue has formed i.e. liver cirrhosis.(47) The hepatic inflammation, oxidative stress and remodelling alongside the direct mutagenic effects of alcohol and acetaldehyde can subsequently cause DNA mutations that lead to hepatocellular carcinoma development.(43,62)

### 1.3.4 Signs and symptoms of alcohol-related liver disease

A challenge in the identification of ArLD is that as a patient progresses through the stages shown in Figure 1.1 they typically do not have any symptoms specific to ArLD. Only when reaching advanced stages of ArLD – alcohol-related hepatitis or cirrhosis – do patients become symptomatic.(43) In reflection of this, guidance advocates to consider the presence of ArLD if patients have symptoms of an alcohol use disorder (see section 1.2.1) or other symptomatic organ damage caused by excess alcohol use such as peripheral neuropathy (nerve damage), pancreatitis (inflammation of the pancreas) or heart failure.(26)

Excess alcohol use itself can cause a number of signs and symptoms in the absence of organ damage as shown in Table 1.3. However, these are non-specific to alcohol use, having many other potential causes but should (if identified) prompt assessment of alcohol use.

Table 1.3 Non-specific signs and symptoms of excess alcohol use

| Symptoms | Signs |
|---|---|
| • Tiredness<br>• Abdominal pain<br>• Poor sleep<br>• Loss of sex drive<br>• Amenorrhoea (loss of menstrual periods) | • Palmar erythema (reddening of palms of hands)<br>• Dupuytren's contracture (thickening of connective tissues of the hand causing contraction of fingers)<br>• Loss of proximal muscle mass<br>• Gynaecomastia (enlargement of male breast tissue)<br>• Testicular atrophy |

When ArLD cirrhosis has developed this can initially be largely asymptomatic in what is termed 'compensated' cirrhosis. This absence of symptoms has been posed as one of the reasons ArLD is frequently only first diagnosed at a 'decompensated' cirrhotic stage. This was shown in a large population study of 5118 patients with cirrhosis.(64) 47.3% (n=2420) of these patients were first diagnosed with liver cirrhosis only when admitted to hospital as an emergency, with 66.3% decompensated at diagnosis. ArLD was the aetiology of cirrhosis in 60% (n=1467) of this hospitalised group.

The transition to 'decompensated' (symptomatic) cirrhosis may be caused by ongoing progression of liver damage due to alcohol or precipitated by an additional physiological stress such as an infection. The symptoms of decompensated cirrhosis are a result of insufficient liver function and include any of: jaundice (yellow of the skin), hepatic encephalopathy (brain dysfunction ranging from mild cognitive impairment to coma), ascites (fluid accumulation in the abdomen) or variceal bleeding (bleeding from dilated veins – varices – typically in the oesophagus, that develop as a result of liver cirrhosis).(42,65) The median survival of a patient with decompensated cirrhosis has been estimated at 2 years, compared with over 12 years for a patient with compensated cirrhosis.(65)

### 1.3.5 Diagnosing and staging alcohol-related liver disease

A liver biopsy is the gold standard test for the diagnosis and staging of ArLD but given the procedure has associated morbidity it is not routinely recommended.(26) The diagnosis of ArLD is therefore presumed in the setting of excess alcohol use and evidence of liver injury in the absence of other causes.

As discussed in section 1.3.4, ArLD typically lacks clear signs and symptoms until decompensated cirrhosis or alcohol-related hepatitis has developed. As such evidence of liver injury may only be found through laboratory or imaging tests. Abnormalities of routinely conducted liver function tests (LFTs) are commonly found on routinely requested blood tests in primary care.(66) LFTs include blood levels of: bilirubin (a product of red blood cell breakdown that is metabolised by the liver); albumin (a protein produced by the liver); enzymes found in (but not specific to) the liver. The enzymes tested for include: alanine transaminase (ALT) and/or aspartate aminotransferase (AST); alkaline phosphatase (ALP); gamma-glutamyl transpeptidase (GGT).

Whilst abnormal LFTs results may indicate liver injury, they can also be raised in many other non-liver conditions. Additionally, in isolation they do not indicate the degree of liver injury and what is more they can be normal despite the presence of advanced liver injury/disease.(67–69)

Consequently, the staging of ArLD focuses on assessing for liver fibrosis, the most advanced stage of which is liver cirrhosis. Historically a liver biopsy was the only way to assess for liver fibrosis. A tide change in hepatology has been the development of non-invasive tests for liver fibrosis (NILTs), allowing fibrosis stage to be ascertained without liver biopsy. A large number of NILTs have been developed for use in multiple aetiologies of liver disease(70) but in UK guidance the Enhanced Liver Fibrosis (ELF) blood test and transient elastography (TE) are the NILTs advised for fibrosis assessment in ArLD.(66,71)

The ELF test measures blood levels of three surrogate markers of fibrosis (hyaluronic acid, tissue inhibitor of metalloproteinase-1 and N-terminal peptide of procollagen III), applying a logarithmic algorithm to these values to produce a result.(72) It requires a standard blood sample as used for most other blood tests.

TE (trade name Fibroscan®) is a form of ultrasound that measures the velocity of an elastic shear wave moving across through the liver, in essence measuring the stiffness of the liver.(70) The wave moves faster the stiffer the liver is i.e. the more fibrosis there is. TE requires a specialist machine and training in its use.(70)

The use of such NILTs has facilitated earlier diagnosis and staging of ArLD, which can in turn reduce the risk of ArLD harm as discussed in the next section.

## 1.4 Reducing risk of alcohol-related liver disease harm

### 1.4.1 Brief interventions to reduce alcohol consumption

If a person is identified as drinking above recommended levels they should also be fed back this result and given advice to encourage reduction in alcohol use.(73) This process is termed a brief intervention, defined by the WHO as ‘those practices that aim to identify a real or potential alcohol problem and motivate an individual to do something about it’.(74)

There are a number of other terms recognised in the research literature that would come under the broad definition of brief intervention. These include ‘brief advice’, ‘extended brief intervention’, ‘brief lifestyle counselling’, ‘brief motivational interviewing’.(24,74) These terms are often unified with the identification process when describing the intervention e.g. ‘screening and brief intervention (SBI)’ or ‘identification and brief advice (IBA)’.(75)

From a service and research perspective 'brief advice' typically refers to a brief intervention lasting up to five minutes(24,74) and 'extended brief intervention' to an intervention involving motivational interviewing(76) and/or lasting 20-30minutes or more.(24,74) Both are still under the umbrella term of 'brief intervention', which may also refer to an intervention somewhere between these two.

### 1.4.2 Evidence of effectiveness of alcohol brief interventions

Alcohol screening and brief intervention (SBI) is an internationally recognised and advised method of reducing alcohol consumption.(77) The effectiveness of alcohol SBI in primary care was reviewed in a widely cited systematic review and meta-analysis, originally published in 2007 and updated in 2018.(78) The review included 69 studies, of which 34 randomised control trials (RCTs) were included in the main meta-analysis. The analysis found that, when compared to minimal or no intervention, brief interventions can reduce alcohol consumption in hazardous and harmful drinkers. The effect of this reduction was a mean difference of -20 grams (2.5 units) of alcohol consumed per week with 95% confidence interval (CI) of -28 to -12 grams (-3.5 to -1.5).

An interesting secondary finding was in the length of the brief intervention. The review categorised any intervention with more than five sessions or a combined duration of intervention greater than 60minutes as an extended intervention. These were not included in the main meta-analysis but were subject to a separate meta-analysis. Six studies were included and when compared with minimal or no intervention there was no statistically significant effect of the extended intervention in terms of mean difference in alcohol consumed per week (MD -19.5 grams/week, 95% CI -40.5 to 1.5). When comparing extended intervention to brief intervention no difference was found (MD 2grams/week, 95% CI -42 to 45) although only three studies were identified for this meta-analysis. The authors concluded that longer duration of intervention probably has little if any benefit on reducing alcohol consumption.(78)

A large RCT in the UK demonstrates this finding.(79) In the study 756 patients with hazardous or harmful drinking were recruited from 34 GP practices. Participants were randomised to one of three interventions: (1) the control intervention of simple feedback and a 16-page patient information leaflet, (2) five minute brief advice, (3) 20 minutes brief lifestyle counselling. The primary outcome was the proportion of participants with an AUDIT score of <8 at six months post intervention. All three intervention groups had an increase in the proportion of participants with an AUDIT score of <8 at six months but there was no statistically significant difference between the interventions. This finding remained the case at 12 months post intervention.(79)

The authors highlight the reason for no difference between interventions may be that the control intervention has active components to change alcohol drinking behaviour.(79) Alcohol screening alone (without advice) having an effect on alcohol consumption has been demonstrated in a study by McCambridge et al. in which 421 university students who drank alcohol were randomly assigned to complete a baseline health questionnaire either with the AUDIT score (group 1) or without (group 2).(80) No formal brief intervention was provided. Both groups of participants then completed an AUDIT score at 2-3 months follow up. The primary outcome was between-group difference in mean audit score at follow up. There was a statistically significant between-group difference in mean AUDIT score at follow up with a lower mean score in group 1 (8.3 vs 9.7, p=0.038). Additionally, a statistically significant decrease in mean AUDIT score from 9.3 to 8.3 (p=0.005) was seen in the group 1 participants i.e. those who completed an AUDIT score.(80)

Whilst there may be uncertainty as to which components of SBIs exert their effect, the evidence as described supports the effectiveness of SBIs in reducing alcohol consumption when delivered in primary care and national guidance advocates their use.(81)

### 1.4.3 Evidence of harm reduction through early diagnosis of alcohol-related liver disease

Earlier diagnosis of ArLD has recognised benefits at all stages of the disease. As described in sections 1.3.4 and 1.3.5, challenges in earlier diagnosis of ArLD are that the disease frequently has no (or only non-specific) symptoms and routine liver blood tests can be normal even in advanced disease. In reflection of this national and international and guidance advocates for case finding strategies in primary care for ArLD by testing for it in people who are at risk of it i.e. those with alcohol misuse.(26,42,66,82)

Identifying ArLD at an early stage before cirrhosis has developed allows opportunity for alcohol intake to be addressed and in doing so reduce risk of progression to cirrhosis.(83) If ArLD is at an advanced stage when identified, the benefit of attaining abstinence from alcohol remains as shown in a cohort study by Masson et al.(84) In this study 134 patients with advanced ArLD diagnosed by liver biopsy were followed up for 15 years or until death or liver transplantation. The strongest predictor of mortality at 15 years was persisting alcohol consumption with an odds ratio of 5.6 (95% CI 1.52 to 20, p=0.01). Similar findings were seen in a cohort study by Verril et al. examining the survival of 96 patients with cirrhosis confirmed on liver biopsy.(85) The mean follow-up was 7 years and 2 months. Patients who were abstinent at 30 days post biopsy had significantly improved survival with 72% survival at a median follow up of 7 years compared with 44% in those who had not achieved abstinence (p=0.026).

In addition to engaging patients in alcohol reduction strategies, the earlier identification of advanced stage ArLD facilitates earlier engagement in recommended screening, surveillance and treatment strategies. This includes screening for oesophageal varices and subsequent prophylactic treatment to prevent potentially life threatening bleeding(86) and also surveillance for hepatocellular carcinoma (HCC) using 6-monthly liver ultrasounds.(87) The effectiveness of HCC surveillance has recently been examined in a systematic review and meta-analysis.(88) 59 cohort studies were included and the review found HCC surveillance improved early-stage detection (RR 1.9, 95% CI 1.73 to 1.98) and curative treatment receipt (RR 1.83, 95% CI 1.67 to 1.97). Overall survival was also improved, and this remained the case when adjusting for lead time bias (hazard ratio 0.67, 95% CI 0.61-0.72). The meta-analyses included patients with cirrhosis from any aetiology. There was no subgroup analysis by aetiology to establish the effectiveness of HCC surveillance specifically in ArLD.

In 2022, new international consensus advocated for treating patients who have cirrhosis and clinically significant portal hypertension (CSPH) – indicating more advanced cirrhosis – with non-selective beta-blockers (NSBB) in order to prevent progression of cirrhosis to a decompensated state.(89) Whilst there remains debate on whether this should be become standard practice,(90) the potential to provide treatment to prevent progression of cirrhosis to a decompensated state further highlights the need for even advanced disease to be identified earlier.

### 1.4.4 Evidence of harm reduction through testing for alcohol-related liver disease

With the goal of reducing alcohol use to prevent progression of ArLD in mind it is relevant to consider the research that has examined the effect of testing for ArLD on alcohol consumption. A recent systematic review and meta-analysis examined the effect of alcohol brief interventions (ABI) containing advice based on markers of liver injury on reducing alcohol consumption. The review found an increased reduction in alcohol consumption in patients receiving ABI containing advice based on markers of liver injury as compared to controls with a mean difference in weekly alcohol consumption of -74.4grams/week (95% CI -126.1 to -22.6). A significant limitation of this meta-analysis, as highlighted in my published letter to the journal's editor (see Appendix O) was that seven of the nine studies included had a control group that received no brief intervention.(91) As such it is not clear if the reduction is a result of the advice based on markers of liver injury or just having a form of brief intervention, given the latter is already known to be effective as discussed in section 1.4.1.

There are a few further studies examining the effect of testing for ArLD on alcohol consumption. In a feasibility study in the UK, 393 GP registered patients responding to an AUDIT questionnaire

and with an AUDIT score >=8 were invited and attended a nurse-led liver assessment clinic where they underwent the Southampton Traffic Light test – a blood test assessing for liver fibrosis that provides a green (negative), amber or red (positive) result.(92) At 1 year follow-up there were statistically significant reductions in mean AUDIT score whether the result was positive (mean AUDIT reduction -3.0) or negative (mean AUDIT reduction -1.9), with the reduction in the positive group being significantly greater than the negative group (p=0.014). The implication is that a liver test may encourage a reduction in drinking and that an abnormal liver test has greater effect.

An abnormal liver test having greater effect on alcohol reduction has been examined further in a prospective cohort study in the UK where patients with AUD being seen in a community alcohol service were invited to have a Fibroscan®.(93) Of 86 patients undergoing a Fibroscan® there was a statistically significant reduction in alcohol consumption (median units per week) at 6 months of 65 units (range 27-88, p<0.001). When split into those with a normal (n=53) and abnormal (n=33) Fibroscan® results (whose baseline alcohol intakes were not significantly different) the reduction was only significant in the abnormal group, although the proportion of patients who had either become abstinent, reduced their drinking or increased their drinking at 6 months showed no statistically significant differences between groups.

Both these studies are limited by the absence of control group but a small feasibility RCT has recently tried to address this limitation.(94) The study recruited 184 adult patients with AUD from drug and alcohol services (DAAS) and randomised them to usual care (DAAS treatment of their AUD) or usual care plus intervention (a Fibroscan® with scripted feedback of the result and access to alcohol video recovery stories). Both groups showed reduction in median daily units and AUDIT score at 6 months. The majority of patients in both groups also reduced their AUDIT category (by one or more categories) with the proportion being greater in the intervention group compared to the control group (71.7% vs 61.8%). The study was not powered to find statistically significant differences in outcomes between groups and so no statistical comparison of these effects was made.

The research considering the effect of a test for ArLD on alcohol consumption is not conclusive but the suggestion that it may aid reduction in alcohol consumption is important when considering the use of case-findings strategies for ArLD.

### 1.4.5 Existing primary care case findings strategies for alcohol-related liver disease

With evidence supporting the attainment of an earlier diagnosis of ArLD, there are a number of strategies encouraging a case finding approach both nationally and at a local level in the UK.

#### 1.4.5.1 National alcohol-related liver disease case finding strategies in England

Nationally, NICE recommends that men drinking over 50 units per week and women who drink over 35 units per week are offered TE to assess for cirrhosis.(71) However a key limitation of this strategy is that the assessment of alcohol consumption in primary care is known to be suboptimal. A large cross-sectional study investigating alcohol recording in general practice found that less than half of almost 1.8 million GP-registered patients had a recorded level of alcohol consumption in the last five years (n=862642, 49%).(95) This finding has been seen elsewhere: in an English study using primary care electronic patient records to screen for liver disease risk factors alcohol consumption was documented in 56% of 10479 patients.(69)

A further national case finding strategy is the NHS health check. This incorporates an AUDIT score and recommends all patients with an AUDIT score of ≥ 16 are offered a non-invasive test for liver fibrosis/cirrhosis.(96) However, NHS health checks are offered to those age 40-74 years but around 15% of patients with liver cirrhosis are <45years old at diagnosis.(64) Additionally, a systematic review of observational studies found that for the whole of England, only 45.6% of eligible adults had attended an NHS health check in the 5-year period from 2013-2017.(97) More recent data from the Office for Health Improvement and Disparities (OHID) showed only 38.9% (95% CI 38.8 – 39.9) of patients invited for an NHS health check in the year 2022-2023 attended for one.(13)

#### 1.4.5.2 Local pathways for liver disease identification and management

In addition to these national strategies, liver pathways have also been developed locally across the UK. A 2021 cross sectional survey of clinical commissioning groups (CCGs) and health boards in the UK found 40% (n=64) reported having a pathway for assessing abnormal liver function tests (LFTs) and 29% (n=46) reporting having a pathway for liver disease more generally. The use of a case finding approach to assess for liver disease in those with risk factors was reported by 24% (n=38).(98)

Despite the number of CCGs and health boards with a pathway, most of these are unpublished. This was highlighted by a systematic review published in 2022 that identified only 12 publication-evidenced pathways for the identification and risk stratification of liver disease, of which 10 were in the UK.(99) Six of the 12 studies were of pathways that incorporated a case finding approach based on liver disease risk factors, half of which were focused only on NAFLD and not ArLD. In the other six studies abnormal LFTs were the basis for entry into the pathway.

Locally in Southampton there is the Southampton primary care liver pathway (SLP).(100) The SLP is described in more detail in section 3.1.1.1. In brief it compromises a decision tree and guidance document for GPs on investigation of liver disease in three circumstances:

asymptomatic abnormal liver function tests, fatty liver on ultrasound and harmful alcohol use (defined as >30units of alcohol per week for 3 years or an AUDIT score greater than 10). The pathway uses a two-step fibrosis assessment in the community for patients with suspected ArLD or NAFLD. Patients first undergo an ELF test and where this is >9 are referred for TE in the community. Those with a TE >10kPa are then referred on to hepatology clinic and those where TE <10kPa remain in primary care. A schematic diagram of the pathway is shown in Figure 1.2.

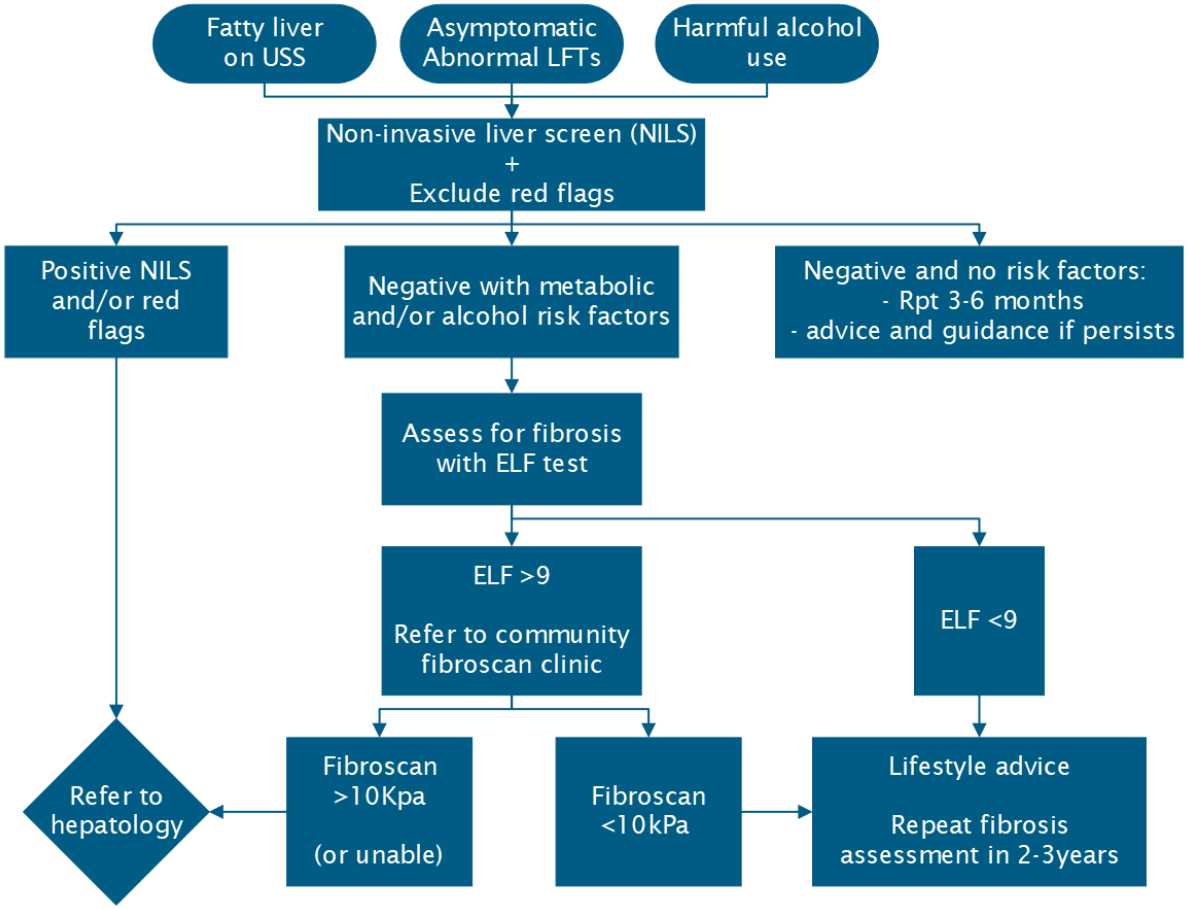



Figure 1.2 Schematic diagram of the Southampton primary care liver pathway

### 1.4.6 Evidence of efficacy and effectiveness of primary care liver disease pathways

In reflection of the relatively small number of published pathways there are even fewer publications providing evidence of the efficacy and effectiveness of such pathways compared to usual care. This may reflect the difficulty in using experimental designs to evaluate care pathways given their nature as complex interventions. To my knowledge the efficacy of only two pathways have been examined in experimental conditions and published in full, of which only 1 incorporated a specific ArLD pathway.(101,102)

A prospective cluster randomised feasibility trial in Southampton randomised 10 GP practices 1:1 to either intervention or control (care as usual).(101) The intervention was a liver nurse clinic run in the GP surgery with registered patients invited to attend the clinic through three routes: 1) referral from a primary care practitioner at the surgery, 2) response to invitation following a research nurse led case finding of patients with liver disease risk factors through screening electronic patient notes, 3) invitation sent to patients responding to mailed AUDIT questionnaire and with a score >8. Patients were recruited from July 2014 to March 2016 and gave informed written consent to participate. The main outcome evaluated was the incident cases of liver disease identified over the study period in GP practices. Based on electronic read codes of patient records there were 287 new cases of liver disease in intervention practices and 221 in control practices. The authors state that a further 257 new cases of liver disease were identified in the liver nurse clinic that had not been read coded and so report there being a total of 544 new cases of liver disease in the intervention practices. Their analysis found that having adjusted for baseline liver disease rate, the intervention was associated with an increased odds of identifying new cases of liver disease compared to control with OR 2.4 (95% CI 2.1 to 2.8). This is perhaps not unsurprising given that 71.1% (n=638) of the patients receiving the intervention were proactively identified and invited through the case finding approaches (nurse led case finding or AUDIT mailout).

Dillon et al. used a randomised step wedge study design to examine the efficacy of their 'iLFT' intervention – an automated system to guide management of abnormal LFTs in primary care.(102) The intervention involved an automated electronic pop up when a primary care practitioner (PCP) requests LFTs asking if screening for liver disease should be performed if the LFTs are abnormal, with the PCP asked to provide information on alcohol use, BMI and metabolic features asked if screening is requested. Automated testing would then be performed if LFTs were abnormal and the PCP provided with a suggested diagnosis and management plan.

Six GP practices in Tayside, Scotland received the iLFT intervention for a 6 month period, with each practice randomised to 1 of 3 start dates, each a month a part. Patients were consented for the iLFT intervention to be used when having their LFTs requested. Patients with abnormal LFTs in the 6 month period prior to the intervention period were used as a control group for each practice. The primary outcome was the rate of diagnosis of liver disease following the findings of abnormal LFTs by the GP, based on documentation in the GP patient record 6 months after the test.

The study found the adjusted difference in rate of liver disease diagnosis to be 43% greater in the iLFT group compared to controls (95% CI 27 to 50%, $p<0.0002$). Secondary outcomes also looked at the effect of the intervention on workload. There were mixed effects on GP visits but

no significant difference in overall number of visits. More notable was the observed significant increase in referrals to secondary care in the iLFT group with OR 8.44 (95% CI 1.99-35.73). The iLFT intervention advised referral for abnormal LFTs deemed by the algorithm to need secondary care management. Given this, and the study finding there was no action taken for 59% of patients in the control group, an increase in referrals to secondary care is not surprising. Further impact of this increase in workload on secondary services was not examined. However, the authors did conduct a health economic analysis (see 1.4.7).

Published real world evaluations of primary care liver pathways (ArLD or otherwise) have lacked a true comparator group and hence their true effectiveness is uncertain. A published evaluation of the first 12 months of the Nottingham liver disease stratification pathway (which incorporates a case-finding approach for ArLD and NAFLD) compared their pathway to that proposed in British Society of Gastroenterology (BSG) guidance.(66,103) The authors state that if the BSG pathway (based only on abnormal LFTs) had been used there would have been 55 fewer patients with significant liver disease identified, corresponding to their case-finding approach providing a 7.4% absolute increase in detection of significant liver disease.(103) However, this lacked a comparison group and to my knowledge there is no real world ArLD pathway evaluation providing evidence of effectiveness compared to usual care.

### 1.4.7 Cost effectiveness of primary care liver pathways

Studies examining the cost effectiveness of primary care liver pathways are few. In the described work by Dillon et al. a health economic analysis was performed.(102) The within study cost effectiveness of the iLFT intervention was an incremental cost of £284 per correct diagnosis at 6 month follow up. The authors used a Markov model that extrapolated the study outcomes to conduct a lifetime cost effectiveness analysis. This was specifically for detected or undetected ArLD and NAFLD. This found the iLFTs intervention to be cost-saving and more effective than standard or care with a saving of £3216 per person with an additional 0.021 quality-adjusted life year (QALY) gained. The authors report that these lifetime savings are through earlier diagnosis of ArLD and NAFLD consequently enabling earlier interventions that reduce progression of liver disease. The authors report their modelling used conservative estimates of interventions' impacts on disease progression but do not detail further what estimates are used or what the interventions would be, although do state the iLFT remained the dominant strategy in almost all modelled scenarios.

When considering ArLD, the most important intervention treatment in all stages of the disease is abstinence from alcohol. In a cost-effectiveness study of four different screening strategies for alcohol-related liver disease, the authors modelled for different effects of a diagnostic test for

ArLD on abstinence.(104) One effect was a sustained effect on abstinence rates and the other was a transient effect on abstinence rates. The cost-effectiveness of each strategy varied depending on this effect, with greater lifetime costs and fewer QALYs gained for each strategy if the effect was only transient compared to sustained. However, as discussed in section 1.4.3 there is limited evidence that a diagnostic test for ArLD can affect drinking behaviour.

It may be that these cost-effectiveness analyses underestimate benefits of testing and earlier identification as they did not examine potential non-liver health benefits. This is particularly true of ArLD where abstinence would reduce other healthcare costs resulting for alcohol use such as cancer or road traffic accidents.(105)

A unifying limitation to current national and local strategies is that they are all accessed through primary care and such will miss those who do not attend primary care. This limitation has been highlighted in international recommendations on reducing the burden of ArLD, and specifically that novel settings, including pharmacies, should be considered to help identify ArLD.(106)

## 1.5 The potential role for community pharmacy in alcohol-related liver disease identification

The last 20 years has seen the progressive development and expansion in the role of community pharmacy improving the public's health in the UK as set out in the 2008 white paper 'Pharmacy in England — Building on strengths, delivering the future'.(107) Community pharmacists are a vital part of the NHS long term plan, specifically highlighted as health professionals that can be supported to 'provide opportunities for the public to check on their health' and 'to case find and treat people with high-risk conditions'.(108)

Community pharmacies in England are contracted and commissioned under the national Community Pharmacy Contractual Framework (CPCF). This includes details of the services that are commissioned by NHS England, either as a requirement ('essential' services) or optional 'advanced' services.

The most recent CPCF (109) comments on a 'fundamental shift towards clinical service delivery focussed initially on minor illness and the prevention and detection of ill health'. This is demonstrated in the CPCF as all pharmacies are now required to be a Health Living Pharmacy (HLP). The HLP framework was created to increase community pharmacy delivery of a broad range of public health services with a focus on promotion of healthy lifestyles. Amongst other requirements, HLP attainment requires at least one patient-facing member of staff trained in understanding health improvement, the pharmacy to have a dedicated health promotion zone and to have a dedicated consultation room.(110) Also included in the CPCF, and further

demonstration of clinical service delivery, was the inclusion of Hepatitis C testing as an advanced service.(111) Hepatitis C testing in community pharmacy is discussed further below.

### 1.5.1 Community pharmacy accessibility as an attribute to a role in alcohol-related liver disease identification

A widely cited reason for expanding the roles of community pharmacies into clinical service delivery is their accessibility, in particular in areas of higher deprivation. The primary evidence for this in the UK is from a 2014 study by Todd et al. that examined the geographic accessibility of community pharmacies in England.(112) The primary outcome was the percentage of the population that could access a community pharmacy within a 20 minute walk. This was done by mapping community pharmacy postcodes to lower super output areas (LSOA) and working on the assumption that an average person can walk one mile in 20 minutes. The study found that 89.2% of the population has access to a community pharmacy within a 20 minute walk. A secondary outcome was access according to level of deprivation using the Index of Multiple Deprivation deciles for each LSOA. Compared with all other deciles, the top two most deprived deciles (deciles 1 and 2) had a significantly higher proportion of the population with access to a community pharmacy within a 20 minute walk. The authors of the study termed this the 'positive pharmacy care law'. The authors used the same methods in a second study to examine access to general practice(113), finding 84.8% of the population has access to a general practice within a 20 minute walk. Comparison was made to community pharmacy accessibility, finding a significant positive association between general practice and community pharmacy accessibility but that access to community pharmacies is overall higher, and this remains true across all deprivation deciles.

Further evidence for the accessibility of community pharmacies in the UK is from interview-based surveys undertaken with 1645 adults from 120 different locations in England as part of market research done on behalf of the Department of Health in 2008.(114) The research found that 84% of the participants stated they visit a pharmacy at least once per year and the mean number of pharmacy visits per year was 14. No comparison was made with visits to other healthcare professionals. This has been examined in a recent study by Berenbrok et al. published in 2020.(115) This cross-sectional study in the United States used government health insurance claims data to examine frequency of attendance at community pharmacies compared to primary care physicians in a one year period. 681,456 individual participant data sets were used, all of which required at least one community pharmacy claim and primary care physician claim to be included. The study found the median visits to a community pharmacy were significantly higher than to primary care physicians (13 vs 7, $p<0.001$). In subgroup analysis this remained significantly higher for both sexes, all age groups and all ethnic groups. Of note

pharmacy attendances were derived from prescription drug claims and therefore visits for over the counter medication or health advice would not have been captured i.e. the number of pharmacy attendances may have been higher. Furthermore, the category 'primary care physician' included general practice, geriatric medicine, family medicine, internal medicine and preventative medicine.(115) This reflects a different health system structure to the UK but may suggest that the number of primary care physician attendances would be lower if only general practitioners were counted.

The evidence outlined here does support the statement that community pharmacists are an accessible healthcare provider and in particular their accessibility to the most deprived populations. As discussed in section 1.3.2.1 there is greatest harm from alcohol in areas of greatest deprivation and one potential reason for this is due to poorer access to primary care. The accessibility of pharmacies in these areas therefore is an invaluable attribute that could be used to help reduce alcohol-related morbidity and mortality, of which ArLD is the largest single contributor.

### 1.5.2 Existing evidence for disease screening and case finding in community pharmacy

Screening for disease in community pharmacies has been examined in a number of systematic reviews. A 2013 review included 51 studies covering a variety of conditions including cardiovascular risk factors, osteoporosis, diabetes, depression, respiratory disease and cancers.(116) The review found consistently high participant satisfaction and indicated feasibility of implementation as well as acceptability to the public. The quality of most studies was poor and the majority of the studies (n=42) were uncontrolled. As such no conclusions on effectiveness could be drawn.(116)

A further systematic review examining community pharmacy education and screening for cancers found it was feasible to identify patients at increased risk of developing cancer and recruit patients to early cancer detection interventions.(117) Twelve studies were included with the majority of moderate or strong quality (n=8).

The question of cost-effectiveness of screening for disease in community pharmacy was considered as part of a wider systematic review of the cost-effectiveness of expanding professional pharmacy services.(118) Twenty-one studies were included in the review of which two were on disease screening, one for sleep apnoea and one for chlamydia.(119,120) Both were found to be cost effective however the applicability to the UK is limited as both studies were conducted in mainland Europe.

When considering the UK, Hepatitis C testing in community pharmacy until recently was a nationally commissioned service.(109) HCV antibody testing in community pharmacy has been shown to be cost effective and demonstrates that community pharmacists are capable of reaching individuals who are not engaged with other services.(121–123) Other research has also shown the ability of community pharmacists to not only test for HCV but provide HCV treatment, resulting in better treatment outcomes compared to conventional care.(124)

As another cause of liver disease identified in at-risk groups, HCV provides a platform in UK community pharmacy to build on for ArLD. I do not believe there has been any published work relating to community pharmacies identifying ArLD, however the foundation for identifying ArLD is finding those who are at risk through alcohol screening.

### 1.5.3 Evidence of community pharmacy identifying people at risk of alcohol-related liver disease

Alcohol screening and brief intervention (SBI) services are an example of a locally commissioned community pharmacy services in the England. These optional services are commissioned by local authorities, integrated care boards (ICB) and local NHS England teams. A 2017 study by Mackridge et al. (125) found 15% of local authority areas had a community pharmacy SBI service commissioned locally. The proportion of pharmacies in these local authority areas providing the SBI service showed large variation of 2%-95%. In the whole of England 5% of all pharmacies offered an SBI service (n=618).

A number of published studied have shown the ability for alcohol screening with or without brief intervention to be done in community pharmacy.(126–136) A recurrent finding in these studies is a higher proportion of hazardous and harmful drinking than is present in the general population. In the UK, estimates from the most recent Health Survey for England are that 18% of adults drink hazardous amounts of alcohol and 4% drink harmful amounts.(137) As shown in Table 1.4, community pharmacy studies show a higher proportion of hazardous alcohol use, ranging from 27% to as high as 79% and, where reported, a higher proportion of harmful alcohol use.

Table 1.4: Studies performing an alcohol use screening test in people attending community pharmacies and the percentages of hazardous and harmful alcohol use identified in those completing the test adapted from Smith et al.(138)

| Study, year | Alcohol Use Screening Test Used | Number offered test | Number completing test | Percentage Hazardous or Harmful [study criteria] | Percentage Harmful [study criteria] | Country |
|---|---|---|---|---|---|---|
| Dhital, 2005(126) | AUDIT | Not given | 73 | 36% [AUDIT ≥8] | Not reported | UK |
| Goodall et al., 2006(127) | FAST | Not given | 352 | 30% [FAST ≥3] | Not Reported | UK |
| Fitzgerald et al., 2008(128) | FAST | Not given | 70 | 53% [FAST ≥3] | 10% [FAST ≥7] | UK |
| Dhital et al., 2010(129) | AUDIT-C | 237 | 102 | 52% [AUDIT-C ≥3♀, ≥4♂] | Not reported | UK |
| Watson et al., 2011(130) | FAST | 1087 | 844 | 27.1% [FAST ≥3] | Not reported | UK |
| Sheridan et al., 2012(131) | AUDIT-C | Not given | 2268 | 29.5% [AUDIT-C ≥5] | Not reported | NZ |
| Khan et al., 2013(132) | AUDIT-C | 663 | 125 | 72% [AUDIT-C ≥3♀, ≥4♂] | 16% [AUDIT-C ≥4♀, ≥5♂ or weekly units ≥70♀, ≥56♂] | UK |
| Brown et al., 2014(133) | AUDIT | 613 | 261 | 67% [AUDIT ≥8] | 3.5% [AUDIT ≥20] | UK |
| Krska and Mackridge, 2014(134) | AUDIT | Not given | 164 | 32% [AUDIT ≥8] | 17% [AUDIT ≥16] | UK |
| Dhital et al., 2015(135) | AUDIT | 2361 | 561 | 79% [AUDIT ≥8] | 7% [AUDIT ≥20] | UK |
| Hattingh et al., 2016(136) | AUDIT | Not given | 50 | 70% [AUDIT ≥8] | 24% [AUDIT ≥16] | NZ |

AUDIT, alcohol use disorder identification test; -C, consumption; FAST, fast alcohol screening test; UK, United Kingdom; NZ, New Zealand

Most of the studies in Table 1.4 offered an alcohol use screening test to any adult attending the community pharmacy, while five of the studies used a case-finding strategy, offering the test to targeted groups.(130,132,133,135,136) Four of these five studies identified the highest percentages of hazardous alcohol use.(132,133,135,136) Brown et al. only offered the test to women who were accessing the community pharmacy for emergency hormonal contraception.(133) The other three studies offered tests to people requesting treatment for predefined symptoms that may be related to alcohol use (e.g. reflux, poor sleep). Additionally, the presence of behaviours including use of certain medication prescriptions, use of smoking cessation services and asking for alcohol advice were used to prompt the offer of a test.(132,135,136) The acceptability of routine alcohol use screening by community pharmacists as part of medication reviews has been recently demonstrated in a randomised control trial (RCT) published in 2020 by Stewart et al. (139)

This evidence demonstrates the ability of community pharmacists to identify hazardous and harmful drinking, and as such identify people who may benefit from an assessment for ArLD.

### 1.5.4 Evidence of the effectiveness of community pharmacy alcohol screening and brief intervention services

There has only been one published RCT examining the effectiveness of a community pharmacy alcohol screening and brief intervention service. Dhital et al. assessed whether a brief alcohol intervention delivered by community pharmacists in comparison with a leaflet control was effective in reducing hazardous and harmful alcohol use at three months, determined by change in AUDIT score at three months.(135) All participants required an AUDIT score of 8-19 to be eligible for the study. Of 561 customers who were tested, 407 were eligible and participated. The study did not find a significant difference in AUDIT score between the intervention and control groups, and the AUDIT score did not significantly change from baseline to follow up in either group.

Notably, a secondary outcome analysis examining AUDIT-C scores showed statistically significant reductions in mean AUDIT-C score of 0.75 (95% CI 0.41–1.08) in the intervention group and 0.69 (95% CI 0.35–1.03) in the control group, indicating a decrease in alcohol consumption. This finding of an effect in both the intervention and control groups mirrors what was seen in a primary care RCT of alcohol brief interventions as discussed earlier(79), possibly explained by the process of alcohol screening and simple feedback having active components to change alcohol drinking behaviour.

A reduction in alcohol consumption has been seen in other community pharmacy SBI studies. Khan et al. followed up 41 hazardous drinkers three months after a pharmacy-delivered SBI and found a statistically significant decrease in the median number of drinking days per week from three to one and an 84% reduction in the number of alcohol units consumed.(132)

Hattingh et al. followed up ten participants after a pharmacy-delivered SBI and observed three of the five participants with hazardous or harmful alcohol use had reduced their level of drinking at one month follow up.(136)

This reduction in alcohol consumption is in keeping with the findings of the discussed systematic review of effectiveness of SBI in primary care(78) and when considering a role for community pharmacy in ArLD it signals an ability for community pharmacy based interventions to reduce risk of ArLD harm.

## 1.6 Summary Rationale

Globally, and in the UK, harm from ArLD represents a major health problem and further action is needed to reduce this harm. Harm from ArLD can be reduced through earlier diagnosis of the disease. Earlier diagnosis can be achieved by testing for ArLD in people who are at risk of it due to their alcohol consumption. The current pathways of care aim to achieve earlier diagnosis and management through testing people at risk of ArLD but they are limited by the reliance on attendance in primary or secondary care. International consensus supports widening the reach of these pathways by using novel settings to help identify people with undiagnosed ArLD and those who are at risk of it.

Community pharmacies are accessible and geographically approximate to at-risk populations. They are therefore well placed in the community to have a role in reducing alcohol-related harms. The existing evidence of alcohol screening and brief intervention in community pharmacy shows there is the potential to identify people at risk of ArLD and suggests capability to reduce this risk.

A complex intervention could enable community pharmacies to utilise these attributes to identify people at risk of ArLD and link them into ArLD pathways of care. This could increase earlier diagnosis of ArLD and in doing so reduce ArLD harm.

## 1.7 Aim and objectives of this PhD

### 1.7.1 Aim

To develop a complex intervention that could enable community pharmacists to identify people with undiagnosed ArLD and connect them with existing ArLD pathways of care

### 1.7.2 Objectives

The objectives are:

1. Evaluate the impact and enhance understanding of the Southampton primary care liver pathway, an existing ArLD pathway of care
2. Understand the barriers and facilitators to delivering alcohol screening and brief intervention in community pharmacies
3. Explore the perceptions and attitudes of service providers, pharmacy users and patients with ArLD about a role for community pharmacists in ArLD pathways
4. Design an intervention with stakeholders that enables community pharmacists to identify patients at risk of ArLD and connect them with ArLD pathways of care

## 1.8 Outline of work in this PhD

The chapters that follow detail the work conducted for my PhD to address this aim and the objectives. Chapter 2 first provides an overview of the design and methodology of the work in this PhD. Chapter 3 contains the first work package of my PhD, an interrupted time series study of the Southampton primary care liver pathway, addressing Objective 1. Chapter 4 contains the second work package, a qualitative evidence synthesis of barriers and facilitators experienced in the delivery of alcohol screening and brief intervention in community pharmacy. This addresses Objective 2. Chapter 5 is the third work package, a stakeholder qualitative interview study that addressed Objective 3. Chapter 6 is the fourth and final work package addressing Objective 4. This is creating the design of the intervention through application of theory to the findings of the preceding work packages in conjunction with a stakeholder co-design workshop. Finally, Chapter 7 is a discussion of the overall findings of the work in this PhD.

# Chapter 2 Research Design and Methodology

## 2.1 Introduction to chapter

The work undertaken in my PhD uses a mixed-methods approach involving four work packages that are presented in chapters 3-6. The specific methods for each work package are described separately in each of chapter. This chapter aims to discuss the overarching methodological considerations and structure for my PhD. This will begin with an overview of research paradigms and mixed methods in relation to my PhD. I will then describe the patient and public involvement (PPI) and stakeholder engagement in my work. Finally, I will describe complex intervention development methodology and how this is applied in my PhD.

## 2.2 Funding

The research undertaken for this PhD was funded by the National Institute for Health and Care Research (NIHR). I was initially awarded a PhD scholarship by NIHR Applied Research Collaboration (ARC) Wessex that provided funding to cover 40% of my salary to develop my own research alongside my clinical work as a specialty registrar in gastroenterology and hepatology. I used this ARC scholarship to prepare, plan and apply for an NIHR doctoral fellowship for the work contained within this PhD. My NIHR fellowship application contained a description of my planned design and methods of the research. I was successfully awarded the fellowship (NIHR302286), enabling me to undertake and complete the research and this PhD through providing funding for the research costs, my salary and my training.

## 2.3 Research paradigms

The term ‘research paradigm’ (or just ‘paradigm’) has no single agreed definition but conceptually it is a pattern of beliefs and principles of how the world is viewed and understood that guides research action.(140,141)

Based on work by Guba and Lincoln any research paradigm can be viewed as being comprised of three elements: ontology, epistemology and methodology.(142) Definitions of these terms adapted from my reading is shown in Table 2.1.

Table 2.1 Definitions of the three elements of a research paradigm

| **Element of a research paradigm** | **Definition** (adapted from (140,142,143)) |
|---|---|
| *Ontology* | What is reality? – the underlying assumption(s) a person has about reality and how it exists |
| *Epistemology* | How can reality be known? – beliefs of how we come to acquire and validate knowledge |
| *Methodology* | How do you go about finding reality out? – what research methods can be used to discover reality/acquire knowledge |

### 2.3.1 Paradigms in relation to quantitative, qualitative and mixed methods research

The research paradigm thought to be the most dominant across the sciences is positivism.(144) The ontological stance of positivism is that of realism – that there is one reality or truth. The epistemological stance is that this reality can be measured and known. As such positivists generate hypotheses to test through observation and measurement using experimental methodology in which the researcher is independent from what is being measured. The production of knowledge through this process is viewed as being reproducible and generalisable across different contexts. Positivism is therefore typically aligned with quantitative research methods.(140,143,145)

The other main research paradigm is constructivism, often alternatively referred to as interpretivism.(140) In contrast to positivism, the ontological stance in constructivism is that of relativism - there is no one single reality but there are multiple realities constructed by the social context in which they exist. Reality is socially constructed and subjective based on one's perceptions and experiences. As such, the epistemological stance of a constructivist is that reality needs to be interpreted, recognising that knowledge is produced as a result of interaction between researcher and researched.(140,146) As such constructivism/interpretivism is aligned with qualitative research methods.

My research will use mixed methods, which neither constructivism nor positivism research paradigms on their own are in keeping with given their relative opposition to each other. Pragmatism is a research paradigm that is commonly associated with mixed methods research.(147) The simplified concept of pragmatism is to use methods that work to answer the research question, recognising that both qualitative and quantitative methods are useful.(148) The ontological stance of pragmatism is that reality is constantly interpreted and debated with the epistemological stance being one of practicality - that knowledge is produced however works best to solve the problem being researched. This incorporates both inductive and deductive approaches to knowledge generation in the research.(143,147) For the work set out in this PhD I have therefore adopted a pragmatism paradigm.

## 2.4 Mixed methods in healthcare research

The overall research planned within my PhD involves both qualitative and quantitative research methods. My work will integrate the results and understanding obtained by these methods to develop my intervention and hence be using a mixed method approach.(147) The use of mixed methods in the development of complex interventions is encouraged in guidance.(149)

Cresswell and Plano Clark(147) describe three core designs to mixed-methods research as shown in Table 2.2.

Table 2.2 Core designs of mixed methods research

| Mixed method design | Description |
|---|---|
| Convergent (also called triangulated) | Quantitative and qualitative data analysed separately and then results integrated to generate a more complete understanding |
| Explanatory | Collection and analysis of quantitative data and subsequent collection and analysis of qualitative data to explain/expand quantitative results |
| Exploratory | Collection and analysis of qualitative data to inform development of a quantitative feature and subsequent testing of the feature through quantitative data collection and analysis |

The focus of the quantitative work contained in Chapter 3 is to further my understanding of the context in which my intervention will fit and consider methods for potential future evaluation. The qualitative work contained in Chapter 4 and Chapter 5 is exploratory in nature, well suited to informing the design of a complex intervention. (147,150) The work from these chapters is utilised in Chapter 6 to design the intervention with stakeholders. As such my PhD overall is utilising a convergent mixed methods design, which is known to create a more complete understanding of an intervention.(147) The methods considered and used in each chapter of work are presented separately in the methods sections of these chapters.

## 2.5 Patient and public involvement and stakeholder engagement

Stakeholders are described by Deverka et al. as ‘Individuals, organizations or communities that have a direct interest in the process and outcomes of a project, research or policy endeavor’.(151) When specifically considering complex interventions this would mean those involved in the development and/or delivery of the intervention, those who are the targets of the intervention and those whose interests (personal or professional) are affected by the

intervention.(149) Stakeholders are often described as either those from professional groups or those who are patients and/or the public.(126)

### 2.5.1 Patient and public involvement approaches

Patient and public involvement (PPI) is recognised as best practice in any research project, helping improve the quality and relevance of research conducted.(152) PPI is also seen to be conceptually in keeping with a person's rights in that someone who is affected by research has a right to be involved in it in some way.(153) Different approaches to PPI are recognised, with different approaches incorporating different degrees of involvement. I find the nomenclature used by the National Institute for Health and Care Research (NIHR) useful(153) and is further built upon by a 2018 concept analysis undertaken by Hughes and Duffy.(154) The nomenclature and my own description adapted from these two sources is shown in Table 2.3.

### 2.5.2 Patient and public involvement in this PhD

As further described in Table 2.3, my PPI approach in my PhD initially took a consultation approach. This reflects what is recognised to be appropriate for an early career researcher undertaking their first PPI work.(153)

My access to patients was facilitated through my work with the University Hospital Southampton (UHS) hepatology department. This allowed me to access an existing patient group consisting of five patients with different liver diseases in the early design of my research and subsequently have contact with two patients with lived experience of ArLD who were interested in being involved with my research as it progressed. One of these patients has continued their involvement throughout and was part of the stakeholder group collaborating in the design of the intervention (see Chapter 6).

Alongside patients I also saw it important to gain the views of members of the public with experience of using community pharmacies. I worked with the Applied Research Collaboration (ARC) Wessex PPI officer to develop an advert to share across the ARC PPI network to hold a discussion group with members of the public that used pharmacies. Six members of the public responded, although only five attended the discussion, which was held virtually using Zoom (version 5.5.0). Three of the attendees were happy to be consulted about the research project as it progressed and were beneficial in reviewing all patient-facing materials and the lay summary used for the interview study. The impact I have observed from the PPI across my PhD work is described in Table 2.3.

Table 2.3 Approaches to patient and public involvement (PPI) and their application and impact in this PhD

| PPI approach | Description of approach | Application in my PhD | Impact on PhD work |
|---|---|---|---|
| *Consultation* | Patients and/or members of the public (PP) are asked for their views on aspects of the research to inform the researcher's decision making.<br><br>Can be further described as either 'targeted' or 'embedded' consultation. 'Targeted' indicating mostly one-off involvement for a specific task with little or no feedback or further involvement and 'embedded' indicating regular consultation and feedback throughout the research cycle. | • Initial development of research idea and design through an online discussion with five patients with liver disease<br>• Planning of study design through online discussion with six members of the public<br>• Discussion of research idea and study design in separate online meetings with two patients with ArLD<br>• Formation of group of PPI contributors (3 members of the public and one patient with ArLD) subsequently involved in review and amendment of lay summary and all patient-facing documents.<br>• Piloting semi-structured interviews with member of public and patient with ArLD | • Highlighted unintentionally stigmatising views can be expressed about people with ArLD by other patients<br>• Raised the need to explore views of a mix of stakeholders in relation to ArLD in pharmacy before pursuing an intervention. Views of patients with ArLD seen essential.<br>• Highlighted that patients with ArLD may not wish to share their experience with a group and hence supported the use of interview methods.<br>• Changes to lay summary, patient information sheets and advert for participation – impact potentially evidenced by ethical review not requesting any amendments to these<br>• Topic guides refined to include broader initial questions. Raised a tendency for me to subconsciously add potential leading statements to questions e.g. what do you think about x…is it a good thing? I subsequently could make a conscious effort not to do this. |
| *Collaboration* | PP are part of the research team and there is a process of shared decision making. Can be done at one or more stages of a research project. | • Inclusion of PP in the co-design stakeholder workshop in which individual opinions of the stakeholder group are valued equally | • Balanced the professional voices in the workshop, in particular helped keep language 'lay' e.g. mention of fibrosis tests explained<br>• Where conversations focused around professionals' time/capacity this was naturally balanced with discussions about how to engage patients and the public despite these time challenges<br>• Helped ensure that the relative importance of the components of the complex intervention I presented was not solely the opinion of professionals |
| *Co-production* | PP, researchers and practitioners work together from start to the end of the research project. Further builds on collaboration in that there is greater emphasis on all members being regarded as equal with power shared equally and relationships built and maintained. | • As discussed in 2.5.2, the co-design work undertaken in Chapter 6 is in keeping with co-production concepts but may fall short of the definition | • As above |
| *User controlled* | PP service users decide and control all aspects of the research project, from what to be researched to how findings are written up and disseminated. They may also undertake the research themselves. 'User-led' also used similarly but may not indicate full PP control. | N/A | N/A |

As noted in Table 2.3, my PPI approach in the design of the intervention takes a collaborative approach and could be termed co-production. Co-production definitions can vary, and the term is not specific to PPI in research. Its conceptual origins are recognised to be from the development of public services where the economist Elinor Ostrom described co-production as 'the process through which inputs used to produce a good or service are contributed by individuals who are not "in" the same organization'.(155) This early definition has evolved and whilst there is no single agreed definition, the underlying notion is of equal relationships and shared decision-making between service users and those responsible for services, working together from design to delivery.(156) This is in keeping with the NIHR definition of co-production.(153) The concept that co-production is something done from the very start to the end of project is why I have considered my PPI approach in Chapter 6 to be collaboration rather than full co-production.

An alternative term taken from the co-production literature around service development would be 'co-design'. Think Local Act Personal – a national partnership of more than 50 organisations committed to transforming health and care through personalisation and community-based support – define co-design as 'People who use services are involved in designing services, based on their experiences and ideas. They have genuine influence but have not been involved in 'seeing it through''.(156) Similar definitions are given elsewhere.(157,158) I have therefore described the work in Chapter 6 as co-design as this best represents both the PPI and the professional stakeholder involvement undertaken.

### 2.5.3 Professional stakeholder involvement in this PhD

Engaging professional stakeholders in intervention research is recognised to be challenging often due to their other priorities or competing interests.(159) My background as a specialty registrar in gastroenterology and hepatology has facilitated access to potential stakeholders in the hepatology specialty. This was further aided by one of my supervisors Dr Ryan Buchanan (RB) being a hepatology consultant. This combination enabled me to engage a key stakeholder – the hepatology consultant lead for the Southampton primary care liver pathway (SLP) at University Hospital Southampton (UHS). I have been able to discuss the SLP with the consultant to understand the context and process of its implementation and establish what data was held with regards the pathway. This facilitated the work conducted in Chapter 3. The consultant also served as a gatekeeper for recruiting healthcare professionals for the work in Chapter 5 and was a planned member of the stakeholder workshops in Chapter 6.

With the research concerning community pharmacy I was conscious of the need to engage with stakeholders in this area. This was achieved through an early introduction by one of my supervisors (RB) to the chief officer of Community Pharmacy South Central (CPSC). CPSC is the Local Pharmaceutical Committee (LPC) for Hampshire and the Isle of Wight. LPCs are the local organisation for community pharmacies, representing community pharmacy owners in a defined locality. The LPC works with healthcare stakeholders and commissioners to enable satisfactory provision of services in community pharmacy. Commissioners include NHS England, integrated care boards, local authorities and other healthcare professionals.

I was able to discuss my research idea with the chief officer who was supportive of it from the start. I have been able to benefit from the chief officer's knowledge and expertise in the development of my research. This included co-authoring a narrative review of alcohol services in community pharmacy and a potential role in alcohol-related liver disease (see Appendix O).(138) I have been able to meet quarterly during my research with the chief officer as my research has progressed to discuss potential hurdles or ideas. As described further in Chapter 5 and Chapter 6, the chief officer has also been instrumental in meeting and engaging other pharmacy stakeholders and facilitating recruitment for my research.

The inclusion of professional stakeholders as research participants in my interview study (see Chapter 5) serves to provide understanding of the context in which my intervention will sit and an understanding of problems – both existing and anticipated – in relation to this context. In Chapter 6, professional stakeholders' involvement (alongside PPI) was in the co-design of the intervention. Through drawing upon their experience and expertise their involvement was used to agree feasible solutions in the design of the intervention that address problems and challenges identified.

## 2.6 Complex Intervention Development

The work contained within my PhD is part of a process of complex intervention development. Within health care, a complex intervention has been defined as an intervention involving multiple interacting components.(160,161) This description has evolved, acknowledging that complexity can come from characteristics of the intervention itself, the context in which the intervention is being delivered, and interaction between these.(149)

What is entailed within the process of 'development' does have some variation in the literature. The variation is around testing as some recognise a process of feasibility testing and piloting to be part of (or at least overlap with) the development process(162) and others see planning for this testing, and not the testing itself, to fall within the development process.(149) Development has also been used to describe an ongoing process that continues into the real world evaluation

and implementation of a complex intervention.(163) For my PhD I use 'development' to describe a process from idea of an intervention through to its design and creation to a point where it can be expected to work and be tested.(161,162,164)

There have been many different published methods to develop complex interventions in healthcare. This is exemplified by a 2019 systematic methods overview in which the authors used a broad search strategy to identify different approaches to complex intervention development and create a taxonomy of these approaches. They applied data saturation to their inclusion of approaches such that an approach would not be included if it involved the same actions as another i.e. not all approaches identified through their searches were included in their results. Even with this restriction, the authors identified 25 different approaches and from these created a taxonomy of eight categories of approaches to intervention development as shown in Table 2.4.(164)

Table 2.4 Categories of intervention development approaches and their definitions

| **Category of intervention development approach**(164) | **Definition**(164) |
|---|---|
| Partnership | The people whom the intervention aims to help are involved in decision-making about the intervention throughout the development process, having at least equal decision-making powers with members of the research team |
| Target population centred | Interventions are based on the views and actions of the people who will use the intervention |
| Theory and evidence-based Interventions | Interventions are based on combining published research evidence and published theories (e.g. psychological or organisational theories) or theories specific to the intervention |
| Implementation-based | Interventions are developed with attention to ensuring the intervention will be used in the real world if effective |
| Efficiency based | Components of an intervention are tested using experimental designs to determine active components and make interventions more efficient |
| Stepped or phased based | Interventions are developed through emphasis on a systematic overview of processes involved in intervention development |
| Intervention- specific | An intervention development approach is constructed for a specific type of intervention |
| Combination | Existing approaches to intervention development are combined |

This systematic methods overview was part of the 'identifying and assessing different approaches to developing complex interventions' (INDEX) study funded by the Medical Research Council (MRC) in the UK. In 2000 the Medical Research Council (MRC) published landmark guidance that provided a framework for the development and evaluation of complex

interventions.(165) Since this first publication the guidance has been updated first in 2006(166) and most recently in 2021.(159)

### 2.6.1 Medical Research Council framework for developing and evaluating complex interventions

The MRC framework is widely used in complex intervention research and the most cited of all complex intervention guidance.(167) This is demonstrated by a 2016 scoping review examined studies published between 2000 and 2015 that reported optimising complex health interventions prior to their evaluation. The review looked at the strategies used within the studies, finding that 17 of 27 studies identified used the original or updated MRC framework.(168)

Throughout its revisions the MRC framework has described four key phases of complex intervention research. The framework emphasises the non-linear, iterative nature of the process and that phases may need to be repeated or revisited if uncertainties exist or develop.(149) Although there has been some alteration in the nomenclature with each revision, the main focus of each phase has not changed.(149,160,161)

In the most recent revision, the four phases are: 1) development (or identification), 2) feasibility, 3) evaluation, and 4) implementation.(149) A brief description and aims of each phase adapted from my reading of the literature are provided in Table 2.5. One of the reasons for revising the MRC framework to its current version was to update and provide more detail on the development phase.(159) Authors of the aforementioned INDEX study highlighted an evidence gap with regards guidance for intervention development(164) and the MRC framework highlights the paper produced by the INDEX study as the comprehensive guide to the development phase.(169)

Table 2.5: Description and purpose of the four phases of complex intervention research described in the Medical Research Council framework (149)

| MRC phase of complex intervention research | Description | Purpose |
|---|---|---|
| *Development or identification* | The process of designing and planning the intervention through to the next phases. It may be a new intervention or the identification (or adaption) of an existing intervention(s) into a new population, setting or context.(159,170) | To create an intervention that is described (including associated training), is anticipated to be effective and is ready for formal feasibility testing(161,162,169) |
| *Feasibility* | This is the undertaking of a feasibility study. This should examine the feasibility and acceptability of both the intervention itself and of the evaluation design.(159) | Explore uncertainties identified in the development phase to assess (using progression criteria) whether to move to evaluation or undertake further development or feasibility work to address issues identified (or possibly terminate the research)(149,162) |
| *Evaluation* | This is the assessment of the effects of the intervention. Emphasis is placed on evaluation generating useful information to guide future decision-making about the intervention and not solely focusing on the effectiveness of the intervention. (149) Outcomes for evaluation should be developed with stakeholders and identification of outcomes should be part of the process of developing a programme theory for the complex intervention.(159) | Evaluate the intervention against pre-defined outcome measures, examine other impacts of the intervention and gain understanding of how the intervention works in context. (159) |
| *Implementation* | In simple terms implementation in health care refers to the action of putting research findings into practice.(171) The definition used in implementation science (the study of implementation) describes implementation as 'methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services and care'.(172) Implementation should be considered in all phases to increase the chance of the developed intervention being successfully implemented in real-world settings. It may be that the implementation phase is combined with the evaluation phase. (159) | The implementation phase aims to maximise the impact of an intervention and avoid a proven-effective intervention not being taken up into practice.(173) |

The INDEX guidance describes the principles of intervention development as dynamic, iterative, creative, open to change and forward looking to future evaluation and implementation. The guidance advises 11 key actions that should be considered in intervention development, recognising that not all actions may be possible or necessary.(169) The MRC framework highlights these and two other key actions – consider future evaluation design and consider the wider system – as well as describing six core elements that should be considered in every phase of complex intervention research.(159) Figure 2.1 shows my mapping of the key actions to the core elements in the MRC framework. The key actions and core elements are anticipated to be non-linear and revisited throughout the development process, recognising that learning in one may inform or influence others.(169)

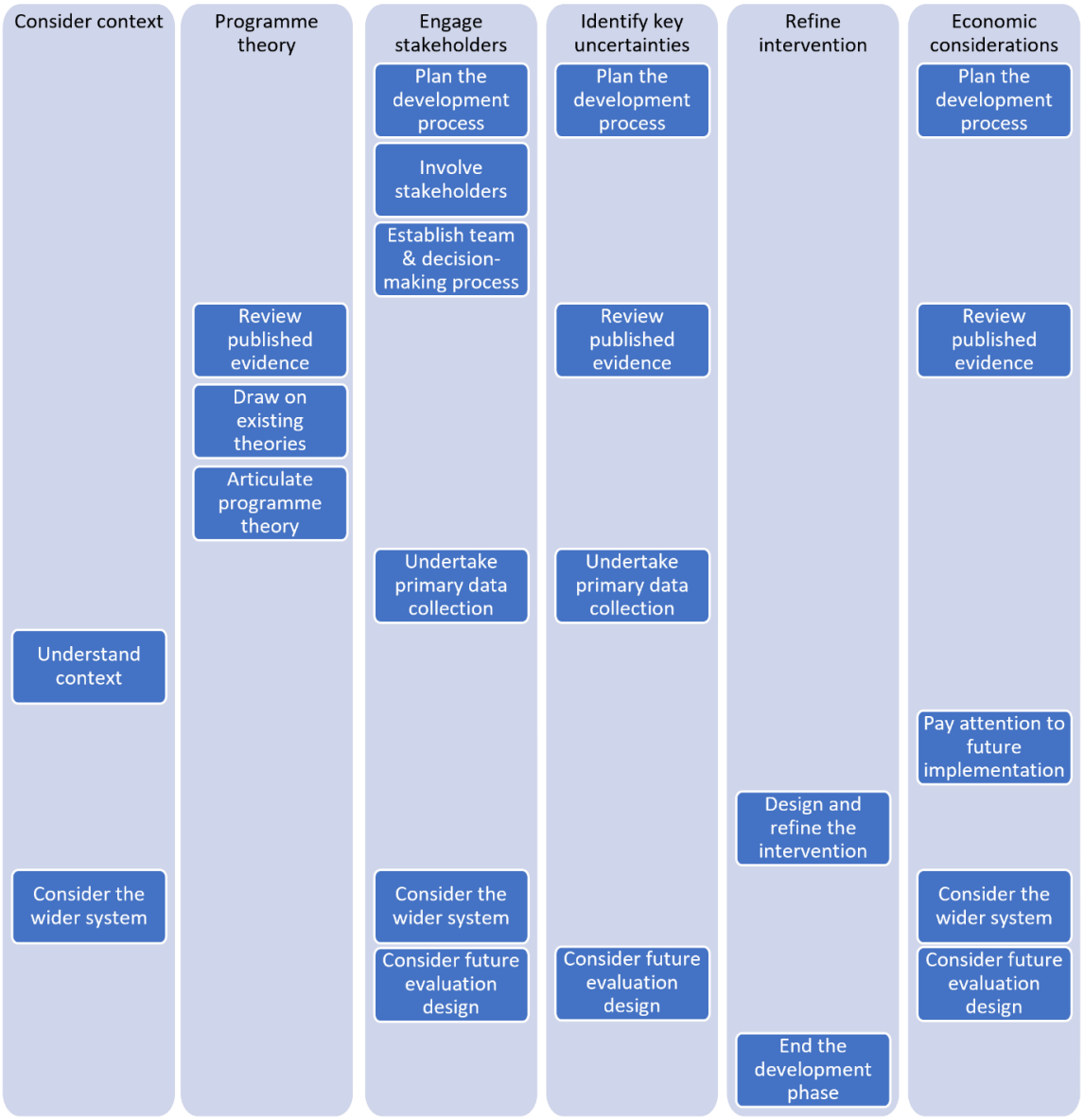



Figure 2.1 Diagram showing the key actions advised by the INDEX study (dark blue boxes with white text) mapped to the six core elements of the MRC framework (black text in light blue columns)

### 2.6.2 Application of MRC Framework to my PhD

The widespread use of the MRC framework provides a large body of published evidence to support my work and the recently published update ensures my work is reflective of current methodological practice. The work in my PhD focuses on the development phase of the MRC framework with a view to progressing to a feasibility and formal evaluation phases in future work. Table 2.6 demonstrates how each chapter of this PhD maps to the core elements of the MRC framework and the INDEX key actions.

Table 2.6: Work contained within this PhD mapped against MRC framework core elements and INDEX key actions of complex intervention development

| PhD Chapter | MRC core element(s) addressed | INDEX action(s) incorporated |
|---|---|---|
| 1: Background | - Consider context<br>- Identify uncertainties | - Review published research evidence<br>- Understand context<br>- Consider the wider system |
| 2: Research Design and Methodology | - Engage stakeholders | - Plan the development process<br>- Involve stakeholders<br>- Draw on existing theories |
| 3: Evaluation of the Southampton primary care liver pathway using interrupted time series analysis | - Consider Context<br>- Engage stakeholders | - Understand context<br>- Consider the wider system<br>- Consider future evaluation design |
| 4: Barriers and facilitators experienced in delivering alcohol screening and brief interventions in community pharmacy: a qualitative evidence synthesis | - Consider Context<br>- Identify uncertainties | - Review published research evidence<br>- Understand context<br>- Draw on existing theories |
| 5: Exploring a role for community pharmacists in the identification of alcohol-related liver disease through qualitative interviews with stakeholders | - Consider Context<br>- Identify uncertainties<br>- Engage stakeholders | - Undertake primary data collection<br>- Understand context<br>- Involve stakeholders<br>- Draw on existing theories |
| 6: Designing a complex intervention to enable ArLD identification by community pharmacists using a theory-based and co-design approach | - Identify uncertainties<br>- Engage stakeholders<br>- Development and iteration of programme theory<br>- Economic considerations<br>- Refine intervention | - Involve stakeholders<br>- Draw on existing theories<br>- Articulate programme theory<br>- Design and refine the intervention<br>- Pay attention to future implementation of the intervention in the real world<br>- Consider future evaluation design |

A visual representation of the complex intervention development process achieved through each chapter of work undertaken in this PhD is shown in Figure 2.2 with indication of how earlier chapters informed subsequent chapters.

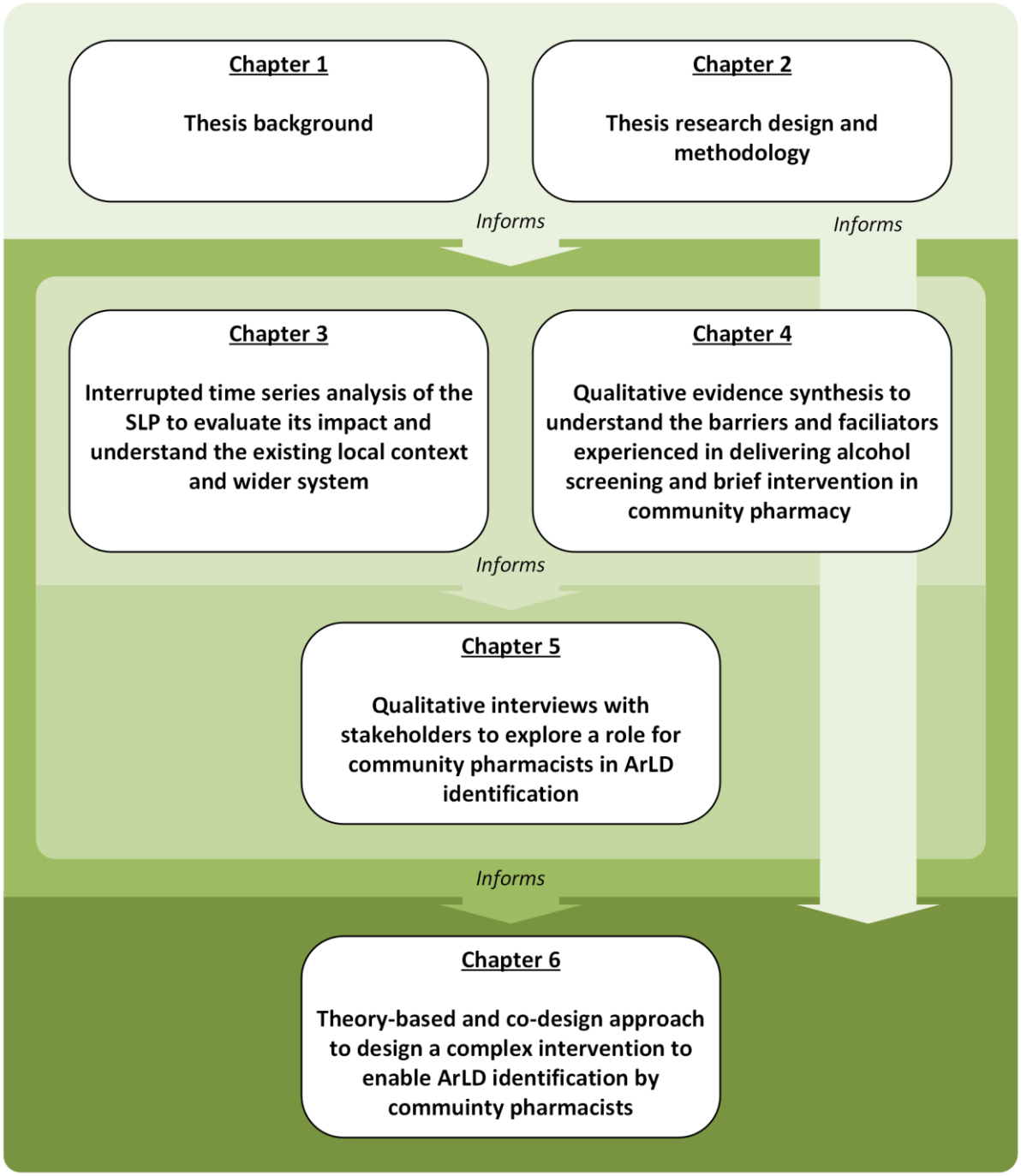



Figure 2.2 Diagram providing an overview of each chapter of work in this PhD and indicating how the chapters informed the process of complex intervention development being undertaken. ArLD, alcohol-related liver disease; SLP, Southampton primary care liver pathway

The following four chapters (chapters 3 to 6) report the methods and findings of the work packages undertaken. The overall findings of the work in this PhD as a whole are then discussed in Chapter 7.

# Chapter 3 Evaluation of the Southampton primary care liver pathway using interrupted time series analysis

## 3.1 Introduction to chapter

This chapter describes the first work package of my PhD, an interrupted time series study of the Southampton primary care liver pathway (SLP). In this chapter I look at how referrals for alcohol-related liver disease (ArLD) are created within the SLP, who the key players are in this process and what impact the SLP had on referrals to University Hospital Southampton (UHS) hepatology outpatients. This work corresponds to the complex intervention development key actions of 'understanding context' as well as 'considering the wider system' and 'consider future evaluation design' as discussed in section 2.6.1. I have been able to present results of this work nationally as an oral presentation at the British Association for the Study of the Liver annual conference.(174) The conference abstract is included in Appendix O. At time of thesis submission the work is under review for publication in the Journal of Hepatology (JHEP) Reports.

### 3.1.1 Background and rationale

Community liver pathways are well supported by international consensus as demonstrated by the most recent publication by the EASL-Lancet liver commission, an international multidisciplinary commission aiming to improve liver health in Europe.(82) The commission highlights the utility of pathways in earlier detection (and intervention) of liver disease and reduction in unnecessary referrals to secondary care. The commission also calls for more evidence of benefit of such pathways to ensure they are commissioned long term.(82)

As described in section 1.4.5 there are relatively few published evaluations of community liver pathways. A 2022 systematic review identified only 12 publication-evidenced pathways for the identification and risk stratification of liver disease, of which 10 were in the UK.(99) Only three of these pathways examined their effectiveness against a control group, two using cluster randomised control trials (RCTs) (101,102) and one using a non-randomised natural experiment methodology.(175) All three studies found an increase in diagnoses of liver disease relative to the control population. Notably, two of the studies also examined referrals to secondary care, both noting an increase in referrals associated with the pathway.(102,175)

The importance of this potential increase in secondary care workload is also relevant in relation to the liver fibrosis testing that generally form part of such community pathways. Non-invasive liver fibrosis tests are known to have excellent negative predictive values but poor positive predictive values – especially when conducted in populations with a low prevalence of liver disease.(176) There is therefore a risk that hospital-based services could get overwhelmed by a large number of referrals with false positive results. Some reassurance against this is the finding of one published evaluation of a non-alcoholic fatty liver disease community liver pathway. In their study, Srivastava et al. found that referrals made through the community pathway were significantly less likely to be unnecessary, where 'unnecessary' was defined as a referral of a patient who does not have advanced liver fibrosis.(175)

Community liver pathways represent complex interventions and – given the relatively limited evidence of effectiveness – their increasing implementation is driven by observational evidence and policy action. As described within the MRC complex intervention guidance(159), natural experiment studies (NES) can be utilised to evaluate complex interventions that have not been developed and proven effective through a process of experimental testing i.e. in a RCT. NES (described further below in section 3.2.1.1) provide an option for evaluation when RCTs are not an option, as is the case where interventions have already been implemented. The Southampton primary care liver pathway is the local community pathway in Southampton, forming a key part of the context in which my complex intervention development work is taking place.

Given the concern in the evidence base around the potential for community pathways to increase referrals to secondary care, I aimed to evaluate the impact of the Southampton primary care liver pathway (SLP) on referrals to secondary care by using natural experiment methodology.

By undertaking a natural experiment study of an existing complex intervention I will gain understanding in potential evaluation methods for future evaluation – a key action in complex intervention development guidance as discussed in section 2.6.1. Additionally, the process of undertaking this natural experiment study will provide invaluable insight into the context into which I anticipate my complex intervention to fit, namely community liver pathways.

#### 3.1.1.1 Overview of the Southampton primary care liver pathway

I was able to gain understanding of the Southampton primary care liver pathway (SLP) through meetings with the pathway's hepatology consultant lead. The SLP was implemented in January 2018 having been created as a collaboration between this UHS hepatology consultant and a local GP. The pathway was created with the aims of enabling: (1) clinicians to make a diagnosis

and identify the aetiology for liver disease, and (2) primary care assessment for advanced liver disease to allow appropriate referral to University Hospital Southampton (UHS) hepatology. The SLP was made available to GPs in Southampton city clinical commissioning group (SCCG) and accessed via an electronic platform. For clarity, clinical commissioning groups (CCGs) were groups of general practices in England with responsibility for commissioning most health and care services for patients in their local communities. They were dissolved on 1st July 2022 and replaced by integrated care boards (ICB).

The SLP provided a decision tree and guidance document to SCCG GPs on investigation of liver disease in three circumstances: asymptomatic abnormal liver function tests, fatty liver on ultrasound and harmful alcohol use (defined as >30units of alcohol per week or an AUDIT score greater than 10).

The pathway advises GPs to undertake a non-invasive liver screen (NILS) and check for red flags (see Appendix A), with any positives to be referred directly to hepatology. If red flags are excluded and the NILS is negative then GPs are advised to perform two stage fibrosis testing in primary care if metabolic and/or alcohol risk factors are present. Fibrosis testing involves an initial enhanced liver fibrosis (ELF) test and where this is above 9 to refer for a Fibroscan®. These tests are described earlier in section 1.3.5. For the first 9 months of the SLP the Fibroscan® was performed at UHS but from October 2018 the Fibroscan® was performed by a hepatology nurse in a community Fibroscan® clinic that was delivered in two GP surgeries in SCCG. Patients with a Fibroscan® result greater than 10kPA (or where a scan was not possible) are referred to hepatology outpatients. Those with fibrosis markers below these thresholds were advised to remain in primary care. Figure 3.1 shows a schematic diagram of the pathway process.

From the date of pathway implementation (January 2018) any referrals to hepatology that had not followed the pathway when it was appropriate to do so were asked to follow it and re-refer if necessary. GPs in SCCG were also sent reminder emails of the pathway's existence every 2-3 months. There were also meetings with SCCG GP surgeries and the hepatology pathway consultant lead every 3-4 months.

Prior to the SLP implementation there was no local pathway available for GPs in SCCG to guide investigation and referral of liver disease. GPs had access to the ELF test since November 2016 but there was no local guidance on its use. GPs in SCCG therefore only had nationally available guidance (as described in section 1.4.5) to direct their practice. This was the same for GPs in the geographically adjacent West Hampshire CCG (WHCCG). SCCG and WHCCG cover different populations, but liver services prior to the SLP were relatively similar with both referring to UHS as well as both being part of the Wessex Hepatology operational delivery network which means national initiatives such as the Hepatitis C elimination programme are disseminated in both

areas and GPs are part of the same regional alliances. Around 90% of all GP referrals to UHS hepatology are from either SCCG or WHCCG, with each making up around 60% and 40% of referrals respectively. SLP was only available to GPs in SCCG and so WHCCG GPs continued to only have national guidance to direct practice following the implementation of SLP.

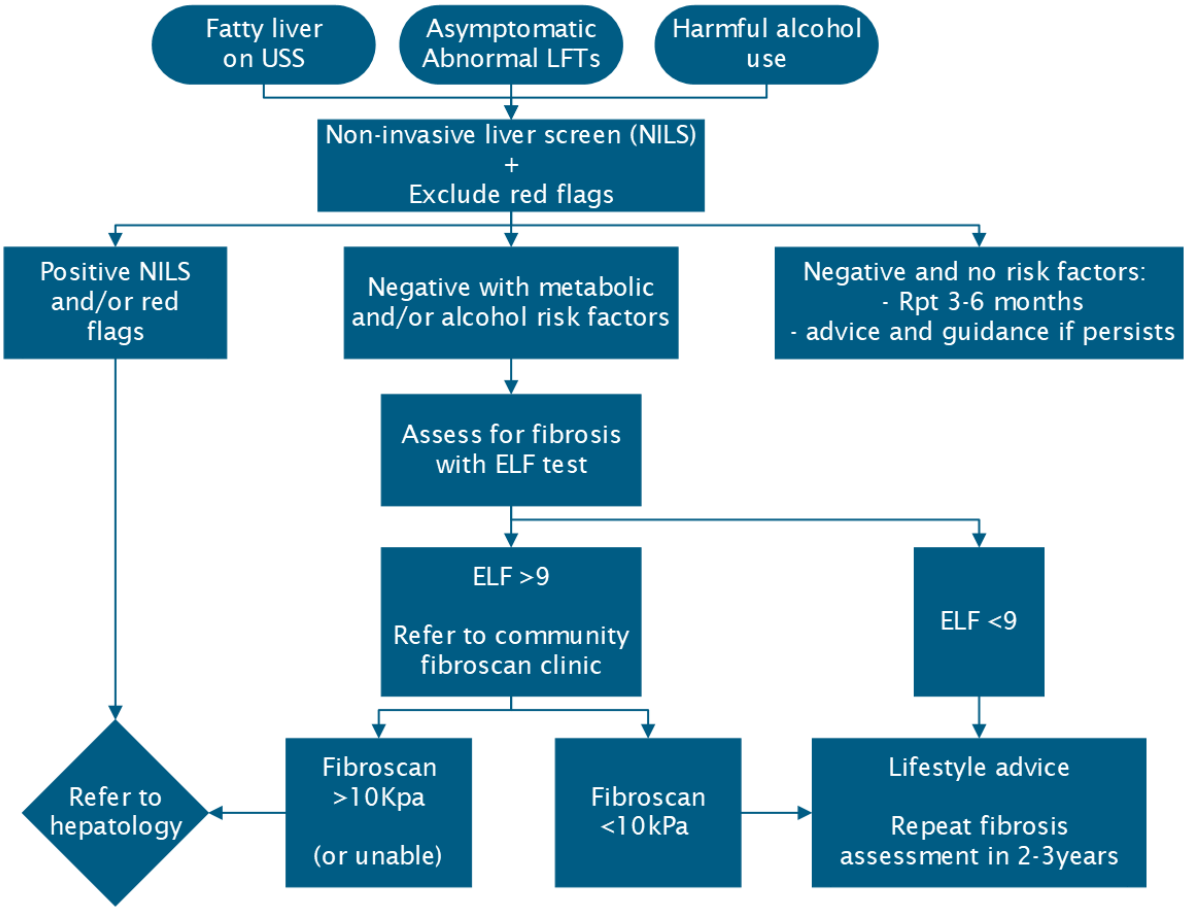



Figure 3.1 Schematic diagram of the Southampton primary care liver pathway

### 3.1.2 Study aims

The aim of this study is to describe the pathway outcomes for patients assessed for liver fibrosis in the SLP and evaluate the effect of the implementation of a community liver pathway on referrals to University Hospital Southampton (UHS) hepatology outpatients. This addresses objective one of my PhD.

## 3.2 Methods

### 3.2.1 Study design

This study uses natural experiment methodology and a controlled interrupted time series design.

#### 3.2.1.1 Overview of natural experiment studies

The definition of a 'natural experiment' has some variation in the literature but a broad encompassing definition provided by the MRC is: 'events, interventions or policies which are not under the control of researchers, but which are amenable to research which uses the variation in exposure that they generate to analyse their impact'.(177) This variation in exposure results in the generation of exposed and unexposed groups. A 'natural experiment study' (NES) is an approach to evaluating the impact of a natural experiment. The MRC complex intervention guidance advocates for the use of natural experiment studies in the evaluation of complex interventions.(159)

The rationale for use of NES reflects the recognised challenges in evaluation of complex interventions. Randomised control trials (RCTs) are generally viewed as the gold standard for the evaluation of interventions but this experimental method may difficult or impossible. Reasons for this may include: problems relating to cost, the timescale required to conduct an RCT, an inability to manipulate the intervention experimentally, the intervention has already been implemented, ethical issues around exposure e.g. if the intervention has known benefits other than that being studied and therefore it would be unethical to create an unexposed group.(178,179) When considering 'events' such as natural disasters or – more topically – pandemics, an inability to use experimental methods is obvious. Natural experiment studies offer a solution to these challenges.(179)

When considering terminology, it is worth also noting the term 'quasi-experiment' study. This term is often used synonymously with NES but there are variations of this in the literature. NES has been used to specifically describe studies where the exposure is a naturally occurring event (and not an intervention). Quasi-experiment has also been used to describe an experiment that lacks random assignment to an exposure but researchers may have some control of the intervention e.g. when it is delivered.(180) NES has also been used as a category of quasi-experiment study to specifically describe circumstances when the assignment to exposure is 'as if randomised'.(181) A cited example of this definition is a study examining the impact of a conditional cash transfer for poor families program in Brazil.(182) A computer error meant that

people due to benefit from the program whose names contained nonstandard characters (e.g. ç) did not receive it. This created exposed and unexposed groups that would not be expected to have any different characteristics, akin to a randomisation process. The criticism of using this definition for NES is that such occurrences are very rare as such creates an overly narrow definition.(183) For the purpose of my PhD I use NES in the way described by the MRC as above.

#### 3.2.1.2 Overview of interrupted time series methods

Interrupted time series (ITS) methods are considered to be the mostly widely used for natural experiment studies and one of the strongest designs.(183,184) Their use in health research has dramatically increased over that last 20 years, as demonstrated in a methodological systematic review that found just over 500 ITS studies published in the year 2000 compared to almost 3000 studies published in 2019.(185) An overview of interrupted time series methods follows, the learning of which I was able to apply in co-authoring a published review on NES (see Appendix O).(186)

In simple terms a 'time series' is sequence of data points of a specific observation with each being recorded at (usually regular) intervals over time.(187) There are many routinely generated time series data in healthcare and elsewhere such as number of births per week, monthly emergency hospital admissions, or average annual rainfall.

A 'interruption' is a known time specific change point in the time series. This could be an intervention, a policy change or a real-world event.(188) A single interruption defines two segments of time series data i.e. before and after the interruption. The interruption does not have to have occurred overnight but the period over which it occurred must be defined e.g. a 2 month implementation period of an intervention.(189)

In conducting analysis of any time series, two important factors specific to time series data should be considered, namely seasonality and autocorrelation. Seasonality, if present, describes cyclical patterns in the observations over time. These patterns may occur over any time period i.e. days, weeks, months but the unit of time each observation represents in the time series will dictate what seasonality can be observed i.e. one cannot see weekly patterns in monthly observations. An excellent example of this in the literature is seen in the ITS study by Robinson et al. examining the impact of the Scottish minimum unit pricing (MUP) on off-trade alcohol sales in Scotland.(190) The time series of their examined observation (weekly off-trade alcohol sales) demonstrates dramatic seasonality from the effect of the Christmas period as shown in Figure 3.2.

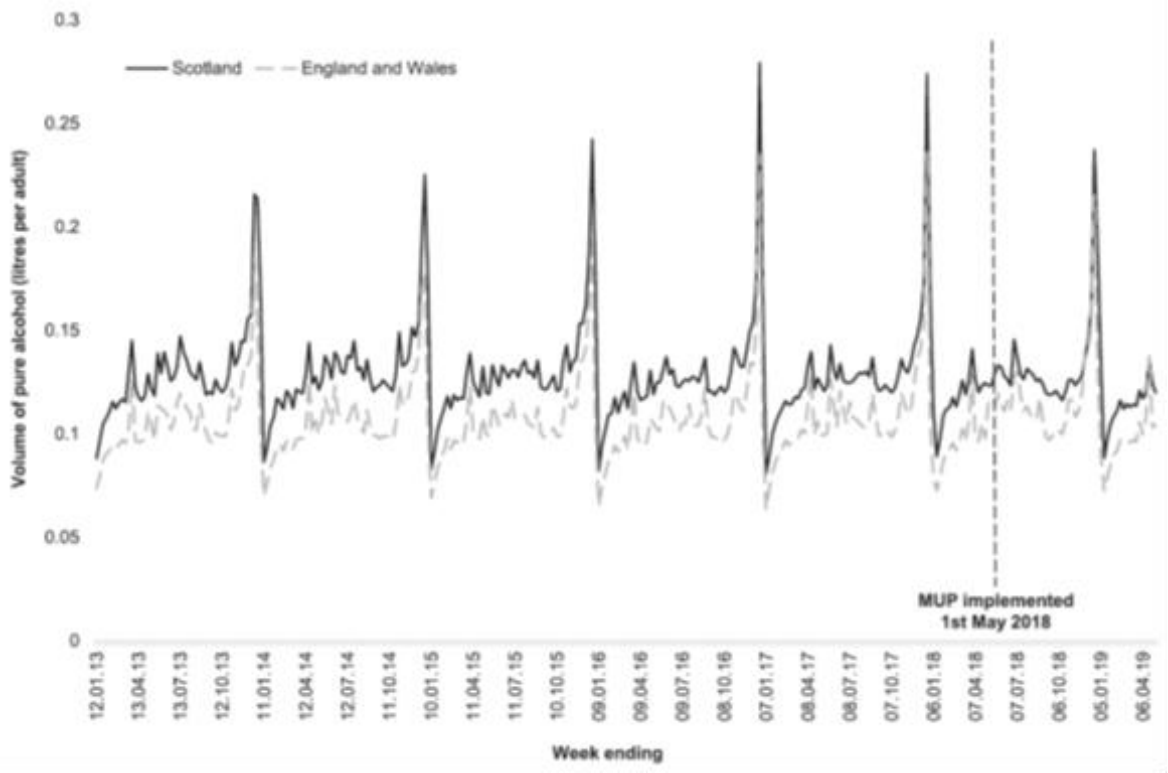



Figure 3.2 Line graph of time series of off-trade alcohol sales in Scotland, England and Wales taken from Robinson et al.(190)

As such in any ITS analysis it is important that any such seasonality is taken into account. However, in order to identify seasonality, the time series needs to include at a minimum 2 complete 'seasonal' cycles, according to what time-unit of cyclical pattern is being considered i.e. 2 weeks for a daily cyclical pattern or 2 years for a monthly or quarterly seasonal pattern.(188,191)

Autocorrelation (in the context of a time series) is a statistical term describing the presence of a statistical association between observations in the time series with earlier observations in the same time series. Autocorrelation is often encountered with observations that are temporally close together. An example of this is daily temperatures, where the temperature today is often similar to the temperature tomorrow. Seasonality represents a form of autocorrelation. As can be seen in Figure 3.2 there would be an association of a Christmas period data point with another Christmas period data point.

This is problematic in the analysis of times series using regression techniques as most standard regression models assume that observations are independent i.e. an absence of autocorrelation. In time series analysis autocorrelation should be examined for and corrected if identified. This is done using auto-correlation function (ACF) and partial-autocorrelation function (pACF) plots and/or the Durbin-Watson test.(192)

#### 3.2.1.2.1 Overview of interrupted time series analysis

The key concept and strength of ITS analysis is the assessment and incorporation of the underlying trend in the outcome prior to the interruption.(188) The analysis involves estimating this underlying trend and assumes a hypothetical scenario where, in the absence the interruption, this trend would have continued. This is called the 'counterfactual' and serves as a control.(189) The counterfactual is compared to what was observed to examine for any impact of the interruption. I find this concept and what it adds over a simple before and after comparison is best described visually, reflecting a further strength of ITS analyses – that it lends itself to visual representation.(188)

Figure 3.3 shows four scatter plots of the same hypothetical time series data. Plot A shows the basic scatter plot. Plot B highlights the values for the pre-interruption period (ringed in blue) and the post-interruption period (ringed in green). The average (mean) of these two sets of values are the same and so if the mean before and after interruption were statistically compared there would be no effect identified. Plot C shows a regression line for the pre-interruption period (solid red line) and the continuation of this in the post-interruption period – the counterfactual (dotted red line). Visually it is clear that the observed values in the post-interruption period appear different from the counterfactual. Plot D shows a segmented regression analysis with two separate regression lines for the pre-interrupted and post-interrupted period (solid red lines) along with the counterfactual line (dotted red line). The estimated effect of the intervention is the change in the trend compared to the counterfactual as shown by the black arrow.

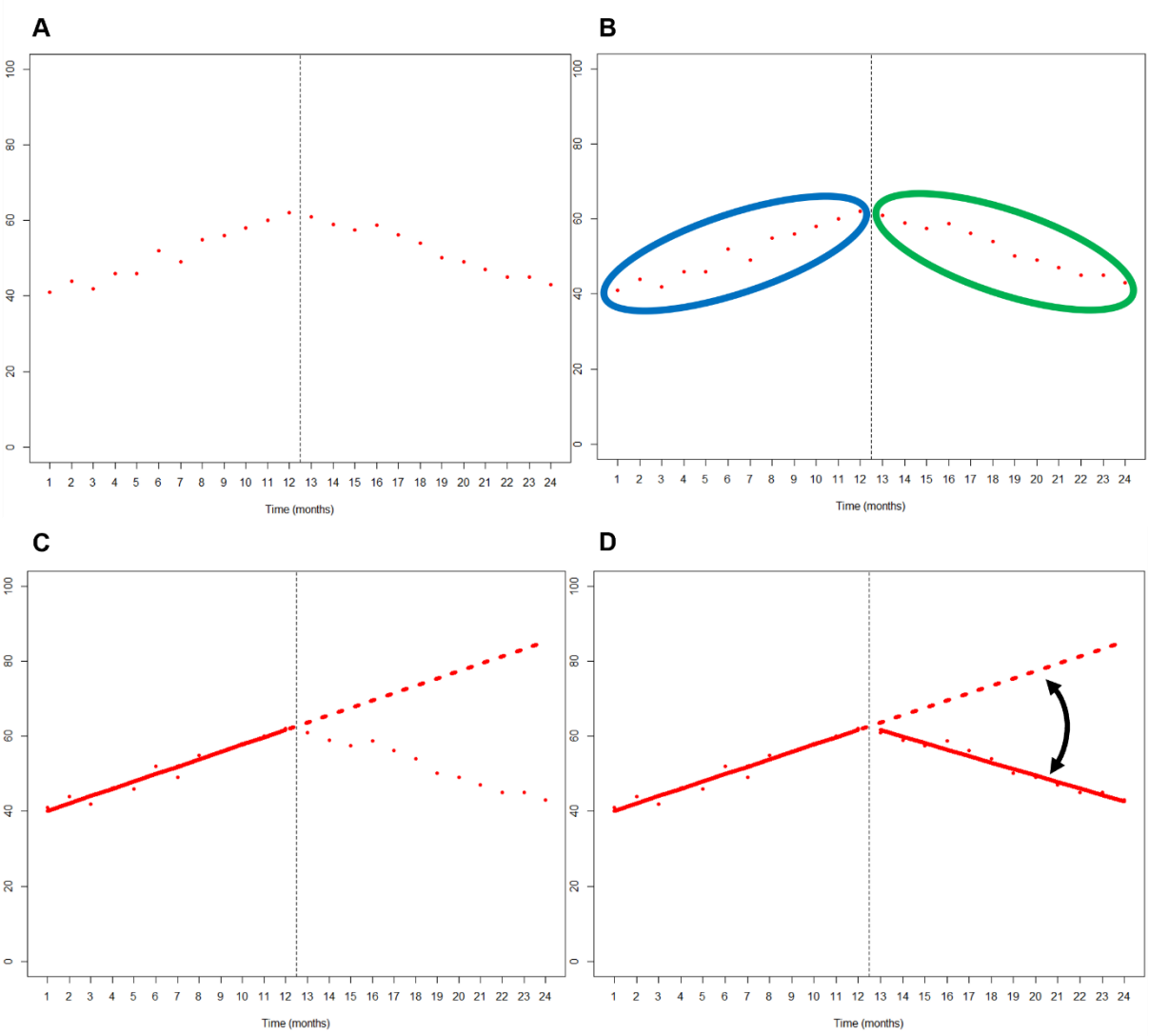



Figure 3.3 Visualisation of interrupted time series analysis concepts. Red dots show data points. Blue circle shows pre-interruption points and green circle shows post-interruption points. Black vertical dotted line indicates interruption. Solid red line indicates segmented regression lines. Red dotted line shows counterfactual expected trend estimated from the pre-interruption regression line. Black arrow indicates difference in expected trend compared to observed.

In the analysis of interrupted time series two statistical methods dominate: segmented regression and autoregressive integrated moving average (ARIMA) model. Of these, segmented regression is by far the most common method in health care research. This was shown in a review of healthcare studies using an ITS design in which authors found 78% of the studies used segmented regression. ARIMA model was the second most common method (13% of studies) meaning that over 90% of all the ITS studies identified in the review used either segmented regression or ARIMA model methods.(193) These two methods are now described in brief.

#### 3.2.1.2.2 Segmented regression

Segmented regression analysis utilises the structure of an interrupted time series. The interruption creates two segments (before and after interruption) and a segmented regression model is one that has different intercept and slope coefficients for the two time segments.(194) This allows for an estimation of the trend of the outcome prior to the interruption and an estimation of the change in level and slope of the trend of the outcome after the interruption (see Figure 3.4).(188)

In segmented regression a linear regression model is fit to the segments i.e. a linear relationship between time and the outcome variable is assumed. The standard segmented regression model used in the analysis of an interrupted time series can be written as the following equation as per Lopez Bernal et al.(189) :

$$Y_t=\beta_0+\beta_1 T+\beta_2 X_t+\beta_3 (T-T_0)\cdot X_t$$

$\beta_0$ is the constant value obtained from the regression model and $\beta_{1,2,3\ etc}$ are the regression coefficients obtained from the regression model for each variable. Table 3.1 defines what each variable indicates.

Table 3.1 Definition of variables used in segmented regression model

| Variable | Definition |
|---|---|
| $Y_t$ | Estimated value of outcome variable at a given time 't' |
| T | The number of units of time (day, week, month etc.) elapsed since the start of the time series |
| $X_t$ | The presence (value 1) or absence (value 0) of the intervention at time 't' |
| $T_0$ | The number of units of time when the interruption occurred. $T-T_0$ is therefore the number of units of time after the interruption |

From this regression model, the coefficients used to examine the impact of the interruption are $\beta_2$ , which indicates the level change immediately associated with the interruption, and $\beta_3$, which indicates the slope change associated with the interruption. $\beta_1$ indicates the existing trend prior to the interruption and $\beta_0$ is the intercept value i.e. the value of the outcome variable at time zero (the start of the time series). This is demonstrated in Figure 3.4.

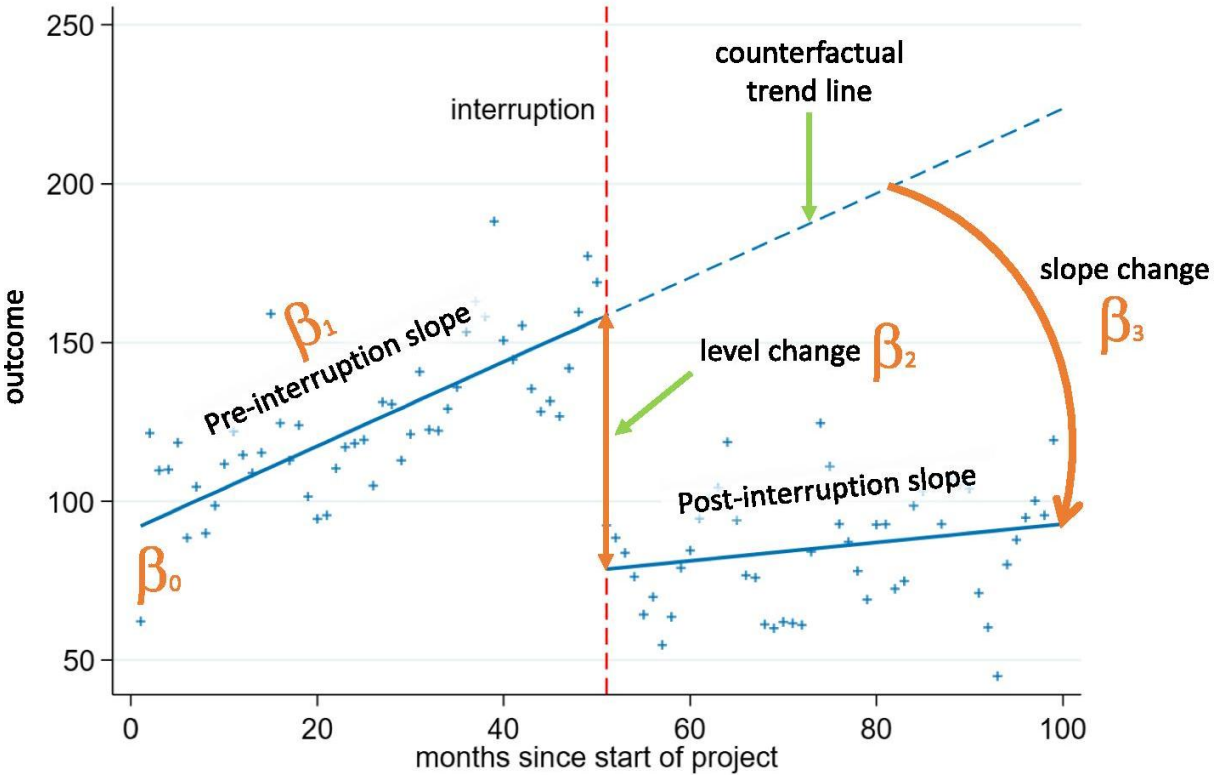



Figure 3.4 Graph from Turner et al. (195) representing segmented regression analysis of an interrupted time series and what each coefficient of segmented regression model represents

#### 3.2.1.2.3 Autoregressive integrated moving average (ARIMA) model

ARIMA models were developed by the two statisticians George Box and Gwilym Jenkins in the 1970s, hence ARIMA models are also known as 'Box and Jenkins' models.(196) They were developed as part of work relating to creating a self-optimising chemical reactor and subsequently were adapted and widely used in time series analysis for forecasting in business and economics. Their use in interrupted time series analysis has only developed in the last decade.(196)

ARIMA models are a more advanced technique in the analysis of time series and, as discussed earlier, less well recognised in clinical research.(192) An ARIMA model transforms time series data to remove any autocorrelation, existing trend(s) and seasonality. An ARIMA model is described by three parameters: 1) auto-regressive parameter referred to as 'p'; 2) differencing parameter referred to as 'd'; 3) moving average parameter referred to as 'q'. There can also be a seasonal component for each parameter. ARIMA models are consequently written as 'ARIMA (p, d, q)' with each parameter taking a positive whole integer value e.g. ARIMA (1, 1, 0). This description can be extended to ARIMA (p, d, q),$(P, D, Q)_s$ where the latter capitalised parameters describe the seasonal component for one or more parameters. The auto-regressive, moving

average parameters and seasonality component address any autocorrelation and the differencing parameter addresses any non-random trend.(197)

The ARIMA model is developed using the pre-interrupted time series data only. Once the model is identified it is then applied to the whole interrupted time series with an interruption effect added to the model to examine for impact of the interruption. ARIMA modelling is recognised as being quite complex, although statistical software packages have made the process of identifying an ARIMA model more approachable.(197)

#### 3.2.1.2.4 Controlled interrupted time series analysis

A controlled interrupted time series (CITS) analysis can be used to strengthen the findings of an ITS study. By definition a CITS analysis requires a control group that was not exposed to the interruption. Whereas the counterfactual is used as the comparator in an ITS analysis, a CITS analysis uses the observed change in trend (if any) of the control group as the comparator. What constitutes a control group can vary and include: a different group that was not exposed to the interruption; a different outcome in the same group that is not expected to change following the interruption (also called a 'control outcome'); creation of a synthetic control group by combining multiple potential control groups.(198)

In relation to segmented regression and ARIMA model analyses both can be used for a CITS. A key difference between the two analytical methods in relation to CITS is that segmented regression can incorporate the control group into the regression model, although this is not essential.(198) This provides estimates of the magnitude of impact of the interruption over and above and change in the control group.(192) In ARIMA model analysis, ITS analyses are done for the exposed group and control groups separately. Impact is evidenced by a change being observed in the exposed group ITS analysis and not in the control group analysis (or vice-versa).(199) In segmented regression it remains good practice to similarly conduct separate ITS analyses for the exposed and control groups in addition to the CITS using a model incorporating the control group.(198)

A summary comparison of different aspects of the two analysis methods is shown in Table 3.2.

Table 3.2 Comparison of segmented regression and ARIMA model methods of interrupted time series analysis

| | **Analysis method** | |
|---|---|---|
| | **Segmented regression** | **ARIMA model** |
| **Statistical ability required** | Relatively straightforward to perform | Requires more advanced statistical ability |
| **Use of control group(s)** | Can be incorporated into regression model or analysed separately | Can only be analysed separately |
| **Advised number of data points needed** | Absolute minimum of three time points before and after intervention. (200)<br>More commonly advised is 8-12 before and after(188,194,201) | A minimum of 50 time points in the pre-intervention period with over 100 preferred(192) |
| **Autocorrelation and seasonality adjustment** | Can be adjusted for if detected but may make interpretation more difficult(192) | Addressed as part of the model(197) |
| **Intervention effect assessed** | Limited to a step and/or slope change | Can be flexible(192) |

As a PhD student new to ITS analysis I viewed segmented regression more appropriate for my experience, and in keeping with majority practice. I was able to access support from a statistician experienced in time series analysis (Rasiah Thayakaran). Further to this, I was aware my dataset would not include 50 pre-intervention time points and therefore ARIMA model analysis is not considered appropriate.(192)

### 3.2.2 Data sources

To describe the outcomes for patients assessed for liver fibrosis in the SLP I was able to utilise an UHS hepatology department anonymised database of all individuals assessed for liver fibrosis with an ELF test in SCCG following the implementation of the SLP.

To evaluate the impact of the SLP on primary care referrals to UHS hepatology I used a database of aggregated monthly counts of new referrals to UHS hepatology outpatients held by the UHS hepatology department. This database covers the period April 2016 to October 2019 and is organised into originating CCG of referral and whether from primary or secondary care, including referrals made via the community Fibroscan® clinic. This provided a time series of 43 individual months, 21 prior to SLP implementation and 22 post SLP implementation.

For the sensitivity analysis I also utilised publicly available monthly hospital activity data from the Monthly Activity Return (MAR) data produced by NHS England. The data used were the monthly number of referrals from GPs (aggregated by CCG) for a first consultant outpatient

appointment in general and acute (G&A) specialities, which has the descriptor 'GP referrals made in general and acute specialities'.(202) The specialities this includes are shown in Appendix B.

### 3.2.3 Data analysis

All data analysis was conducted using RStudio (v2022.12.0). I generated summary descriptive statistics of characteristics of individuals undergoing an ELF test following implementation of the SLP in SCCG.

To examine the impact of the SLP on primary care referrals to UHS hepatology, I performed a controlled interrupted time series analysis using segmented regression.(189) This assessed the impact of the pathway through estimating the change in level and slope of the existing trend of primary care referrals to UHS hepatology following the SLP introduction. As the outcome variable is count data (number of referrals each month), a Poisson distribution is assumed.(203,204) However, the outcome data showed over-dispersion and so I used a quasi-Poisson segmented regression model that allows the variance to be proportional to the mean.(189) The coefficients of the change in slope and level from the quasi-Poisson regression model can be reported as an incidence rate ratio (IRR) and corresponding percentage to aid interpretation.(205)

As is recognised practice(198) I first performed an ITS for SCCG and WHCCG separately to examine the level change and slope change as compared to the counterfactual trend for each CCG. The regression model for each ITS included an indicator variable for time (the number of months elapsed from the start of the time series), time after SLP (the number of months elapsed from SLP introduction) and a binary indicator variable for the intervention. I then performed a CITS, with this model adding a binary variable for the CCG (i.e. intervention or control group) and indicator variables for the interactions of 1) CCG and time, 2) CCG and intervention and 3) CCG, time and intervention (see Appendix C for data structure). The CITS allows for the slope and level change in SCCG to be examined in relation to that in WHCCG, controlling for any difference in preintervention trends and levels between the groups. I examined the models for autocorrelation using the auto-correlation function (ACF) and partial-autocorrelation function (pACF) that did not suggest autocorrelation was present. The R code and the ACF and pACF plots are provided in Appendix D.

The length of the time series pre-intervention was less than 2 full years, making any assessment of seasonality difficult.(188,191) However, the control group is geographically adjacent to the intervention group. As such one would not expect any difference in seasonal effects between the two CCGs, thus seasonality is controlled for in the analysis. Additionally, the absence of

evidence of autocorrelation would suggest seasonality was not present in the time series data.(188) I did not have an appropriate monthly population to incorporate into the regression models. However, the relatively short period covered by the time series (43 months) means significant changes in population sizes that may affect the outcome would not be anticipated unless a major event was known e.g. natural disaster.

### 3.2.4 Sensitivity analysis

I performed three further analyses to add to the understanding of the impact of the SLP and look for potential confounders. Firstly, I compared average number of ELF tests per month before and after the pathway was implemented to see if testing changed following implementation. This was compared statistically using a Mann-Whitney U test.

Secondly, I used a control outcome, rather than a control group. The control outcome was monthly GP referrals made from SCCG to UHS outpatients for all specialties other than hepatology. This was obtained by subtracting the number of hepatology referrals from the G&A specialty referral counts from the MAR dataset. For the analysis I conducted an ITS of the control outcome for SCCG in keeping with recognised practice.(206) This was done to examine whether any findings of the main ITS could be explained by a change in referrals that was not specific to hepatology.

Thirdly, I re-performed the main ITS and CITS but with referrals to UHS hepatology incorporating the referrals to community Fibroscan® clinic that were not subsequently referred onto UHS i.e. treating them as direct referrals to UHS hepatology (as would have been required in the absence of the Fibroscan® clinic). This was done to try and isolate any effect the community Fibroscan® clinic.

## 3.3 Results

### 3.3.1 Outcomes of liver fibrosis assessment in SCCG following SLP implementation

Over the post SLP implementation time period for which data were available (Jan 2018 – August 2019) there were 1,719 patients undergoing an ELF tests requested by SCCG GPs. 61% (n=1,051) were male, the median age was 51 years (IQR 40-61) and the median ELF result was 9.3 (IQR 8.7 – 9.9). 68% (n=1,164) of patients were in the two most deprived indices of multiple deprivation (IMD) quintiles. A flow chart of the outcomes of liver fibrosis assessment in SCCG following SLP implementation is shown in Figure 3.5.

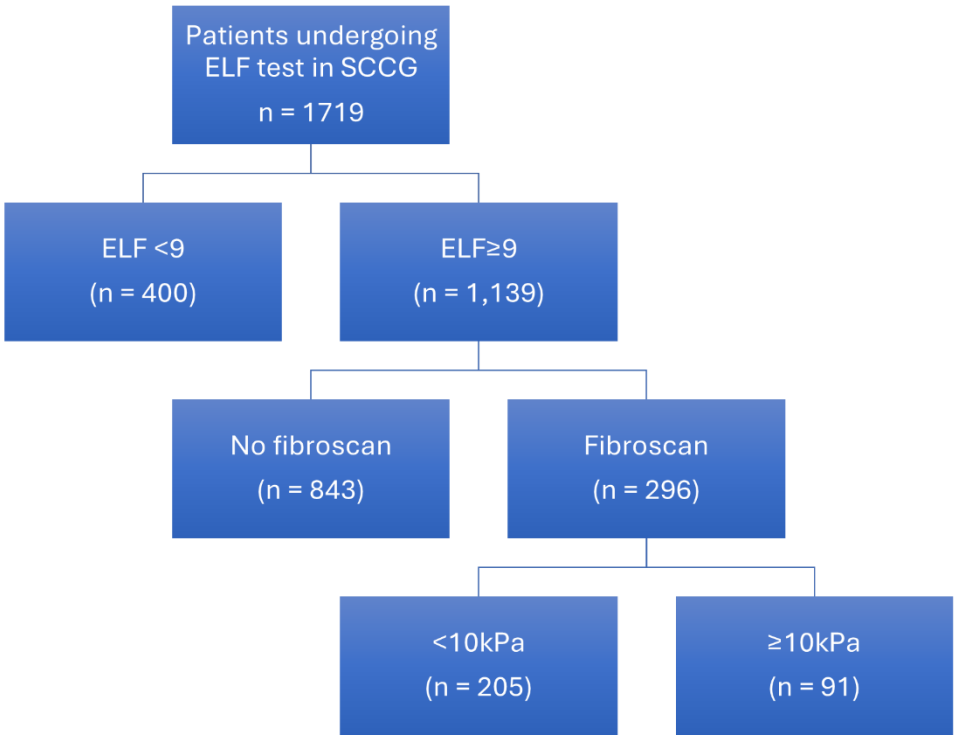



Figure 3.5 Flow diagram of outcomes of patients undergoing fibrosis assessment in the Southampton primary care liver pathway.
SCCG, Southampton city clinical commissioning group; ELF, Enhanced Liver Fibrosis Score; kPa, kilopascals

### 3.3.2 Association between pathway implementation and referrals to secondary care

Between 1st April 2016 and 31st October 2019 a total of 1722 referrals were made from SCCG GPs to UHS hepatology. The median (IQR) referrals per month for the whole period was 39 (35-35). The median was 44(35-46) in the preintervention period and 37(34-41) in the postintervention period. Comparatively in the control area (WHCCG) a total of 1205 referrals were made from WHCCG GPs to UHS hepatology with the median referrals per month for the

whole period being 28 (25-32). The median was 28 (24-33) in preintervention period and 28 (25-31) in the post intervention period.

The ITS analysis of SCCG referrals demonstrated an upward trend over time in the pre SLP period. From the segmented regression model this was estimated as a 2.1% increase in referrals per month (IRR 1.021, 95% CI 1.01-1.03, P=0.001). Following the SLP, SCCG referrals demonstrated a downward trend estimated as a 1.3% decrease in referrals per month. This equates to a 3.3% (CI 1.7%-4.9%) decrease in the trend slope after the SLP. This is visualised in Figure 3.6. Over the post-SLP period this translates as 650 fewer referrals compared to what would be expected based on the underlying trend.

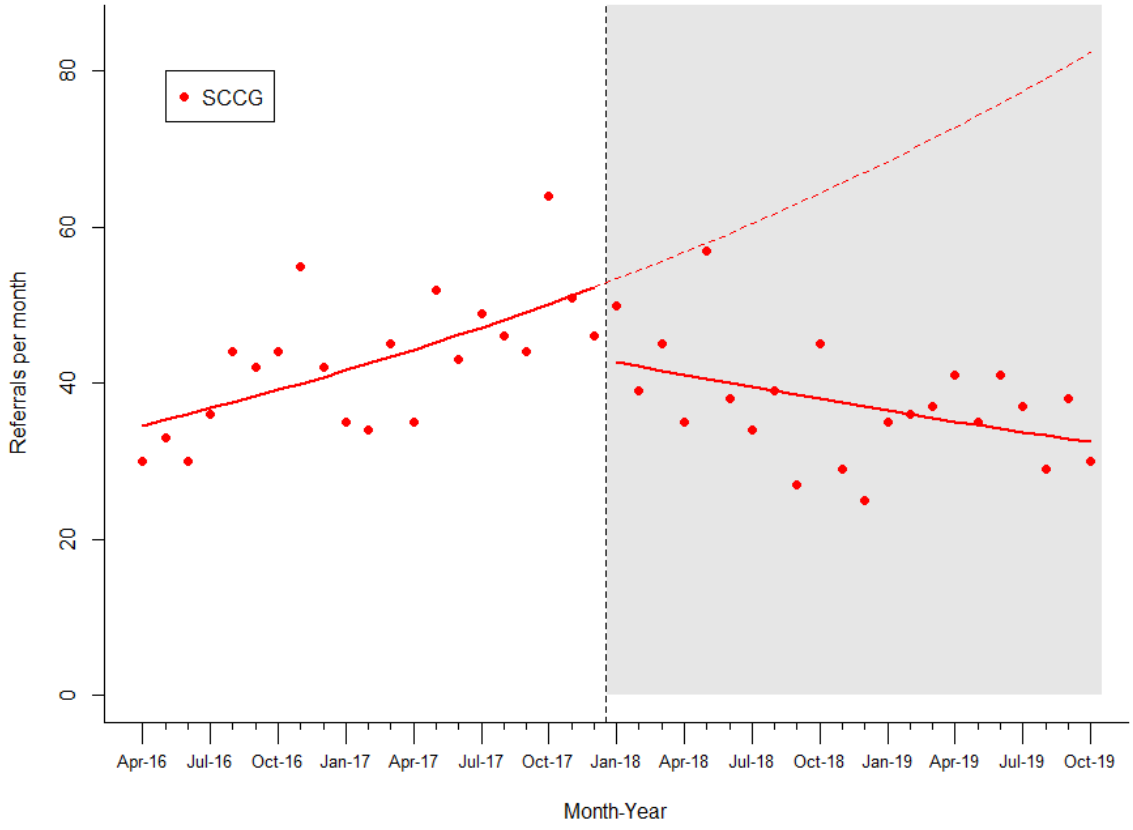



Figure 3.6 Graphical representation of interrupted time series analysis examining impact of the Southampton primary care liver pathway (SLP) on Southampton city CCG monthly GP referrals to University Hospital Southampton hepatology outpatients. Solid red lines indicate modelled trend; dotted red line shows modelled counterfactual trend; vertical dotted line marks the implementation of the SLP; grey shaded area indicates post-SLP period

In WHCCG a flat trend over time was observed in the pre-SLP period, demonstrated by an IRR 1.00 (CI 0.98-1.06) and there was no significant change in this trend following the SLP. A slight

increasing trend is evident on visualisation (Figure 3.7) but this was non-significant (IRR 1.01, 95%CI 0.99-1.03, p=0.293). The separate ITS analyses for SCCG and WHCCG both demonstrated non-significant decreases in level.

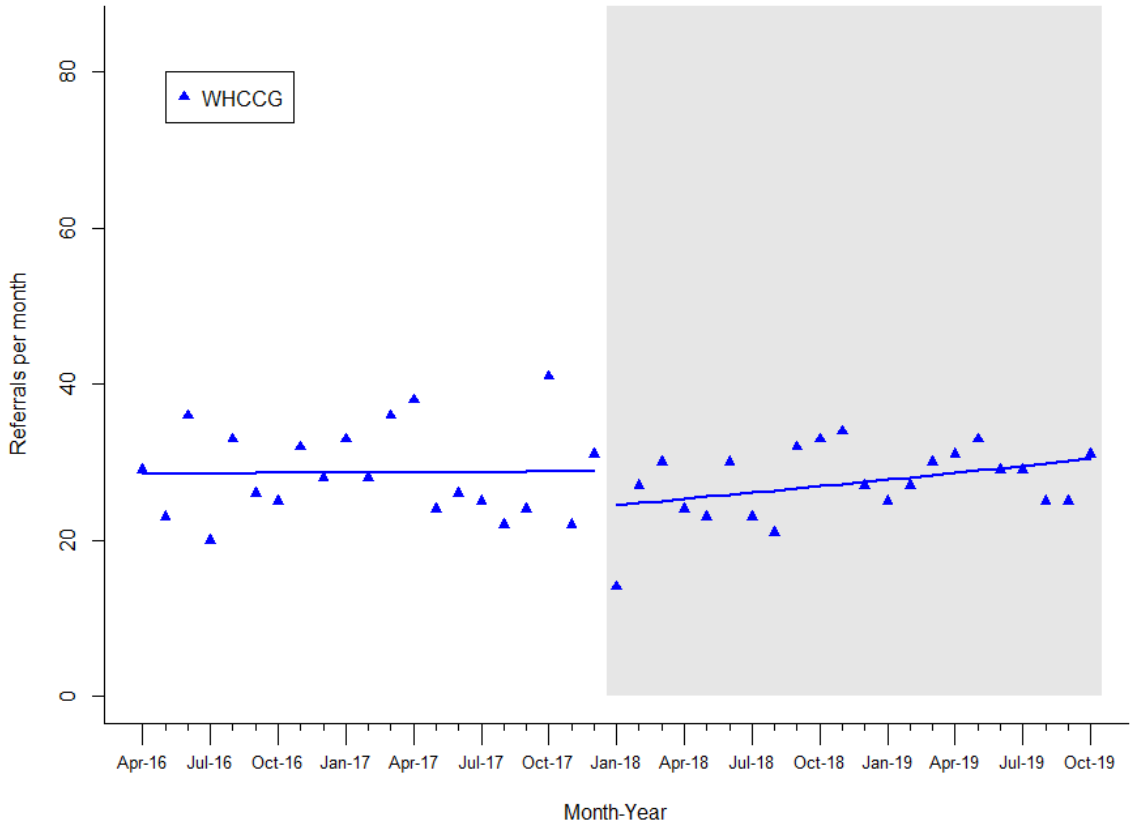



Figure 3.7 Graphical representation of interrupted time series analysis examining impact of the Southampton primary care liver pathway (SLP) on West Hampshire CCG monthly GP referrals to University Hospital Southampton hepatology outpatients. Solid blue lines indicate modelled trend; vertical dotted line marks the implementation of the SLP; grey shaded area indicates post-SLP period

The CITS analyses controls for the slope and level change in WHCCG. The results of the CITS were similar to the ITS for SCCG. Controlling for the slope and level change in WHCCG, there remained a decrease in trend slope of SCCG referrals following the SLP but the size of this change increased to 4.3% (95% CI 1.9%-6.6%) as compared to 3.3% in the ITS analysis. The level change in the CITS analyses remains non-significant, which reflects the finding of the ITS analyses that both SCCG and WHCCG saw non-significant level changes. The CITS also demonstrated a difference in pre-intervention trend between the two areas (IRR 1.02, 95%CI 1.00 to 1.04, p=0.026). The CITS is visualised in Figure 3.8 and the estimated slope and level changes in trend for the ITS and CITS analyses are shown in Table 3.3

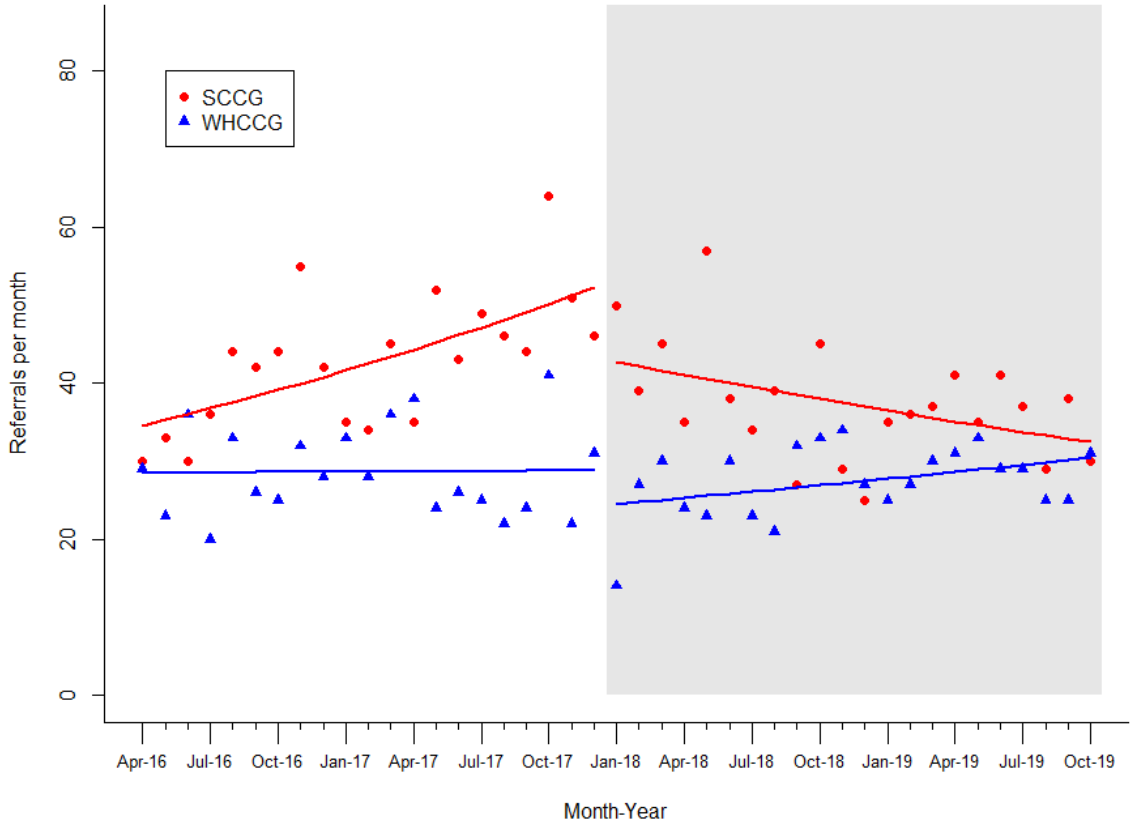



Figure 3.8 Graphical representation of controlled interrupted time series analysis examining impact of Southampton primary care liver pathway (SLP) on Southampton city CCG (SCCG) monthly referrals to University Hospital Southampton hepatology outpatients using West Hampshire CCG (WHCCG) monthly referrals as a control. Solid red lines indicate modelled trend in SCCG; Solid blue lines indicate modelled trend in WHCCG; vertical dotted line marks the implementation of SLP; grey shaded area indicates post-SLP period

The CITS model estimates there would have been 1403 referrals in the post-SLP period if the SLP had not been implemented. As such the SLP was associated with an estimated 581 fewer referrals, having controlled for changes in trend seen in WHCCG.

Table 3.3 Estimated changes in trend in GP referrals to hepatology associated with SLP implementation from segmented regression analyses

| | IRR | 95% CI | p-value |
|---|---|---|---|
| Pre-intervention trend SCCG | 1.02 | 1.01 – 1.03 | **0.001** |
| Pre-intervention trend WHCCG | 1.00 | 0.99 – 1.01 | 0.941 |
| Pre-intervention trend SCCG vs WHCCG | 1.02 | 1.00 – 1.04 | **0.026** |
| Slope change SCCG | 0.97 | 0.95 – 0.98 | **<0.001** |
| Slope change WHCCG | 1.01 | 0.99 – 1.03 | 0.313 |
| Slope change SCCG vs WHCCG | 0.96 | 0.93 – 0.98 | **0.001** |
| Level change SCCG | 0.83 | 0.68 – 1.01 | 0.060 |
| Level change WHCCG | 0.84 | 0.66 – 1.07 | 0.163 |
| Level change SCCG vs WHCCG | 0.98 | 0.72 – 1.33 | 0.902 |
| SCCG, Southampton City Clinical Commissioning Group; WHCCG, West Hampshire Clinical Commissioning Group; IRR, incidence rate ratio; CI, confidence interval | | | |

### 3.3.3 Sensitivity analyses

#### 3.3.3.1 ELF testing before and after SLP implementation

In the 6 months prior to the SLP the average (median) number of ELF tests per month as 74 (IQR 62-70). In the period following SLP implementation the average was 78 (70-81). This increase did not reach statistical significance (p=0.07) but given there is no evidence of a decrease this result does not indicate the observed decrease in referrals is a consequence of reduced testing.

#### 3.3.3.2 Referrals to other specialities

Visual examination of the MAR outpatient referral data over the same time period revealed an apparent sudden change in G&A specialities' referral numbers to UHS at the start of the 2017-2018 financial year i.e. April 2017. This was the case for both SCCG and WHCCG and clearly evident when a longer time series of 5 years was examined as shown in Figure 3.9. The visual examination also showed clear seasonal trend with reduced referrals every December.

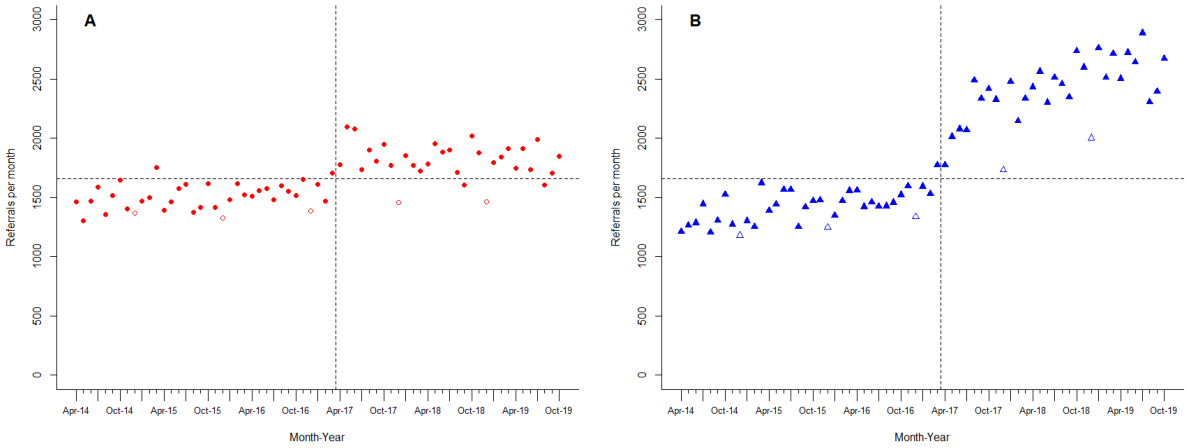



Figure 3.9 Scatter plot of GP referrals to University Hospital Southampton general and acute specialties from April 2014 to October 2019 from (A) Southampton City CCG GPs and (B) West Hampshire CCG GPs. Crosshairs highlight sudden increase occuring in April 2017 in both CCGs. Data points shown in outline only demonstrate the seasonality for the month of December.

I examined the data for two other large hospital trusts in the south of England (Brighton and Sussex University Hospital Trust and Portsmouth Hospital Trust) which did not demonstrate the same change (see Figure 3.10), suggesting the cause for change was not at a national level.

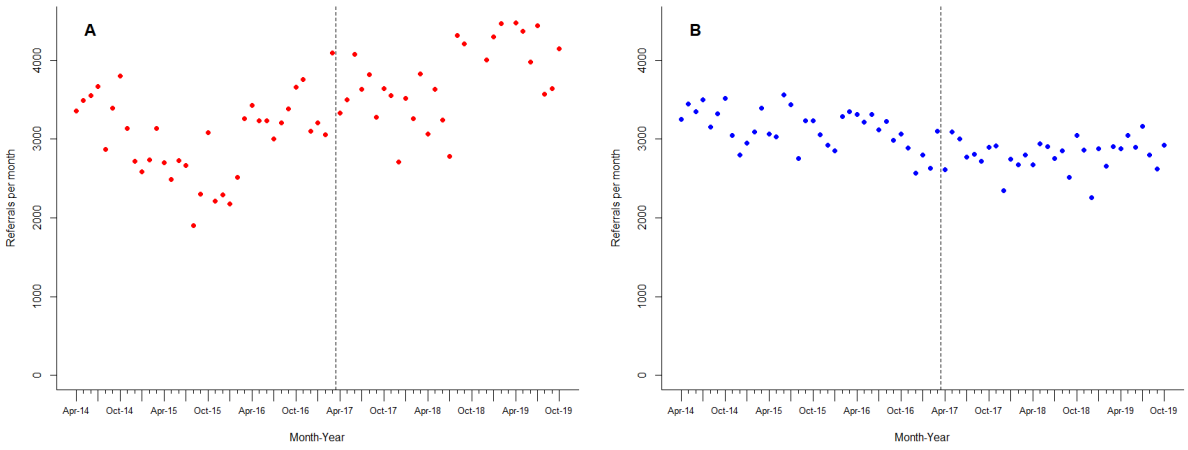



Figure 3.10 Scatter plot of GP referrals to general and acute specialties of (A) Brighton and Sussex University Hospital (B) Portsmouth Hospital from April 2014 to October 2019. Vertical dotted line indicates the start of 2017-2018 financial year.

Given the number of specialities included in G&A specialities in the NHS England data (see Appendix B) it was not clear if the cause for the change affected monthly hepatology referrals. I conducted an ITS analysis to explore this by using a time series from April 2016 to Dec 2017 (i.e. prior to SLP implementation) with using an assumed 'interruption' in April 2017.

The result of this for G&A specialities' referrals is consistent with the observed data showing a highly statistically significant positive level change after the interruption, reflecting an estimated 23% increase in referrals (IRR 1.23, 95% CI 1.106 – 1.377, p<0.001) with a flat trend prior that did not significantly change following the interruption, although tended towards a downward slope change (IRR 0.982, 95% CI 0.964 to 1.000, p=0.05).

By comparison the result of the ITS for hepatology referrals with an April 2017 interruption is very different, showing no significant trend prior to the interruption and no significant slope or level change. Although non-significant, the estimates of effect were opposite to that seen in general and acute specialities, with a negative level change (IRR 0.931, 95% CI 0.963 to 1.245, p=0.636) and an upward slope change (1.003, 95% CI 0.954-1.054, p=0.914). The different results of the ITS analysis using an April 2017 interruption are visualised in Figure 3.11.

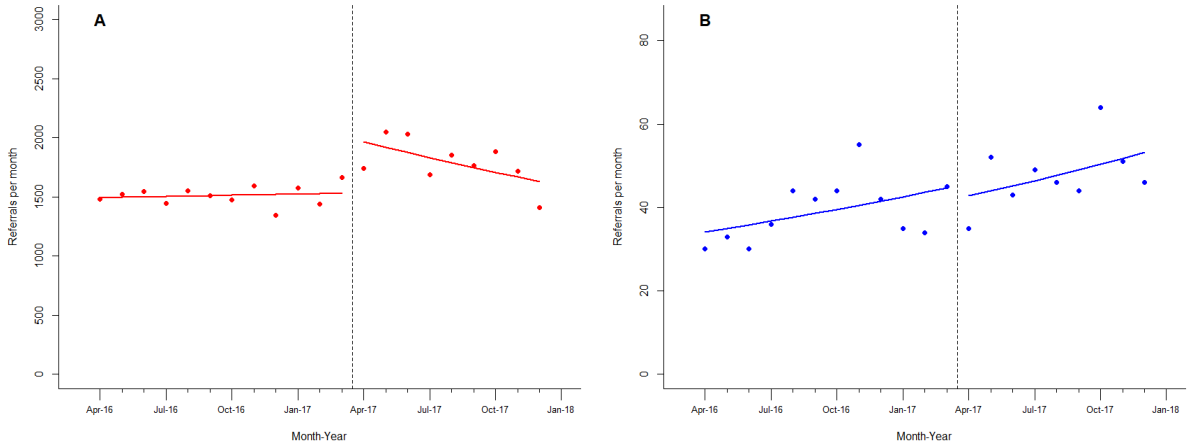



Figure 3.11 Graphical representation of interrupted time series analysis examining the effect of an assumed interruption prior to April 2017 (vertical dotted line) on Southampton city clinical commissioning group GP monthly referrals to (A) general and acute speciality outpatients at University Hospital Southampton (UHS) and (B) UHS hepatology outpatients. Solid lines indicate modelled trend.

I sought advice from the Hampshire and Isle of Wight (HIOW) integrated care board (ICB) analytical team to clarify the reason for the April 2017 change. ICBs replaced CCGs in 2022 with the HIOW ICB replacing both SCCG and WHCCG. The ICB advised that that based on their historical annual referral data the change was a consequence of commissioning changes in

three specialties (neurology, rheumatology and dermatology). There was no commissioning change affecting hepatology referrals.

The MAR data used to examine referrals from G&A specialities does not provide individual speciality data. In view of this I excluded the pre-April 2017 data to perform the ITS analysis for G&A specialities. Adjustment for seasonality was achieved by including the month of December as a binary variable in the regression model.

This ITS analysis indicated that monthly SCCG referrals to G&A specialities had a flat trend prior to SLP implementation. The SLP implementation was not associated with any step or slope change in this trend. A non-significant downward trend prior to SLP implementation was observed, estimated at a 1.1% decrease in referrals per month (IRR 0.989, 95% CI 0.971-1.008, P=0.249). Following the SLP, SCCG referrals continued to demonstrate a non-significant downward trend estimated at 0.1% decrease in referrals per month. This equates to a 1% (CI -0.9% to 2.9%, p=0.285) non-significant increase in the trend slope after the SLP. This is visualised in Figure 3.12.

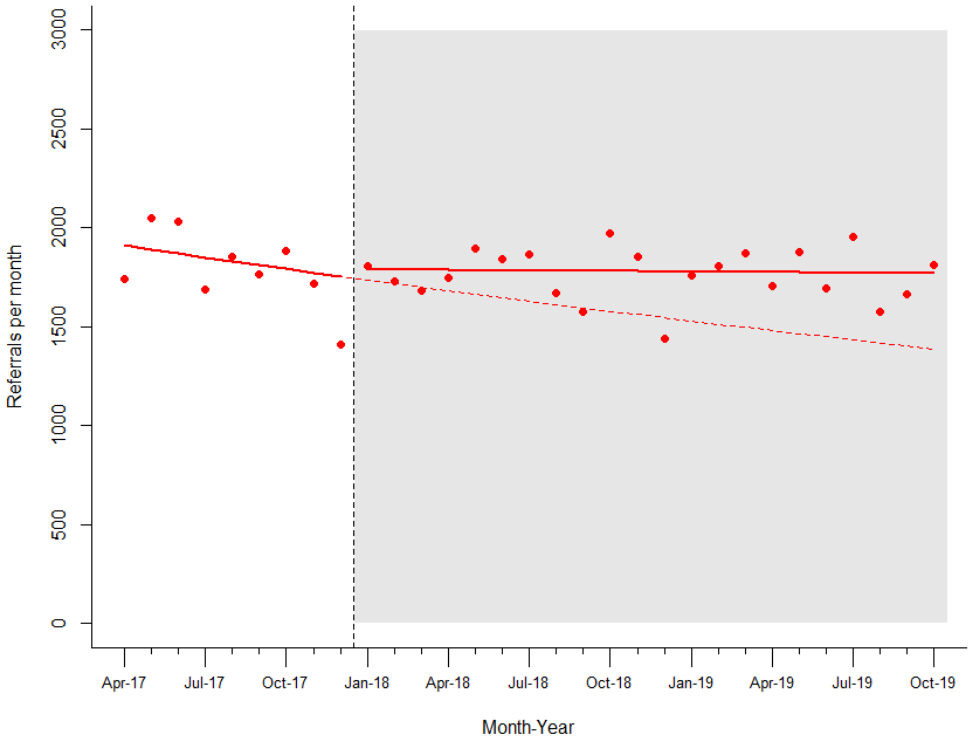



Figure 3.12 Graphical representation of interrupted time series analysis examining impact of the Southampton primary care liver pathway (SLP) on Southampton City CCG monthly GP referrals to UHS general and acute speciality outpatients. Solid red lines indicate modelled trend; dotted red line shows modelled counterfactual trend; vertical dotted line marks the implementation of the SLP; grey shaded area indicates post-SLP period

#### 3.3.3.3 Community Fibroscan® clinic sensitivity analysis

When treating community Fibroscan® clinic attendances as referrals to UHS hepatology the results of ITS and CITS analyses are different to the main analysis. In the ITS analysis there is no longer a significant slope effect seen (IRR 0.99, 95% CI 0.97-1.01, p=0.162) but the level change is now significant (IRR 0.73, 95% CI 0.59-0.91, p=0.005). In the CITS analysis there were no statistically significant effects seen and visually the trend line post SLP implementation in SCCG resembled that of WHCCG as shown in Figure 3.13. Table 3.4 shows the results of the community Fibroscan® clinic sensitivity analysis. Pre-intervention trends and WHCCG trends are not included in the table as they are the same as in the main analysis. Using April 2017 as the start of the time series as done in the other sensitivity analysis (section 3.3.3.2) produced very similar findings (see Appendix E).

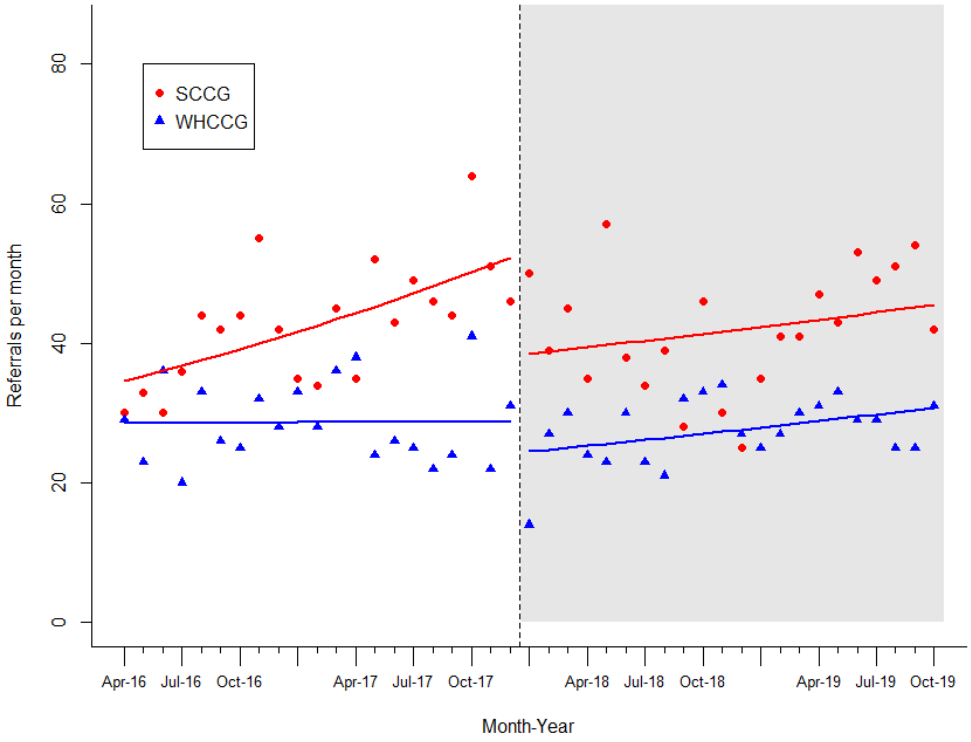



Figure 3.13 Graphical representation of controlled interrupted time series analysis examining impact of Southampton primary care liver pathway (SLP) on Southampton city CCG (SCCG) monthly referrals to University Hospital Southampton (UHS) hepatology outpatients using West Hampshire CCG (WHCCG) monthly referrals as a control with community Fibroscan® clinic attendances treated as a referral to UHS hepatology. Solid red lines indicate modelled trend in SCCG; Solid blue lines indicate modelled trend in WHCCG; vertical dotted line marks the implementation of SLP; grey shaded area indicates post-SLP period

Table 3.4 Results of controlled interrupted time series sensitivity analysis where community Fibroscan® clinic attendances are incorporated into overall referrals to hepatology

| | **IRR main analysis** | **IRR community Fibroscan® sensitivity analysis** | **95% CI for sensitivity analysis** | **p-value for sensitivity analysis** |
|---|---|---|---|---|
| Slope change SCCG | 0.97 | 0.99 | 0.92 – 1.01 | 0.063 |
| Slope change SCCG vs WHCCG | 0.96 | 0.98 | 0.95 – 1.00 | 0.083 |
| Level change SCCG | 0.83 | 0.73 | 0.59 – 0.91 | **0.005** |
| Level change SCCG vs WHCCG | 0.98 | 0.87 | 0.63 – 1.20 | 0.392 |
| SCCG, Southampton City Clinical Commissioning Group; WHCCG, West Hampshire Clinical Commissioning Group; IRR, incidence rate ratio; CI, confidence interval | | | | |

## 3.4 Discussion

### 3.4.1 Summary of main findings

The work in this chapter aimed to establish the effect of the implementation of the Southampton primary care liver pathway (SLP) on referrals to University Hospital Southampton (UHS) hepatology outpatients.

I have shown that the implementation of the SLP was associated with a statistically significant reduction in new referrals to UHS hepatology outpatients from Southampton City CCG (SCCG) GPs over the post implementation period. This reduction was a result of a gradual decrease in monthly referrals following SLP implementation. This finding remained when accounting for any changes seen over the same time period in a control group where the SLP was not implemented – the geographically adjacent West Hampshire CCG (WHCCG). In WHCCG there was no significant change in GP referrals associated with the implementation of the SLP in SCCG.

I performed three further analyses to explore the finding of a reduction in new referrals to UHS hepatology. Firstly, I found that there were on average more ELF tests conducted per month by SCCG GPs following implementation of the SLP compared to prior, although this difference was not statistically significant. This would suggest the reduction in new referrals post-SLP implementation was not a consequence of a reduction in GP testing.

Secondly, I conducted a sensitivity analyses using a control outcome – SCCG GP referrals to general and acute (G&A) specialities at UHS. This analysis used a reduced pre-implementation time period as the MAR time series data prior to April 2017 were not equivalent due to a commissioning change of three G&A specialities (neurology, rheumatology and dermatology). A separate ITS analysis indicated this change affected referrals to G&A specialities but not referrals to hepatology. This corroborated information from the ICB that the commissioning change did not concern referrals to hepatology and supports the use of the longer time series from April 2016 in the main ITS analysis.
The control outcome sensitivity analysis revealed a non-significant downward trend in referrals to G&A specialities prior to SLP implementation and a non-significant slope change corresponding to an increased monthly rate of referrals to G&A specialities following the SLP implementation. This suggests the change in hepatology referrals is not a reflection of a change in referrals to all G&A specialities and supports the suggestion that the SLP caused the reduction in hepatology referrals.

The third sensitivity analysis attempted to isolate the effect of the community Fibroscan® clinic by treating referrals for Fibroscan® without onward hepatology referral as referrals to UHS

hepatology. This analysis showed the same direction of slope and level changes as the main analysis (see Table 3.4) but these were not statistically significant. This suggests that the community Fibroscan® clinic was fundamental in achieving the observed reduction in referral trend following SLP implementation.

### 3.4.2 How this compares to other literature

To my knowledge, published literature examining the impact of a primary care liver pathway on referrals to outpatients is limited to two studies.(175) One study of a non-alcoholic fatty liver disease (NAFLD) primary care pathway in London noted that number of referrals per year to hepatology for suspected NAFLD almost doubled following the pathway's implementation.(175) A potential explanation for the apparent difference in change in referrals between this study and my work is that trend was not examined in the London study.(186) As such it is possible the observed increase in referrals was the continuation of a pre-existing trend and not a consequence of the pathway implementation. The second study was of 'intelligent liver function testing'(iLFT) - a primary care liver pathway in Scotland that incorporated automated extended testing of blood samples and an automated management plan and referral recommendation for GPs requesting liver blood tests. The study found a significant increase in referrals to secondary care from GP practices using the pathway compared to GP practices' usual care.(102) Arguably it is unsurprising that a pathway providing individualised referral recommendation to GPs led to an increase in referrals. The SLP provides general guidance to GPs on tests to request and how they should be actioned but requires GP to know of and recall this guidance, rather than provide individualised instruction for a given patient. It is possible that GPs may not have requested advised tests or action tests as advised. There is suggestion of this in my study given that there were fewer referrals (n=922) than there were patients with an ELF test result >9 (n=1,139) post SLP implementation. However, to say this indicates GPs were not actioning tests as advised makes a number of assumptions such as the ELF test was done for the correct indication and that patients were suitable and willing to be referred. These assumptions cannot be known from the data.

The SLP incorporates two stage community fibrosis assessment, namely an ELF test and a Fibroscan® if the ELF result is greater than 9. The sensitivity analysis in which referrals for Fibroscan® without onward hepatology referral were treated as referrals to UHS hepatology did not find a significant change in monthly referral trend associated with SLP implementation. This may indicate that the significant change seen in the main analysis is driven by the two stage community fibrosis assessment. This is supported by other studies that have shown two stage fibrosis assessment (as compared to single fibrosis assessment) results in fewer referrals to hepatology outpatient clinics (207,208) and is cost-effective(176). Only one of these utilised

Fibroscan® in a pathway specifically for patients with type 2 diabetes.(207) My work therefore builds on to this existing evidence as the SLP applies to any patient in primary care with potential liver disease in addition to incorporating Fibroscan®. Furthermore, by showing there was a potential reduction in secondary care workload associated with the SLP this work indicates that a pathway such as the SLP can fit within the existing capacity of secondary care hepatology services.

### 3.4.3 Strengths and limitations

The strength of this study lies in the natural experiment methodology that by definition necessitates a comparative design.(183) The use of ITS analysis provided this comparative design through the creation of a counterfactual for comparison. The incorporation of trend through ITS analysis addresses any potential maturation bias (i.e. that referrals were already changing) and controls for any characteristics that do not change, or only change slowly, over time such as population size or levels of deprivation.(198) I was able to strengthen this work by conducting a controlled ITS analysis, which mirrored the findings of the ITS and as such adds validity to the result and further supports the argument that the SLP caused the effect seen.(198) The addition of a control groups means any time-varying confounders that may affect the outcome for both groups, such as another intervention occurring around the same time as the SLP, are controlled for.(198)

The findings of this work support the argument that the SLP caused a reduction in monthly referrals to UHS hepatology. However, it is a retrospective observational study and as such there remains the potential for unmeasured confounding.(179) For it to be argued the SLP did not cause the reduction in referrals there would have to be unknown confounding that either 1) caused the reduction in referrals from SCCG or 2) suppressed a reduction in referrals from WHCCG. A theoretical explanation for the latter could be a floor effect in WHCCG i.e. that there is a conceptual 'minimum' number of monthly referrals.(184) If WHCCG was at this level then an unknown confounder that reduced referrals in both areas would only have influenced SCCG. Going against the presence of such a confounder was the upward direction of the slope change in WHCCG, although this was not significant. Additional discussions had with the hepatology consultant SLP pathway lead and creator, as well as the wider UHS hepatology team, did not reveal any other interventions occurring around the same time that may explain a change in referrals in either CCG.

The idea of a floor effect in WHCCG relates to the potential limitation in using WHCCG as a control group. The two areas are similar in terms of liver services as discussed but cover different populations. Evidence of a difference between the two areas is suggested in the

analysis by the significant difference seen in the pre-intervention trends between areas, known as the absence of the parallel trend.(209) The reason for the different pre-existing trends is unclear. Whilst the use of location-based controls for CITS analysis is well recognised,(198) the absence of parallel trend challenges the assumption made in the CITS that the SLP would have the same effect if implemented in WHCCG and therefore its suitability as a control group. However, the findings of effect were the same for the ITS analysis as for the CITS analysis and so I do not believe the use of WHCCG as a naturally occurring control group has weakened the findings.(188) The nature of a true natural experiment means an ideal control group (as would be expected in an RCT) is often not available.

If it is assumed the SLP caused the reduction in monthly referrals, then it is interesting to consider why. My analysis does not look for a mechanism but the sensitivity analysis of the Fibroscan® clinic indicates this was a key aspect. However, many other reasons could be suggested. For example, I described how post-implementation there were meetings between SCCG GPs and UHS hepatology consultants. These meetings were about the pathway but would have also been educational and may have themselves led to more efficient practice irrespective of the pathway itself. The benefits of complementary qualitative evaluation in natural experiments are recognised(177) and a qualitative study exploring the experience of users of the SLP (GPs, patients and members of the hepatology team) could have provided understanding of mechanisms of pathway effect. However, this would be better done prospectively to minimise recall bias, something not possible given the retrospective nature of this work.(210)

There are also many other uncertainties about the impact of the pathway that are not addressed in this study, for example the impact on patients and GPs themselves. With regards GPs, it is not known from my work whether the observed effect of the SLP was universal for all exposed i.e. SCCG GP practices. As is common in ITS studies, the referral data I utilised was aggregated and so sub-group analysis was not possible.(211) Undertaking subgroup analysis of, for example, referring GP practice (or clusters of practices) would have allowed examination of effect across GP practices and potentially furthered understanding of the SLP's impact.

The focus of this evaluation was to assess impact on secondary care workload, given what has been seen in other studies. Although my work indicated a reduction in referrals, this is only desirable (from a clinical perspective) if it reflects a reduction in unnecessary referrals. An increased proportion of appropriate referrals following implementation of a community liver pathway has been demonstrated.(175) Assessment of appropriateness was not undertaken in my work and reflects the limitation that the clinical impact of the SLP was not evaluated. It should be noted that determining what represents an appropriate referral is not easily defined or

standardised. As an example, an appropriate referral in a published NAFLD pathway evaluation was defined as one in which the patient was deemed to have advanced fibrosis or cirrhosis as assessed through a composite clinical evaluation of each referred patient's case record performed by expert hepatologists.(175) The time to undertake this level of assessment is beyond what I could achieve in my PhD, would have required additional ethical approval, and needed more individual level data.

## 3.5 Conclusion

The Southampton liver pathway represents a complex intervention with multiple interacting components and potential effects. I have shown that implementation of the SLP is associated with a decrease in monthly new referrals from SCCG GPs to hepatology outpatients services and that the use of community Fibroscan® assessment may be a key component of the SLP in achieving this. The use of ITS analysis accounts for pre-existing trends and the further use of WHCCG to conduct a controlled ITS analysis accounts for unknown confounders affecting both SCCG and WHCCG. In conjunction this strengths the argument that the SLP caused the decrease in referrals seen.

## 3.6 Next steps

Through conducting this work I have gained much greater understanding of the current community liver pathway context in which my complex intervention is intended to exist. I acquired knowledge of who are key players in one such pathway – the Southampton Liver pathway – and have utilised this knowledge to identify and engage key stakeholders with further work in this PhD as described in Chapter 5 and Chapter 6.

This chapter has also demonstrated the well-recognised challenge of evaluating a complex intervention given potentially multiple interacting components and effects. It has enhanced my understanding of natural experiment methodology that can be considered where a randomised control trial may not be possible, as is often the case for complex interventions.(159) Within this methodology I have learnt a specific method of analysis – interrupted time series – that I can consider for use in future evaluation of the intervention I develop. This is discussed in Chapter 7.

# Chapter 4 Barriers and facilitators experienced in delivering alcohol screening and brief interventions in community pharmacy: a qualitative evidence synthesis

## 4.1 Introduction to chapter

This chapter describes the second work package of my PhD. This is a qualitative evidence synthesis examining the barriers and facilitators experienced in the delivery of alcohol screening and brief interventions in community pharmacy. The work reflects the complex intervention development key actions of 'reviewing published research evidence', 'understanding context' and 'drawing on existing theories'. The synthesis has been peer reviewed and published in the International Journal of Pharmacy Practice.(212) The publication is included in Appendix O.

### 4.1.1 Background and rationale

Alcohol screening and brief intervention (SBI) is internationally recognised as a way to identify and reduce alcohol harm. (77) SBI incorporates an assessment of a person's alcohol use using a recognised alcohol screening tool, feedback of the result and - if identified to be drinking at risk – provision of advice to encourage reduction in alcohol use.(73) As discussed in section 1.4.2 evidence of effectiveness of SBI in primary care in reducing alcohol consumption has been well demonstrated but the evidence for effectiveness of SBI in community pharmacy is limited, having only been examined in one published RCT by Dhital et al.(135) This study did not find a significant difference in primary outcome (change in AUDIT score at 3 months) between or within the intervention and control groups but a secondary outcome found a statistically significant decrease in alcohol consumption (determined by the change in AUDIT-C score at 3 months) in both groups.(135) Observing an effect in both intervention and control groups was similarly seen in a large primary care RCT of alcohol brief interventions.(60) This may be explained by the process of alcohol screening and simple feedback having active components to change alcohol drinking behaviour as described in section 1.4.2.

Although there is limited evidence demonstrating the effectiveness of SBI delivered in community pharmacy, there is a greater body of evidence demonstrating its feasibility and showing patients drinking at risk can be identified and given advice in community pharmacy (see Table 1.4 in section 1.5.3). Identifying people drinking at risk (and providing advice) is

synonymous with identifying people at risk of ArLD and as such anticipated to be incorporated into the complex intervention being developed in my PhD.

When considering the practice of SBI in primary care, despite evidence of effectiveness, it is recognised that implementation of SBI into routine practice has been limited.(213) Research using household survey data of 15 252 adults in England found 50% of people who smoked recalled receiving a smoking intervention in the last 12 months when visiting their GP as compared to 6.5% of people who drank excessively receiving an alcohol intervention.(214) Syntheses of qualitative research have been conducted to understand the barriers and facilitators to implementing SBI in primary care, which can subsequently inform design, delivery and commissioning.(215–218) Notably, and as seen with effectiveness reviews, SBI in the pharmacy setting has not been examined in these reviews.

As such there is an evidence gap in understanding the barriers and facilitators to undertaking SBI in community pharmacy. Gaining an in depth understanding of these can directly inform the design of my complex intervention in order that barriers are addressed and facilitators utilised.

### 4.1.2 Aim

The aim of this qualitative evidence synthesis is to examine what barriers and facilitators are experienced in delivering alcohol screening and brief intervention in community pharmacies, directly addressing objective two of my PhD.

## 4.2 Methods

The purpose of the synthesis is to gain an in depth understanding of individuals' experiences of alcohol screening and brief intervention in community pharmacy in order to apply these findings to the design of my complex intervention. Using a qualitative evidence synthesis as part of complex intervention development is recognised practice, as indicated in WHO commissioned guidance.(219)

### 4.2.1 Overview of qualitative evidence synthesis

A qualitative evidence synthesis is a systematic review that uses a transparent and systematic process to bring together findings from primary qualitative research relating to a specific topic or focus in order to gain new or better understanding of a phenomenon.(220,221) Other terms are used interchangeably, including 'qualitative systematic review', 'qualitative meta-synthesis', and 'qualitative research synthesis' but qualitative evidence synthesis is the preferred term used in Cochrane guidance.(220)

Qualitative evidence synthesis incorporates many different approaches with over 30 different methods recognised.(222) Three approaches dominate: thematic synthesis, framework synthesis and meta-ethnography.(220) These are now briefly described through reference to relevant publications as well as from my own learning attained through attendance at Cochrane qualitative evidence synthesis learning webinars.

#### 4.2.1.1 Common methods of qualitative evidence synthesis

*Thematic synthesis* uses an inductive three stage process to synthesis having been developed by Thomas and Harden when conducting a review of barriers and facilitators to healthy eating amongst children.(223) The three stages described are: 1) open coding of each study's findings; 2) development of descriptive themes through grouping of codes; 3) generation of analytical themes that go beyond the content of the original studies.(224)

*Framework synthesis* uses a five stage process that comes from framework analysis, a more deductive method developed for the analysis of primary qualitative data.(225) The five stages are: 1) familiarization with the evidence base; 2) framework selection, in which a suitable framework is developed or identified (e.g. an established theory or conceptual framework); 3) indexing, which incorporates the searching and screening of studies and subsequent extraction of data from each study and coding it using the framework; 4) charting, where distilled summaries of the evidence are charted and themes derived; 5) mapping and interpretation where the derived themes are considered against the research question.(223,226)

*Meta-ethnography* was developed in the 1980s and is recognised as one of the earliest developed methods for qualitative evidence synthesis.(220) It is recognised as a highly interpretative and complex method of qualitative evidence synthesis incorporating seven steps: 1) getting started i.e. deciding the focus of the review; 2) deciding what is relevant, which is a process of further defining and refining the focus of the synthesis (including searches); 3) reading (and re-reading) of the studies; 4) determining how the studies are related; 5) translating the studies into each other, examining similar and opposing concepts from second order constructs of included studies; 6) synthesising translations; 7) expressing the synthesis, which is typically as a new model, theory or conceptual framework.(220,223)

#### 4.2.1.2 Selecting a qualitative evidence synthesis method

Guidance on choosing a qualitative evidence synthesis method had been produced by the Integrated Health Technology Assessment for Evaluating Complex Technologies (INTEGRATE-HTA) project.(227) This project produced seven criteria to guide selection of method: review question, epistemology, time, resources, expertise, audience, type of data – forming the acronym 'RETREAT'.(228) The requirements of each of the three discussed methods of qualitative evidence synthesis according to the seven RETREAT criteria is shown in Table 4.1.

Table 4.1 Requirements of the three common methods of qualitative evidence synthesis according to RETREAT criteria (adapted from(227))

| **RETREAT criteria** | **Requirement(s) of qualitative evidence synthesis method** | | |
|---|---|---|---|
| | **Thematic synthesis** | **Framework synthesis** | **Meta-ethnography** |
| ***Review question*** | Defined | Defined | Emerging or negotiable |
| ***Epistemology*** | Epistemology of included studies not important.<br>Method aligns with a more realist epistemology. | Epistemology of included studies not important.<br>Method aligns with a more realist epistemology. | Studies should have similar epistemological stance.<br>Method aligns with an idealist/relativism epistemology. |
| ***Time needed*** | Less time intensive | Less time intensive | More time intensive |
| ***Resources*** | Can use comprehensive or purposive sampling of papers | Comprehensive sampling of papers | Purposive sampling of papers |
| ***Expertise*** | Lower level of qualitative expertise needed | Lower level of qualitative expertise needed | High level of qualitative expertise needed |
| ***Audience(s)*** | Academics, designers of interventions, policy makers, practitioners, commissioners of research | Academics, designers of interventions, policy makers, practitioners, commissioners of research | Academics and commissioners of research |
| ***Type of data*** | Does not require conceptually rich or thick data<br>Can be used with large numbers of studies | Does not require conceptually rich or thick data<br>Can be used with large numbers of studies | Requires conceptually rich and thick data<br>Not suitable for large numbers of studies |
| RETREAT - review question, epistemology, time, resources, expertise, audience, type of data | | | |

As a PhD student developing research skills I did not consider meta-ethnography a suitable method for my qualitative evidence synthesis given it requires a high level of qualitative research expertise. This was also coupled with my knowledge of existing relevant studies that lacked detail of context and description of SBI and as such an anticipated lack of 'thick' data required for meta-ethnography. Additionally, my qualitative evidence synthesis aims to inform intervention design - as well as inform practice - neither of which meta-ethnography is considered to be suited for.

In contrast, these factors are suitable for either a thematic synthesis or framework synthesis approaches. Recognised disadvantages of framework synthesis are the potential to force data into the framework, thereby overlooking findings in the data, and also that the framework selected may be found to be unsuitable for the data once the synthesis is underway.(220) To avoid these potential issues I chose a thematic synthesis approach *a priori*. However, as discussed in 'data analysis', this was revised to a framework synthesis approach. This is not out of keeping with advised practice, with guidance advocating that the choice of approach may not be finalised until the papers for inclusion have been identified and the data within them known.(220)

### 4.2.2 Protocol

Prior to developing a search strategy, I created a review team consisting of my three supervisors, a gastroenterology specialty registrar (Dr Helen Stone) and a fellow PhD student with personal experience of conducting a qualitative evidence synthesis (Dr Qian Tan). I created a review protocol that was discussed, revised and agreed by the team. The protocol has been published on PROSPERO (CRD42021284130).(229)

### 4.2.3 Search strategy and inclusion/exclusion criteria

To develop my search strategy and describe the criteria for study selection I utilised the 'setting, perspective, intervention, comparison, evaluation' or 'SPICE' framework.(230) Table 4.2 shows search terms (identified through my wider reading of the evidence base) and the study inclusion and exclusion criteria mapped against the components of the SPICE framework.

I developed a comprehensive search strategy using the search terms in Table 4.2 with the help of an experienced research librarian to identify all relevant studies. This was initially done for the Medline® database (searched using Ovid®) to optimise the strategy before adapting for other databases. The databases selected for searching were MEDLINE®, Embase, Cumulative Index to

Nursing and Allied Health (CINAHL) and PsycINFO as this is recommended in the Centre for Reviews and Dissemination (CRD) guidance for undertaking reviews in healthcare.(231)

The search terms were refined by applying truncation and proximity operators. Those terms relating to evaluation were removed as these excessively narrowed results, which I assessed by checking if known studies were included in the search results. Medical Subject Headings (MeSH) were identified by mapping the search terms to subject headings using Ovid. The developed search strategy for Medline was then adapted for use with the other databases, which including identifying subject headings specific for the database being searched. The final search strategy used is provided in Appendix F.

Searches were conducted in October 2021 and limited to publication from January 2003 onwards. This date was chosen to obtain contemporary findings as 2003 marks the publication of 'A Vision for Pharmacy in the New NHS' by the Department of Health in England.(232) There were no language or country exclusions imposed. I also manually searched reference lists of included studies for relevant studies.

Papers eligible for inclusion were qualitative or mixed-method studies (where qualitative data were presented) published in peer-reviewed journals. Grey literature including conference abstracts, commentaries, book chapters, PhD theses, and reports was excluded.

### 4.2.4 Data screening and extraction

Results of searches were transferred first into Endnote reference management software (version 20.2), de-duplicated and then imported into Rayyan.(233) I performed initial title screening and then myself and Dr Helen Stone (HS) independently screened included abstracts. Disagreement at abstract level resulted in the study being included at the full text review stage. HS and I then independently screened the full-text articles. Any disagreements were resolved through discussion and where disagreement was not met a final decision was made by my supervisor Dr Kinda Ibrahim (KI) who is an experienced qualitative researcher.

I extracted study characteristics into a Microsoft word (Microsoft 365 version 2301) data extraction template that I created for the review. Information extracted included: study title, authors, year of publication, country, study design, study aim, qualitative data collection and analysis method(s), number of participants in qualitative work, type of participant(s), details of alcohol screening and brief intervention.

Table 4.2 Search terms and inclusion and exclusion criteria according to the SPICE framework that were used in my qualitative evidence synthesis

| SPICE component | Search terms | Inclusion criteria | Exclusion criteria |
|---|---|---|---|
| *Settings* | Pharmacy<br>Pharmacies<br>Pharmacist(s)<br>Chemist(s)<br>Community<br>Communities | Alcohol SBI conducted in community pharmacy in any country | SBI not conducted in community pharmacy |
| *Perspectives (participants/population)* | Pharmacy user(s)<br>Service user(s)<br>Staff<br>Pharmacist(s)<br>Pharmacy staff<br>Pharmacy technician(s)<br>Pharmacy assistant(s)<br>Stakeholder(s)<br>Policy maker(s)<br>Public | Any of:<br>Community pharmacy staff<br>Community pharmacy users<br>Pharmacy policymakers<br>Pharmacy commissioners | |
| *Intervention* | Alcohol screening<br>Alcohol assessment<br>Alcohol identification<br>Alcohol intervention<br>Alcohol service<br>Brief intervention<br>Brief advice<br>ABI<br>IBA<br>SBIRT<br>SBI | Any alcohol SBI delivered by pharmacy staff to customers. Alcohol screening defined as an assessment of an individual's alcohol consumption (with or without using a screening tool) that identifies their level of risk of alcohol-related problems. Brief intervention defined as 'practices that aim to identify a real or potential alcohol problem and motivate an individual to do something about it'.(74) | Studies where an intervention has not been delivered will be excluded |
| *Comparison* | N/A | N/A | N/A |
| *Evaluation* | Qualitative<br>Experience(s)<br>Perspective(s)<br>Attitudes(s)<br>Feasibility<br>Barrier(s)<br>Enabler(s)<br>Facilitator(s)<br>Interview(s)<br>Focus group(s)<br>Observation(s) | Phenomena of interest are perspectives, attitudes and experiences of participants regarding the feasibility, acceptability and barriers and facilitators to implementing alcohol screening and brief intervention in community pharmacy | Studies where data were only analysed quantitively |
| SBI, screening and brief intervention, SPICE, setting, perspectives, intervention, comparison, evaluation | | | |

Dr Qian Tan (QT) and I independently extracted relevant data from the results and discussion sections of the included studies. Data related to experiences of SBI delivery were extracted regardless of whether terms barrier or facilitator were used. This included first order constructs (quotations from participants) and second order constructs (interpretation of authors). The extracted data were compared between myself and QT and any differences in extraction discussed and agreed. I then imported these data into NVivo (release 1.0) for analysis.

### 4.2.5 Quality Appraisal

The practice of quality appraisal in quantitative systematic reviews is well established but its practice in qualitative evidence synthesis has no clear consensus. Reasons for this appear threefold. Firstly, there is debate over the value of critically appraising qualitative research given its basis in a constructivist paradigm, although guidance advocates the practice and it is performed in the majority of qualitative evidence syntheses.(234–236) Secondly, accepting that appraisal is recommended practice, there is uncertainty around what criteria (and which tools) should be used to appraise studies. This has been highlighted by a review of critical appraisal tools for qualitative research that identified 102 different published tools.(235) Finally, there is no consensus about how the result of quality appraisal should be used in terms of whether studies should be excluded based on their assessed quality. This partly reflects an absence of agreed quality thresholds.(234)

Considering the above, I did undertake quality appraisal but given the absence of consensus on whether this should affect inclusion I did not exclude studies based on their quality appraisal. To appraise the quality of included studies I used the Critical Appraisal Skills Programme (CASP) critical appraisal checklist for qualitative research.(237) The CASP checklist is a widely used tool in qualitative evidence synthesis (including by members of the review team) and regarded as being easy to use. Additionally, it is suitable for assessing studies that have used any qualitative methodology – relevant as I did not impose any restriction of qualitative methodology – and the 10 CASP questions incorporate the domains recommended by Cochrane guidance to assess qualitative research quality.(234)

The included studies were independently appraised using the CASP checklist by myself and KI. Each question in the checklist could be answered ‘yes’, ‘no’ or ‘uncertain’. One point was assigned for every ‘yes’ response so that each study received a score out of 10. I created a recording tool using Microsoft excel (Microsoft 365 version 2301) in which KI and I independently entered the response for each of the 10 CASP questions for each included study. Disagreements in responses were resolved by discussion to form an agreed quality assessment for each study.

### 4.2.6 Data Analysis

As described above I initially undertook a thematic synthesis approach. This first involved inductively open coding the extracted data. KI and I separately coded the data from two studies with this coding discussed and a coding manual agreed. I subsequently applied the coding manual to subsequent studies and held regular meetings with KI to discuss new codes. If new codes were generated when analysing a study, the coding manual was updated and previously analysed studies were re-analysed and re-coded if indicated. Codes were also iteratively revised throughout. Following the thematic synthesis approach, descriptive themes were developed and discussed at meetings with KI. I found it difficult to attain descriptive themes that did not overlap and consequently found I could not form clear analytical themes. This reflected my learning from Cochrane qualitative evidence synthesis webinars that highlighted this phase of thematic synthesis as being the most difficult for inexperienced qualitative researchers.

In the process of theme development and in discussions with KI the concepts of capability, opportunity and motivation were evident in the data. Additionally, the included studies largely described influences on individual's behaviour around delivering (or engaging with) alcohol SBI. This led me to examine literature around the capability-opportunity-motivation model of behaviour (COM-B model).

#### 4.2.6.1 Overview of the COM-B model

The COM-B model is a model of behaviour describing three components that an individual requires in order to undertake a behaviour, namely the capability, the opportunity and the motivation. All three are required for a behaviour to occur and each have equal importance in determining behaviour.(238) The three components also exert influence on each other, with capability and opportunity influencing motivation, motivation influencing capability, and the undertaking of a behaviour can subsequently also influence each component. The model and the interactions of components are shown in Figure 4.1.

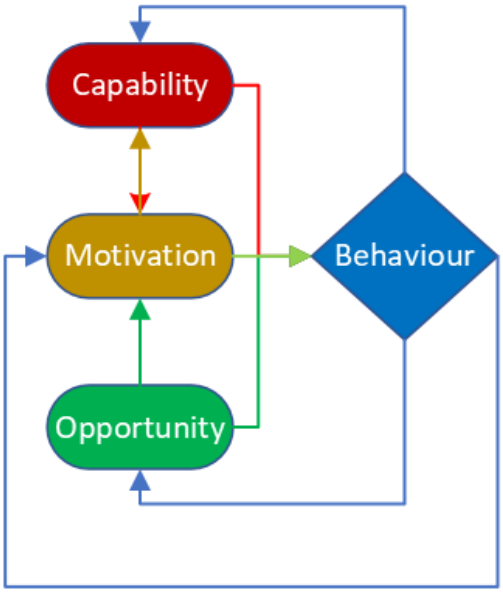



Figure 4.1 The COM-B model of behaviour. Arrows indicate how different components of the model influence each other

Each of the three components can be sub-classified into two more refined components: capability into physical or psychological; opportunity into environmental or social; motivation into automatic and reflective. Definitions of each component and subcomponent are provided in Table 4.3 as adapted from various sources. (238–241)

#### 4.2.6.2 Application of COM-B

On review of the COM-B model literature, it appeared a good fit for the data. I therefore adapted my synthesis approach to a framework synthesis. I utilised a simple framework using the components of the COM-B model applied to SBI as shown in Table 4.3. I mapped the codes against each COM-B component in discussion with KI. The inductive coding already performed meant that relevant data would not be missed or forced into the framework, a potential issue when conducting a framework synthesis.(220) I found the codes could be mapped to each COM-B component with no codes being mapped to more than one component. Sub-themes were inductively derived within each component that served as an overarching theme. These themes and sub-themes were charted to form summaries of the evidence and examined to describe the barriers and facilitators within each theme. Links within and between themes were examined through the lens of the COM-B model. Discussion with KI were held throughout this process of theme development.

Table 4.3 Component and subcomponents of the COM-B model, their definitions and adapted definition for the framework synthesis

| Component | Definition | Subcomponent | Definition | Component definition applied in synthesis |
|---|---|---|---|---|
| *Capability* | Abilities and attributes of a person | *Psychological* | Capability involving a person's mental functioning such as knowledge or memory | Staff or customer psychological or physical attributes that influence alcohol SBI delivery |
| | | *Physical* | Capability involving a person's physical functioning such as strength or dexterity | |
| *Opportunity* | Factors that lie outside of an individual | *Physical* | Opportunity involving inanimate parts of the environment and time | Factors that lie outside the individual (staff or customers) that influence alcohol SBI delivery |
| | | *Social* | Opportunity involving other people and organisations such as social and cultural norms | |
| *Motivation* | All the cognitive processes that energise and direct behaviour | *Automatic* | Motivation involving instincts/emotions/habits | Staff or customer mental processes that influence delivery of alcohol SBI |
| | | *Reflective* | Motivation involving conscious thought processes (plans and evaluations) | |
| SBI, screening and brief intervention | | | | |

### 4.2.7 Reflexivity

This qualitative evidence synthesis was my first experience of conducting qualitative research. I am a specialty registrar in gastroenterology and hepatology by background. As a clinician, my training and experience in research prior to undertaking my PhD has been dominated by a positivist paradigm. This encompasses the view that there is one truth that can be measured and known through experimentation. In the conduct of this synthesis, I took an inductive approach to data analysis in keeping with a constructivist paradigm. I found this move from my prior experience in positivist paradigms to a constructivist one difficult, finding myself conceptually looking for a 'correct' answer in the early stages of the analysis. However, the close supervision of my experienced qualitative supervisor (KI) helped address this and develop my analysis to ensure it was an accurate interpretation of the data.

I found – as is a recognised challenge in thematic synthesis – that I could not develop clear analytical themes. I believe my prior exposure as a clinician to a positivist paradigm was part of the reason for this, meaning an inductive approach did not come naturally to me. However, the regular discussion of theme development with KI resulted in identifying the COM-B model as a

framework. In selecting the COM-B model I also considered the related theoretical domains framework (TDF). The TDF represents a synthesis of behavioural change theories that provides a theoretical lens to view the different influences on behaviour. It was developed to provide healthcare researchers and practitioners an accessible framework to help identify determinates of behaviour change in relation to implementing evidence based practice.(242) It has since been revised and extended to be applicable to patient and general population behaviours.(243,244) The TDF consists of 14 different domains that can provide a more detailed understanding of the COM-B model, in particular the reflective motivation and psychological capability subcomponents.(244) I initially tried the TDF as a framework but I found that many codes could be mapped to multiple domains, making my further analysis and interpretation difficult due to overlapping concepts. This led to using the broader COM-B model components. However, my attempt to utilise TDF improved my analysis as it gave me greater understanding of the COM-B model. This is evidenced by the peer review of the synthesis when submitted for publication, with one reviewer commenting 'The authors should be commended on such a great COM-B analysis'.

Criticism of a framework approach is that data may be forced into the framework and that knowledge of the framework may influence data extraction and analysis, creating a more deductive approach.(220) However, my immersion with the data and the initial thematic synthesis work was done without knowledge of the framework so this influence was minimised. Additionally, the multiple discussions held with my supervisor during analysis ensured my approach remained inductive and data was not forced into the framework.

## 4.3 Results

### 4.3.1 Included articles

A total of nine articles were included in this review. The PRISMA flow diagram(245) of the study screening process is shown in Figure 4.2. Details of the included studies are shown in Table 4.5. Studies were conducted in either the UK (n=7) or Australia (n=2). Five of the studies were qualitative and four of the studies were mixed methods with qualitative components. The qualitative methods were interviews (n=7) or focus groups (2) with two studies also conducting observation. SBI was delivered as a research activity (i.e. requiring participant consent) in three of the studies, as a formal pharmacy service in four studies either as part of a pilot (n=3) or already commissioned service (n=1), or as part of routine care in two studies. The total number of participants in all of the studies was 133: 78 pharmacy users, 51 pharmacists, 4 pharmacy support staff. Observation was conducted in 10 pharmacies across two studies for a combined total of 181 hours.

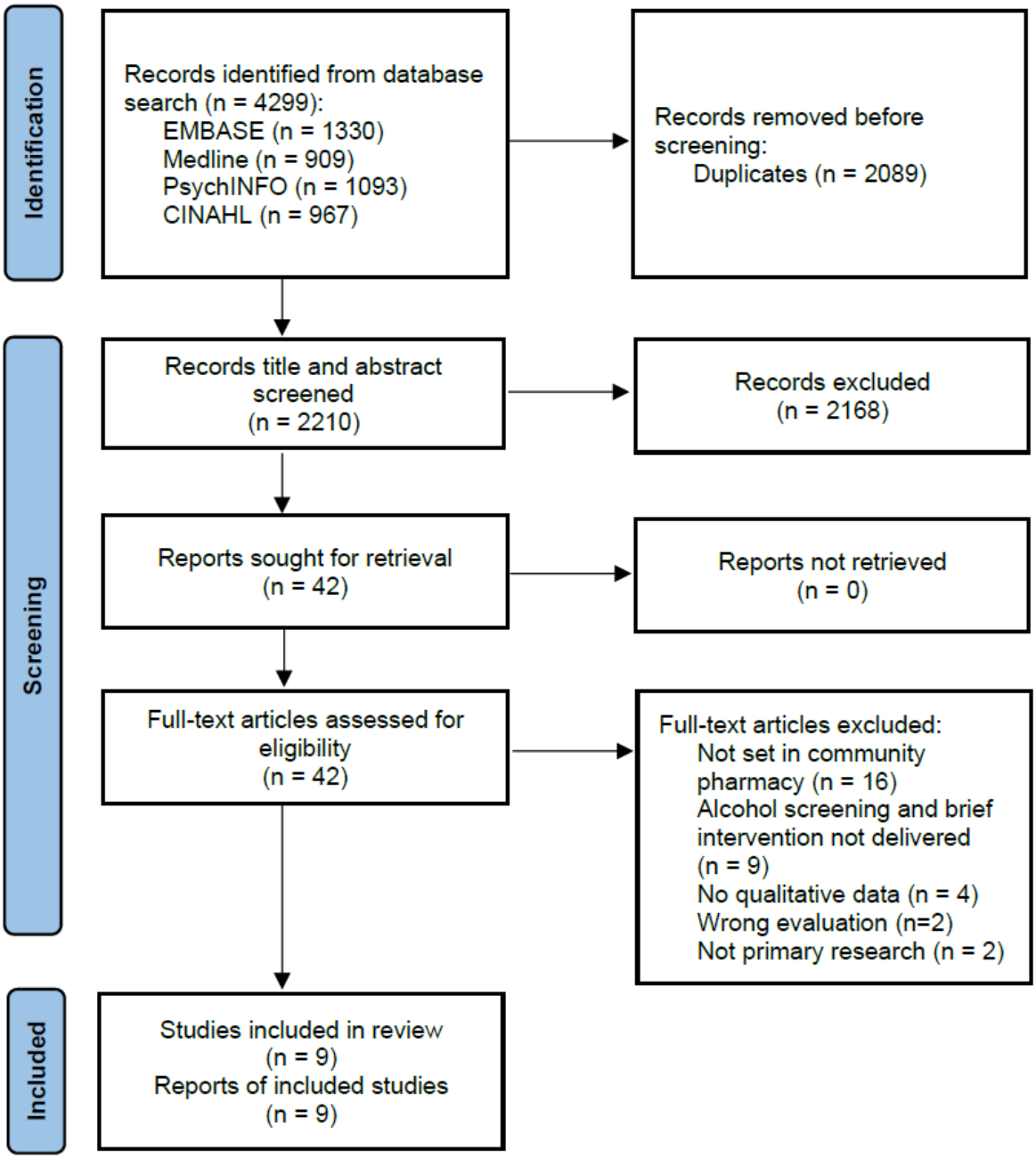



Figure 4.2 PRISMA flow diagram illustrating the study selection process

### 4.3.2 Quality Appraisal

The results of the quality assessment using the CASP checklist are shown in Table 4.4. The scores ranged from 3 to 9 with the majority of the studies scoring 6 or more. None of the studies discussed reflexivity and as such were assessed as not adequately considering the relationship between the researcher and participants (CASP question 6). In seven of the studies(128,133,134,136,246–248) it was not possible to assess if the data analysis was sufficiently rigorous (CASP question 8). This was primarily due to insufficient data presented to support the reported findings. In four of the studies(128,133,134,248) it was not possible to tell if the research design was appropriate to address the aims of the research (CASP question 3).

This was universally due to their being a lack of justification provided for the choice of design. In four of the studies(128,133,134,247) it was not possible to tell if the data were collected in a way that addressed the research issue (CASP question Q5). In two of these studies(128,134) this was due to a lack of description regarding how interviews were conducted and for the other two(133,247) there was no justification given for the use of the data collection method and setting (one used focus groups, the other interviews).

Table 4.4 Result of quality assessment using CASP qualitative appraisal tool

| **Study** | **CASP Checklist Question** | | | | | | | | | | **Overall score** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | |
| *Brown et al.* | Y | Y | U | Y | U | N | Y | U | Y | Y | 6 |
| *Dare et al.* | Y | Y | Y | Y | Y | N | Y | U | Y | Y | 8 |
| *Fitzgerald et al.* | Y | Y | U | Y | U | N | Y | U | U | Y | 5 |
| *Hall et al.* | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | 9 |
| *Hattingh, et al.* | Y | Y | Y | Y | Y | U | Y | U | Y | Y | 8 |
| *Jamie et al.* | Y | Y | N | U | U | N | U | U | Y | N | 3 |
| *Krska & Mackridge* | Y | Y | U | Y | U | N | Y | U | U | Y | 5 |
| *Mackridge et al.* | Y | Y | U | Y | Y | N | Y | U | Y | Y | 7 |
| *Quirk et al.* | Y | Y | N | Y | Y | N | U | Y | Y | Y | 8 |
| CASP, Critical Appraisal Skills Programme | | | | | | | | | | | |

Table 4.5 Details of studies included in qualitative evidence synthesis

| Study, year and country | Study design | Study aim(s) | Qualitative data collection and analysis method(s) | Number and type of participant(s) in qualitative component | Details of SBI | Staff involved in SBI delivery | Details of customer eligibility for SBI | Did staff have training? |
|---|---|---|---|---|---|---|---|---|
| Brown et al. 2014, UK | Mixed methods | Evaluate the acceptability of alcohol screening and brief interventions to women accessing emergency hormonal oral contraception in community pharmacies | Interviews; thematic analysis using a framework approach | Pharmacists (n=14) | Service pilot of AUDIT and brief advice (not described further) to women presenting for emergency contraception.<br>If AUDIT score >19 then no brief advice but referred on to appropriate services. | Pharmacists only | Women presenting for emergency contraception | Yes[a] |
| Dare et al. 2017, Australia | Qualitative | Explore the barriers and enablers influencing Western Australian community pharmacists' knowledge, confidence, willingness and practice in engaging older clients in alcohol-related health discussions | Focus groups; thematic analysis | Pharmacists (n=14) | 'Alcohol related health information and advice' as part of existing care. No further detail. | Pharmacists only | Customers aged >60 years | Not specified |
| Fitzgerald et al. 2008, UK | Mixed methods | Evaluate the feasibility and acceptability of the provision of brief interventions on alcohol in community pharmacies | Interviews; framework analysis approach | Pharmacists (n=6); Pharmacy users (n=19) | Following consent for study customers completed FAST questionnaire with pharmacist and given a brief intervention[b] if score >2. | Pharmacists only (medicine counter assistants could offer study involvement) | Customers enquiring about the study or asking for certain products or services[c] | Yes[d] |
| Hall et al. 2019, UK | Qualitative | Identify the key contextual influences on perceived appropriateness and feasibility of delivering IBA in alternative community settings by non-specialist staff | Interviews; thematic analysis | Pharmacists (n=6); Pharmacy technician (n=1); counter staff(n=2); health champion/ smoking cessation advisor (n=1; supervisor(n=1) | Service pilot of AUDIT-C self-completion scratchcard and information leaflet tailored to each risk category identified from AUDIT-C (category thresholds not reported). Staff engaged increasing risk customers in a targeted brief conversation about alcohol consumption[e].<br>Participants in the "high risk" category advised to contact their GP or local alcohol support services. | Pharmacists and non-pharmacist staff | All adult customers | Yes[f] |

| Study, year and country | Study design | Study aim(s) | Qualitative data collection and analysis method(s) | Number and type of participant(s) in qualitative component | Details of SBI | Staff involved in SBI delivery | Details of customer eligibility for SBI | Did staff have training? |
|---|---|---|---|---|---|---|---|---|
| Hattingh et al. 2016, Australia | Mixed methods | To evaluate an SBI intervention in community pharmacies through assessing 1) the feasibility of recruiting and training pharmacists in SBI techniques, 2) the acceptability of SBI for alcohol use among consumers in pharmacies, 3) process outcomes for pharmacists delivering SBI and 4) retention' of consumers at three months | Interviews; analysis using general inductive approach | Pharmacists (n=10) | Customers provided study information then consented to AUDIT questionnaire with pharmacist followed by brief intervention[g] if AUDIT score ≥8 and provided alcohol booklet.<br>If AUDIT >20 also advised to see doctor or specialist. | Pharmacists only | Customers requesting certain prescription or non-prescription medications[h] | Yes[a] |
| Jamie et al. 2019, UK | Qualitative | 1. Explore patients' experiences of alcohol-related discussions within MURs<br>2. Understand the particular experiences of patients from socio-economically deprived areas vis-à-vis pharmacy-based alcohol-related discussions. | Focus groups; thematic analysis | Pharmacy users (n= 9) | 'Alcohol-related discussions' within a medication use review as part of existing care. No further detail. | Pharmacists only | Customers undergoing MUR | Not specified |
| Krska and Mackridge 2014, UK | Mixed methods | 1. Explore the views of community pharmacy staff, the general public and other stakeholders towards pharmacy- based alcohol screening and advisory services<br>2. Involve all relevant stakeholders in designing acceptable and feasible pharmacy-based alcohol screening and advisory services<br>3. Evaluate a pilot pharmacy-based alcohol screening and advisory service from multiple perspectives | Interviews and direct observation of pharmacy environment; thematic analysis | Pharmacy users (n=10); pharmacies (n=5) | Service pilot of AUDIT-C pre-screen followed 'as appropriate' by referral to pharmacist for completion of AUDIT and discussion in private area.<br>Direct referral to local alcohol treatment service could be offered | Pharmacy support staff did AUDIT-C<br><br>Pharmacists did full AUDIT and discussion | All customers | Yes[i] |
| Mackridge et al. 2015, UK | Mixed methods | To develop and apply a model for in-depth scrutiny of community pharmacy-based screening and intervention services with feedback to service providers to support development of best practice | Ethnographic observation, interviews, and interactive feedback with pharmacy staff; constant comparison technique | Pharmacies (n=5); SBI consultations (n=9); pharmacy users (n=16) | Commissioned service. Customers pre-screened using AUDIT-C and if scored >5 then offered an in-depth consultation framed around a full AUDIT assessment. | Any member of staff could do AUDIT-C<br><br>Pharmacist or other trained member of staff did AUDIT and consultation | Not specified | Yes[a] |

| Study, year and country | Study design | Study aim(s) | Qualitative data collection and analysis method(s) | Number and type of participant(s) in qualitative component | Details of SBI | Staff involved in SBI delivery | Details of customer eligibility for SBI | Did staff have training? |
|---|---|---|---|---|---|---|---|---|
| Quirk et al. 2016, UK | Qualitative | Use qualitative data from a process study nested within a community pharmacist brief intervention trial to study research participation effects | Interviews; framework analysis | Pharmacy users (n=24) | Customers given study information and asked 'how often do you have three or more drinks on a single occasion?' - if monthly or more then offered AUDIT by pharmacist in consultation room.<br>If AUDIT score 8-19 then consented to study and randomised to leaflet or brief intervention[j].<br>If AUDIT score >19 then given written materials and letter with AUDIT result and advise to see GP. Pharmacist also offered to fax letter and book appointment with GP. | Pharmacists and pharmacy support staff asked single question.<br><br>Pharmacists did AUDIT and brief intervention. | Customers exhibiting one or more specified behaviours[k] | Yes[l] |

SBI, screening and brief intervention, AUDIT(–C), alcohol use disorder identification test(–consumption), FAST, fast alcohol use screening test, GP, general practitioner

[a] Details of training given not provided

[b] Included: feedback on screening and risks to health; explanation of sensible drinking and units in clients' preferred drink(s), discussion of pros and cons of current drinking pattern and link with presenting issue, discussion of options for cutting down, recommendation to seek further advice, written information

[c] Emergency hormonal contraception; advice or products to address sleep difficulties or fatigue/lethargy/a feeling of being 'run-down', smoking cessation/reduction

[d] Pharmacists received two-day training course covering problem alcohol use in Scotland, attitudes to alcohol use, drinking guidelines, screening tools, motivational interviewing and brief intervention, how and where to refer clients and the study protocol. Medicine counter assistants had a day of training to enable them to correctly identify possible clients for study participation

[e] This involved three questions: how does your score make you feel?; what other benefits might you get from drinking a little less?; how do you think you could drink a little less?

[f] Staff involved received a self-explanatory IBA kit developed specifically to be self-explanatory and require minimal training or explanation for non-expert staff

[g] Conversation using motivational interviewing technique to facilitate behaviour change

[h] Non-prescription medications relevant to alcohol use such as 'hang-over cures', reflux/heartburn medications and sleep aids; prescriptions for certain chronic conditions that require diet modification (e.g. peptic ulcer disease, diabetes); prescriptions for medications contra-indicated with alcohol; prescriptions for medications with increased falls risk due to increased drowsiness (e.g. certain anti-psychotics, hypnotics and opioid analgesics)

[i] Pharmacy staff received 2-hour training event facilitated by local alcohol treatment service covering alcohol-related illness, units, local alcohol services and referral mechanisms, and the use of standard screening tools to categorise drinking and appropriate action to take. How to identify and approach potential service users was discussed, but this training did not cover delivery of behavioural interventions. Also provided with details of free electronic training

[j] A 10-minute discussion based on structured intervention protocol plus written information

[k] Viewing study posters and flyers; making a general health query or seeking advice linked to alcohol use; purchasing over the counter products for smoking cessation aids, gastrointestinal remedies, sleep aids and central nervous system depressants; receiving any of the following pharmacy services: smoking cessation, medication use review, health check or emergency hormonal contraception; presenting medication prescriptions for: cardiovascular disease, depression or anxiety, diabetes or gastric problems (taken from Dhital et al.)

[l] Pharmacists received seven hours training on trial procedures and intervention delivery, involving communication skills training influenced by the perspective of motivational interviewing. Pharmacy support staff attended a brief training session on how to identify potentially suitable participants for the trial.

### 4.3.3 Synthesis findings

I report the findings of the synthesis using the identified sub-themes within each of the three themes that correspond to a component of the COM-B model. This structure and supporting quotes are shown in Table 4.6 with further supporting quotes provided in Appendix G.

#### 4.3.3.1 Theme 1: Awareness, training and communication skills

This first theme covers attributes held by staff and customers that could influence delivery of SBI, reflecting the capability component of COM-B and in which four sub-themes were identified.

***Non-confrontational, empathetic communication skills***

Pharmacy staff demonstrated the importance of non-confrontational, empathetic communication skills with customers when engaging them with SBI. This staff skill was seen as important by staff and customers when raising the topic of alcohol,(128,133,134,136,246–249) with some customers' further engagement with SBI and perceptions of acceptability being contingent on it.(128,133,134,246,247,250) Staff empathy and non-judgmental approach was also reported to potentially promote customer honesty in an alcohol assessment.(247)

Not all staff demonstrated these communication skills, finding engaging customers difficult as a result(133,246) but the benefit of training in communication skills was recognised by pharmacists in one study.(246)

***Alcohol-related knowledge***

In additional to being empathetic, pharmacy staff alcohol-related knowledge also influenced how alcohol SBI was delivered. Pharmacists' knowledge of medications (133,136,246) and conditions affected by alcohol use such as blood pressure(136) enabled some to personalise the intervention given to customers who were drinking at risk.

However, pharmacists in one study examining provision of 'alcohol-related health information and advice' to older customers reported a lack of knowledge and skill beyond giving advice about medications in context of their alcohol use. In this study by Dare et al.(246) staff did not receive formal training in SBI and this may partly explain this perceived lack of capability. Staff were reported to have had prior training relating to SBI in seven of the nine included studies (see Table 4.5). However, there was limited detail of what the training involved and its impacts on staff and customer behaviour.

***Using alcohol screening tools***

Three studies elicited staff experiences of using alcohol screening tools, all of which involved the AUDIT.(133,136,248) Pharmacists in one study found the AUDIT easy to use and that the tool facilitated discussion about alcohol use.(136) Conversely in another study(133) some pharmacists reported feeling unfamiliar with the AUDIT, consequently reducing motivation to undertake SBI. A reason for the different views of the AUDIT between the two studies may be a consequence of differences in opportunities to gain experience in its use. In Hattingh et al.(136) the AUDIT could be done with any adult customer whereas in Brown et al.(133) it was only done within an emergency hormonal contraception (EHC) service. Authors in the latter noted pharmacists with a low demand for the service did not gain experience with AUDIT use thus ability to use the tool was not acquired or even lost.

In a third study researchers observed staff using the AUDIT and noted some were uncomfortable asking the AUDIT questions and changed question wording as a result, reflecting a significant influence of motivation on staff ability to use the AUDIT. (248) The limited detail about the training provided to staff in these three studies meant it was not possible to examine if the varying staff perceptions of the AUDIT were related to differences in training.

***Customer' awareness of their own risk***

When considering capability aspects of customers, it was evident that many customers engaging with SBI were unaware if they are drinking at risk or not.(128,133,136,247,248) This was a result of a lack of knowledge of recommended low risk drinking levels,(128,248) an unawareness of amount consumed,(128,133,136) or a lack of knowledge of how to calculate amount consumed to compare to recommended levels.(133,248) This lack of customers' awareness of their own risk may be less relevant to those drinking at highest risk, with some pharmacists(136) and customers(250) reporting that those at highest risk were mostly aware of their problem but were less motivated to engage in SBI.

When considering those customers that engage with SBI there is an evident group of 'deniers' – those who undergo alcohol assessment and are identified as drinking at risk but do not perceive themselves to have a problem. Consequently 'deniers' may not see a brief intervention as relevant or of benefit to them.(128,246,248) Why some customers saw benefit from SBI and others did not in part reflected their underlying knowledge and understanding of risk from alcohol with some 'deniers' seeing a 'problem' only equating to alcohol dependence, a view that could also be acquired through comparison with others.(128,250)

#### 4.3.3.2 Theme 2: Physical and social opportunities for SBI

The second theme concerns the opportunity component of the COM-B model and covers aspects of the community pharmacy setting and features of the SBI that can influence delivery. Six sub-themes were identified within this theme.

***Time and competing demands***

Undertaking SBI in the context of time and competing demands in pharmacy was a challenge experienced by pharmacists and non-pharmacist staff across the majority of the studies.(128,133,134,136,246,248,249) This was exacerbated when a pharmacy was busy,(133,136,249) no dedicated staff time for SBI,(249) and when only certain staff could undertake SBI as engaging customers was reported to be dependent on availability of these staff.(133,134,248,249)

Competing demands on staff time were reported to potentially lead to fewer customers being engaged by staff.(128,246,249) Timing of SBI can be crucial and staff should be able to engage customers at the right time. Competing demands and lack of time were reported by some to reduce staff ability to grasp opportunities when customers may be ready and willing to engage.(246) Additionally, for some pharmacists who experienced significant time pressures from their existing work demands, undertaking SBI was perceived to add to this pressure, consequently reducing motivation for it.(133)

With regards customers' time, observation in one study noted how customers declined alcohol assessment for the reason 'don't have the time', although did not elicit whether this was a genuine reason for not engaging or merely an excuse.(248)

***Existing pharmacy services***

Although existing pharmacy services are a demand on both staff and customer time, these services presented opportunity for SBI. For example, dispensing medication was reported as a good opportunity to ask about alcohol use whilst customers were waiting.(136,249) It also created opportunity through targeting customers whose medication requests may suggest alcohol misuse e.g. heartburn,(136) and through discussions about potential interactions between medication (or condition being treated) and alcohol.(133,246,247) Discussions of alcohol interactions may be initiated by staff or customers with the latter circumventing staff motivational barriers to asking customers about their alcohol use.(246)

Formal medication reviews (medication use reviews in UK practice and home medicine reviews in Australian practice),(133,246,247,249) smoking cessation (128,248,249) and health assessments.(246) were also successfully used by some staff to engage customers with SBI.

Staff were more confident asking about alcohol within these services, perceiving it as a more routine part of such services and less likely to make clients feel targeted.(133,246,249)

Despite staff perceptions of opportunity for SBI being provided by these services, two studies conducting in-pharmacy observation highlighted such opportunities were not always taken.(134,248) No reasons for this were reported in the studies.

A possible exception to opportunity from existing pharmacy services was indicated in Brown et al. where SBI was exclusively offered within an emergency hormonal contraception service.(133) Restricting SBI to customers using a single service meant SBI was dependent on uptake of that service, with low uptake a reality for some pharmacists and consequently fewer opportunities for SBI.(133) Some of the pharmacists also saw alcohol as a particularly sensitive topic for this customer group.

When considering services outside of pharmacy, SBI can involve offer of onward referral of those drinking at risk to other services. Two studies made brief reference to this, indicating the presence of clear pathways to refer to other services seem to be a facilitator(249) and their absence a barrier to SBI delivery.(136)

***Privacy and private spaces***

Privacy and private spaces in pharmacies were also important factors for consideration. Having sufficient privacy when undergoing SBI was important to customers (128,134,248) and some staff and customers regarded its absence to prevent customers engaging with and being honest in SBI.(134,249) Some staff found attaining privacy in the pharmacy setting difficult, especially when the pharmacy was busy(136,246,249) but the use of consultation rooms or private areas were perceived by both staff (136,249) and customers (134,248) to facilitate the required level of privacy.

However, it was noted in one study that staff use of private areas for SBI was mostly only when it was done in conjunction with an existing service that used such areas.(249) As discussed earlier, using existing services to ask customers about alcohol was perceived to prevent customers from feeling ‘targeted’ about their alcohol use. This same concern may in part explain this limited use of consultation rooms solely for SBI as some pharmacists in one study felt use of consultation rooms could also make customers feel ‘singled out’.(246) However, customers in the included studies did not express this view and were supportive of using consultation rooms or private areas to attain privacy.(128,134,248)

***Existing relationships***

For some staff, knowing their customers was as an opportunity for SBI through approaching customers they suspected may be drinking.(136,249) The presence of an existing relationship could also encourage customer engagement and honesty with SBI. This was perceived by some pharmacists to be a consequence of these customers feeling more comfortable with staff and was reflected in customer views.(128,246,248)

Existing relationships between staff and regular customers receiving SBI also provided opportunity for staff to ascertain changes in drinking behaviour when these customers re-attended the pharmacy.(136,249) However, the opportunities for SBI provided through existing relationships could become saturated once most regular customers had been engaged. This was of most significance in pharmacies with a high proportion of regular customers.(248,249)

Additionally, existing relationships could limit opportunity if pharmacists perceive an 'over-familiarity' with customers through knowing them very well or knowing them outside of the work environment.(133,246,249) This could increase staff perceptions of difficulty and feelings of embarrassment in engaging these customers (133,249) and through staff believing some customers do not 'need' an alcohol assessment.(133)

***Promotional and written materials***

Promotional materials such as displays, posters and leaflets prompted some customers to 'make the first approach' about alcohol use.(128,133,134,249) Staff also used promotional materials to broach SBI with customers, including use of local or national alcohol awareness campaigns.(246,249) However, for many staff the opportunity that promotional materials provided for customers to bring up their alcohol use was particularly valued.(128,133,249)

In additional to promotional materials, staff were provided with written materials to give customers in four of the studies.(133,136,249,250) Staff reported that these materials should be easily accessible and printed format seem to be favoured. (246,250) Providing written materials to customers as part of SBI was perceived by some pharmacists to enhance delivery through increasing customer knowledge relating to their alcohol use and risk and consequently motivation to reduce their drinking.(133,136,250) Written information may also serve as a reference for customers after SBI and could benefit customers such as the 'deniers' who do not perceive a verbal intervention as relevant to them.(250)

***Corporate restrictions***

Limitations on displaying promotional materials were an instance of corporate restrictions potentially reducing opportunity for SBI, as seen in two studies.(133,134) Restrictions on who

could be engaged with SBI were similarly seen to reduce opportunities as did restricting the number of interventions staff could undertake per week/month.(133,248)

This contrasts with pharmacists from other studies where such restrictions were not imposed and as such pharmacists used a variety of existing services and approaches, perceiving this flexibility to be beneficial for engaging customers.(136,249)

#### 4.3.3.3 Theme 3: Balancing beliefs of worth with concerns of taboo

The motivation component of the COM-B model is reflected in this third theme. Five sub-themes within this theme cover the influences of staff and customers' thought processes on the delivery of SBI.

***Belief in ability to help***

Motivation for many pharmacists to deliver SBI surrounded their belief in ability to help customers.(128,133,136,246) Many pharmacists perceived they could help through providing customers knowledge and enabling them to understand their risk from alcohol. (128,133,136)

The desired effect of SBI for people who are drinking at risk is a reduction in their alcohol consumption. Some staff saw positive impacts of SBI on drinking behaviour through being able to follow up with existing customers,(136,249) increasing their motivation to undertake SBI with other customers. For other pharmacists there was uncertainty about changing customers drinking behaviour, perceiving that some customers will, and others won't.(128,249) However, staff still delivered SBI despite this view as they perceived customers gain knowledge from it and the process could enhance staff-customer relationships.(128,133,136,248)

Customer experiences were in keeping with perceptions of pharmacists, showing an acquisition of knowledge and risk awareness for many (134,248,250) but also mixed motivation to reduce alcohol consumption.

***Alcohol as taboo***

A barrier to staff motivation to deliver SBI were individual perceptions of the alcohol topic. Some staff perceived alcohol as a taboo topic and had a lack of confidence in asking customers about their alcohol use, driven by feeling uncomfortable or embarrassed.(133,246,248) Such feelings could be exacerbated if staff perceived customers to have an alcohol problem and could lead to reduced motivation to engage customers.(128,246)

For staff who engaged customers, feelings of discomfort could also impact their use of alcohol screening tools, as shown by observation of some pharmacists changing wording of AUDIT questions in one study.(248) For other staff who saw alcohol as a sensitive topic, motivation to engage was impacted by concerns of offending customers and the possible negative consequences of this including loss of custom,(133) damaging existing relationships(136) and aggressive reactions.(128,246)

Conversely to these staff concerns, customer participants did not describe feeling offended nor embarrassed when being asked about alcohol.(133,247,248)

***Staff role legitimacy***

Despite the concerns about the alcohol topic expressed by some, pharmacists across five of the studies regarded SBI to be an appropriate activity to undertake as a community pharmacist.(133,136,246,248,249) Further perceptions of role legitimacy for pharmacists were through the view that SBI was in keeping with the expanding roles of pharmacists into health promotion services, providing motivation through meeting contractual requirements as well as enjoyment of such roles.(133,136,249)

Customer views largely reflected those of pharmacists, perceiving SBI by pharmacists to be appropriate (133,134,136,247,248) apart from one study describing a minority of customers seeing general practice to be more appropriate but provided no further detail to gain deeper understanding of this finding.(248)

Four of the studies described non-pharmacist staff being involved in SBI delivery (see Table 4.5) but role legitimacy for non-pharmacist staff was not clear from these studies. An apparent exception to this were UK staff in healthy living champion roles, which were seen to be appropriate for delivering SBI and perceived to enhance delivery.(248,249)

When considering customer motivations to engage with SBI relating to staff role legitimacy, pharmacists believed many customers view them as health professionals and see pharmacy as part of healthcare.(128,136,249) This was perceived to encourage customers to engage with SBI through creating an atmosphere of trust.(128,246,249) Conversely, it was perceived by a pharmacist in one study that being seen as a health professional could reduce customer honesty about alcohol use(249) but none of the studies gave customer views or experiences regarding honesty to understand the truth of this perception.

***Impact on staff***

Negative SBI experiences with customers was acknowledged by some pharmacists in one study to reduce motivation to undertake it in the future.(246) However, it was evident across the

studies that staff gaining experience in SBI delivery increased their confidence to ask customers about alcohol. These gains in confidence consequently increased staff motivation to proactively engage customers both in SBI (136,249) as well as pharmacy services in general.(248) Pharmacists in two studies also saw that delivering SBI could positively impact staff-customer relationships through showing an interest in their customers' health.(133,136)

#### 4.3.3.4 Summary of barriers and facilitators

Barriers and facilitators to delivering SBI in community pharmacy have been described under the different themes above. Table 4.7 provides a summary of these mapped against the COM-B model.

Table 4.6 Themes according to COM-B component and supporting quotes organised by sub-theme

| Theme (COM-B component) | Sub-theme | Supporting quotes |
|---|---|---|
| **Awareness, training and communication skills (Capability)** | Non-confrontational, empathetic communication skills | *'"It's not 'do you drink alcohol?' It's 'I'm just letting you know', and then 'well, oh yes I have a drink every night', and then we'll be like 'oh well I'll choose a different product for you', or 'don't take this at the same time', or something, so that you can keep the conversation going a bit....But that does need some training, because that's hardly a question, it's more giving information so it doesn't seem like a confronting interrogation."'* (pharmacist, first order, Dare et al.(246))<br><br>*'"it's more, amenable to talk here, about it because I - I can be honest and don't feel, that people are going to be judgmental"'*(customer, first order, Jaime et al.(247)) |
| | Alcohol-related knowledge | *'"... some people that were on high risk obviously and moderate risk we spoke to them if they had any blood pressure problems or, you know you usually have the medication next to you because you have dispensed something and have a little bit of a discussion how reducing alcohol intake can reduce blood pressure"'.* (pharmacist, first order, Hattingh et al.(136))<br><br>*'"information's out there on interventions and that sort of thing but there's not really a ... [guide] on how to do it"'* (pharmacist, first order, Dare et al.(246)) |
| | Using alcohol screening tools | *'All pharmacists agreed that working through the AUDIT scores with the consumers provided an opportunity to talk about alcohol use'* (second order, Hattingh et al.(136))<br><br>*'"The more you don't do it, the more and more you kind of, the knowledge kind of just slips away a little bit."'* (pharmacist, first order, Brown et al.(133)) |
| | Customers' awareness of their own risk | *'many of them [customers] were not aware of the amount they were drinking and how that translated into units'* (second order, Brown et al.(133))<br><br>*'"I would say it would be worthwhile to other people but I didn't really find it worthwhile. I don't feel I've got a problem with alcohol."'* (customer, first order, Fitzgerald et al.(128)) |
| **Physical and social opportunities for SBI (Opportunity)** | Time and competing demands | *'Researcher field notes identified inconsistent availability of trained staff owing to other work activities or shift patterns' (second order, Mackridge et al.* (248)*)*<br><br>*'"The potential issue with that [lack of time] is people might be ready to have that conversation right now and they might [not have that] ... desire to have that in ... a weeks' time or they may not feel comfortable having that discussion with someone else, so that's a potential issue."'* (pharmacist, first order, Dare et al.(246)) |

| Theme (COM-B component) | Sub-theme | Supporting quotes |
|---|---|---|
| **Physical and social opportunities for SBI (Opportunity)** | Existing pharmacy services | *'"When alcohol use comes up it is invariably associated with prescription medication – "it is 'will it be ok to drink while I'm taking this?' There is never any other time where I would feel comfortable bringing it up."'* (pharmacist, first order, Dare et al.(246)) |
| | | *'"I just always bring it up anyway in when we are doing the smoking [cessation] and I think they're a bit more honest … but when you're outside in the shop we just sort of, I think they get a bit more embarrassed about it."'* (counter assistant/smoking cessation advisor, first order, Hall et al.(249)) |
| | Privacy and private spaces | *'"… maintaining that level of privacy while you're discussing very personal questions, that was probably a big challenge"'* (pharmacist, first order, Hattingh et al.(136)) |
| | | *'"There were no customers in so it wasn't too bad but if it had have been busy I wouldn't have done it..Just like err may be a private screened area just like you know like a photo booth style curtain or something just at the end of the counter – nothing more than that – I'm not talking about a private room or anything"'* (customer, first order, Krska and Mackridge(134)) |
| | Existing relationships | *'"I think probably most of them [the clients who took part] know myself and the staff so I think they were comfortable with us discussing it."'* (pharmacist, first order, Fitzgerald et al.(128)) |
| | | *'in some cases the pharmacists made a judgement about whether or not to approach the topic with them, based on their knowledge about whether they had a regular partner and whether they were a potential candidate for an alcohol IBA'* (second order, Brown et al(133)) |
| | Promotional and written materials | *'"if the adverts and the promotional material are there sort of for people to see that can sort of lead for them to come in to speak to us rather than having to approach people about it"'* (pharmacist, first order, Hall et al.(249)) |
| | | *'"The leaflet made me think about things. . .. . .and in this case thinking about my drinking meant I drank slightly less"'* (customer, first order, Quirk et al.(250)) |
| | Corporate restrictions | *'Key barriers to service provision raised by staff were […] constraints on commissioned service (e.g. maximum numbers of service episodes or restrictive targeting)'* (second order, Mackridge et al.(248)) |
| | | *'The pharmacists who participated in the alcohol SBI provided positive feedback and highlighted that flexibility in approaching and working with consumers worked well'* (second order, Hattingh et al.(136)) |

| Theme (COM-B component) | Sub-theme | Supporting quotes |
|---|---|---|
| **Balancing beliefs of worth with concerns of taboo (Motivation)** | Belief in ability to help | *'"I think doing the alcohol study and the screening process it sort of, it makes the invisible visible. It brings that out … It allows the person to evaluate their own condition more objectively. … It will definitely allow them to think about what they're doing and their whole lifestyle so it may have an implication on their health, eating habits as well because often alcohol is associated with going out"'* (pharmacist, first order, Hattingh et al.(136)) |
| | | *'"Not everyone was really wanting to cut down even though they knew they were drinking more than was recommended. But I mean everyone I think learned something from it."'* (pharmacist, first order, Fitzgerald et al.(128)) |
| | Alcohol as taboo | *'"There are certain patients where you can smell the alcohol on them and they are regulars and you know they do have an issue, and bringing it up is sometimes a little bit difficult and uncomfortable, so generally we don't like to"'* (pharmacist, first order, Dare et al.(246)) |
| | | *'service users did not report concerns regarding discussing alcohol in the pharmacy'* (second order, Mackridge et al.(248)) |
| | Staff role legitimacy | *'"We do enjoy doing all the service and different promotional activity that we do here"'(pharmacist, first order, Brown et al.*(133)*)* |
| | | *'"I definitely found everybody quite honest and open and I think people especially with all this publicity about pharmacies people do sort of see you as a health professional."'* (pharmacist, first order, Fitzgerald et al.(128)) |
| | Impact on staff | *'"… it made the pharmacists to be more aware and to be more proactive as well when they approach customers"'* (pharmacist, first order, Hattingh et al.(136)) |
| | Remuneration | *'Without clear financial incentives, screening and brief intervention cannot be expected to be undertaken during busy times'*(second order, Hattingh et al.(136)) |
| | | *'"It wouldn't make any difference to me how much we got paid. I would do the service if I felt it was the right thing to do)"'* (pharmacist, first order, Brown et al. (133)) |

Table 4.7 Summary of barriers and facilitators to SBI delivery organised by theme reflecting each COM-B component

| Theme (COM-B component) | Facilitators | Barriers |
|---|---|---|
| **Awareness, training and communication skills (Capability)** | + Staff non-confrontational, empathetic communication skills<br>+ Training in communication skills<br>+ Staff knowledge of conditions and medications affected by alcohol use<br>+ Having and gaining experience in using screening tools<br>+ Many customers unaware of own risk | - Staff with limited non-confrontational communication skills<br>- Lack of training and knowledge in delivering SBI<br>- Staff lack of experience with alcohol screening tools<br>- 'Deniers' - customers drinking at risk but don't see this as a problem |
| **Physical and social opportunities for SBI (Opportunity)** | + Aligning SBI with medication dispensing<br>+ Aligning SBI with medication reviews, smoking cessation and health assessments<br>+ Clear pathways to refer to other services<br>+ Private areas and/or consultation rooms<br>+ Staff knowing existing customers that SBI could benefit<br>+ Existing customers' familiarity with staff<br>+ Regular returning customers<br>+ Posters and displays promoting SBI<br>+ Local/national alcohol awareness promotions<br>+ Easily accessible written materials to provide customers | - Multiple other demands on staff time<br>- Pharmacy busy with customers<br>- No dedicated staff time for SBI<br>- Insufficient staff able and available to undertake SBI<br>- Delivering SBI only within a single pharmacy service<br>- Lack of referral pathways to other services<br>- Lack of privacy due to presence of other customers<br>- A high proportion of customers being regulars<br>- Over-familiar staff-customer relationships<br>- Restrictions on number of permitted SBI per week/month<br>- Restrictions on which customers can be targeted<br>- Restrictions on using promotional materials |
| **Balancing beliefs of benefits and appropriateness with concerns of taboo (Motivation)** | + Staff believing they can help customers<br>+ Staff seeing positive changes in customers drinking behaviour<br>+ Most customers not embarrassed or offended to be asked about alcohol use<br>+ Pharmacist and healthy living champion role legitimacy to deliver SBI<br>+ SBI in keeping with expanding roles in community pharmacy<br>+ Pharmacists seen as trusted health professionals<br>+ Staff confidence in engaging customers<br>+ Remuneration for delivery of SBI | - Staff seeing alcohol as a taboo subject to raise<br>- Staff feeling uncomfortable or embarrassed talking about alcohol<br>- Staff concerns or experience of offending customers<br>- Uncertainty on intervention effect on customer drinking<br>- Some customers see GP surgeries as more appropriate for SBI |

COM-B, Capability Opportunity Motivation – Behaviour; SBI, alcohol screening and brief intervention; GP, general practitioner

## 4.4 Discussion

### 4.4.1 Summary of findings

To my knowledge this is the first qualitative evidence synthesis examining barriers and facilitators to SBI in community pharmacy. I used the COM-B model to describe influences on SBI delivery and understand how these influences facilitate or impede this delivery from a behavioural perspective. Key facilitators include: 1) non-confrontational, empathetic communication by staff; 2) aligning SBI with multiple other pharmacy services; and 3) role legitimacy of pharmacists along with staff belief in their ability to help. Notable barriers include: 1) lack of staff knowledge and experience of screening tools; 2) multiple other demands on staff time; and 3) staff concerns of causing offence or feeling uncomfortable. The greatest proportion of both barriers and facilitators identified were within the opportunity component of the COM-B model but each component should be seen as equally important, reflecting the model's described interaction of components to produce behaviour.(238) For example, the use of dispensing services in pharmacy (opportunity) can facilitate delivery of SBI as it provides time (opportunity) but also utilises staff knowledge of medications related to alcohol use (capability) and reduces staff feelings of discomfort (motivation).

### 4.4.2 Comparison with wider literature

I am aware of four systematic reviews exploring barriers and facilitators to implementing SBI in healthcare settings but none of these included studies of SBI in community pharmacy.(215–218) Two of these examined the primary care setting exclusively,(215,216) one included primary care, emergency care, secondary care, and forensic settings (218) and the other included primary care and community-based settings.(217) A number of barriers reported in all of these studies were evident in my review, suggesting they may be less setting-specific. These included: a lack of training; time and existing workload; and staff concerns relating to causing offence or embarrassment. The same is evident of the facilitators of training, belief in benefit of SBI and staff role legitimacy.

There were some notable differences in my findings as compared with the other systematic reviews of SBI. Firstly, aspects relating to privacy and private spaces were not reported in any of the other reviews. The second notable difference was the finding of non-confrontational, empathetic communication skills serving as a facilitator, or their absence a barrier. This was not a finding of the other reviews, although two found the presence or absence of 'counselling skills' (in reference to giving a brief intervention) a barrier or facilitator respectively.(215,216) I found

that non-confrontational, empathetic communication skills facilitated not just delivery of advice but also initial engagement with SBI. This facilitation of customer engagement is consistent with a systematic review of patient and public perspectives of community pharmacy noting non-judgemental attitudes and communication skills enhance their use of pharmacy services.(251) A further difference to the other systematic reviews of SBI concerns aligning SBI within existing practices as only one review referred to this concept, finding SBI being done as part of wellbeing clinics or registration sessions in primary care as a facilitator.(218)

It is not surprising that barriers relating to time for SBI amidst existing workload were evident in my synthesis as such barriers are well recognised in the delivery of other pharmacy services. A systematic review of implementation factors of professional pharmacy services identified time as a frequently reported barrier(252) and a systematic review of barriers to promoting cardiovascular health in community pharmacies found lack of time to be the leading barrier.(253)

Barriers in delivering public health services in community pharmacy relating to a lack of knowledge, skills and training (or facilitation by their presence) are also well recognised.(252–254) When specifically considering SBI in the community pharmacy setting, training as a facilitator for SBI is in keeping with a number of studies examining pharmacist SBI knowledge and skills.(255–257) 75% of community pharmacists in Auckland, New Zealand responding to a postal questionnaire (n=101) stated they knew nothing about screening tools, 77.2% reported knowing nothing about brief interventions, and only 30% reported prior alcohol or drug-related training.(255) Furthermore, of 497 community pharmacists in Scotland responding to a postal questionnaire just 3.6% reported previous training in alcohol issues.(257) In keeping with these findings the importance of training in SBI as a facilitator has been emphasised elsewhere.(135,256,258)

With regards staff concerns around alcohol as a taboo topic, the finding that these concerns are not reflective of the majority of customers has been reported in two reviews of SBI in primary care settings.(217,218) I only included studies where participants had experienced SBI delivery, which may have introduced a selection bias as customers engaging with SBI may be more likely to see it as acceptable. However, the finding is supported by studies exploring the potential for SBI in community pharmacy. A study in London found 96% of pharmacy user participants (n=102, of which 50% were drinking at risk) would be willing to discuss their drinking with a pharmacist.(129) A questionnaire study of 2384 pharmacy users in New Zealand (30% of whom were drinking at risk) found 72% agreed or strongly agreed that they would be comfortable to be asked about their alcohol use by a pharmacist and 76% agreed or strongly agreed they would be comfortable for a pharmacist to offer advice if thought to be drinking in a harmful way.(131) A

further feasibility study of SBI in London pharmacies found 4% of customers who received SBI reported feeling embarrassed.(132) A potential limitation in this finding is that such views may only reflect those of people that use community pharmacies and not the wider public. However a survey completed by 1573 members of the public in Scotland found the majority of participants (56%) agreed that pharmacists could advise on alcohol.(259)

The majority positive view of public and pharmacy users about pharmacist SBI corresponds with the synthesis finding that pharmacists viewed SBI as a legitimate part of their role. I only included studies where SBI had been delivered and this may have influenced the role legitimacy findings as pharmacists who deliver SBI may perceive more role legitimacy for SBI than those who don't deliver it.(258) However, a majority of pharmacists seeing SBI as a legitimate part of their role has been a finding of a number of exploratory studies.(255,257,260)

Barriers and facilitators relating to privacy and private areas that were identified in my synthesis are not something described in the reviews of SBI in primary care and other healthcare settings.(215–218) This may reflect the physical differences in staff practices in these non-pharmacy settings, where private rooms are the norm and as such privacy may not be seen to be an issue, as compared to the community pharmacy setting where many practices can be (and are) delivered in a public space. The public and pharmacy users' perception of a lack of privacy is a well-recognised barrier to use of extended pharmacy services and public health roles.(251,261,262) However, my findings suggest that sufficient privacy for customers was attainable through use of private areas and consultation rooms, which is in keeping with research into privacy in the pharmacy setting.(263)

Use of private areas and consultation rooms for SBI was facilitated by the alignment of SBI with multiple other pharmacy services that already used these areas. Aligning SBI with other pharmacy services could further facilitate SBI delivery through providing time and also providing a basis for raising the alcohol topic with customers. The facilitation for SBI gained by integration with medication review services has been applied in extensive complex intervention development work by researchers in the UK who co-produced an alcohol intervention integrated with existing UK pharmacy medication review services.(139) However my identified facilitator of utilising multiple services, as opposed to just one service, is reflected by this work as the decommissioning of medication use reviews (MUR) in the UK meant there was no longer a service for the alcohol intervention to integrate with and plans for a definitive trial were abandoned.(139)

### 4.4.3 Strengths and limitations

The findings of this synthesis have to be given in acknowledgement of the limitations of the included studies. Firstly, the identified studies were conducted in the UK and Australia only. Whilst this is in keeping with the context of my work in this PhD, application of the findings to other countries may not be appropriate. Additionally, only one of the studies sought perspectives of non-pharmacist staff in relation to SBI.(249) As such there may be unidentified barriers and facilitators specific to non-pharmacist staff. For this synthesis I used a broad definition of SBI in the inclusion criteria. This meant there was heterogeneity in brief interventions delivered across the small number of studies. There was also limited or no detail on SBI content and as a result the findings are not specific to one SBI approach. However, this can equally be a strength of this synthesis as it allows the findings to be applied more broadly. I believe this is of particular benefit in relation to the complex intervention development work set out in this PhD as it allows for flexibility in the intervention design.

The other potential limitation is that only peer-reviewed published studies were included. This decision was made with my supervisors and other review team members based on the time and resources available for this work as part of a PhD and a lack of methodology for judging quality of grey literature. Inclusion of only published studies may have introduced publication bias. There is no guidance for assessing the possibility of publication bias in qualitative evidence syntheses and uncertainty around its potential impact on a synthesis.(264) A study examining the publication of qualitative research that had been presented at British Sociological Association Medical Sociology meetings found only 44.2% of studies presented were published 5 years after being presented at the conference.(265) A positive association was noted between the quality of reporting of meeting abstracts (judged by the authors own criteria) and the likelihood of future publication, suggesting that non-publication may be a result of poorer quality research. If this is the case then the risk of publication bias is diminished. Given the uncertainties in the area I acknowledge the potential for publication bias in this synthesis but do not believe this will have had undue influence on the findings.

Having considered publication bias I believe a strength of this synthesis study was the use of a comprehensive search strategy to include all contemporary published evidence. A recognised alternative approach would be the use of purposive sampling of studies but by including all identified eligible published studies the selection process is transparent and reproducible.(266)

When considering the use of this synthesis in complex intervention development, a strength is the use of the COM-B model. The use of COM-B model as a framework generated a theoretical understanding of the behavioural influences on delivery of SBI in community pharmacy and permits application of the behaviour change wheel (BCW) to the findings. The BCW maps

intervention functions that address one or more target components of the COM-B model and further links the intervention functions to policy categories that may enable them.(238) The BCW is further discussed in Chapter 6.

## 4.5 Conclusion

This synthesis has provided an understanding of the barriers and facilitators to the delivery of SBI in community pharmacy from a behavioural perspective. Research into SBI in community pharmacy is limited in comparison to other healthcare settings and this review adds to this limited body of research. The use of the COM-B model enables application of the behavioural change wheel (BCW) to aid development of a complex intervention that incorporates functions to address identified barriers and utilise identified facilitators.

## 4.6 Next steps

This work package has examined the barriers and facilitators to the delivery of SBI in community pharmacy as experienced by those staff delivering and customers receiving it. A process of SBI, namely identification of risk and subsequent advice, underlies a case-finding approaches to alcohol-related liver disease (ArLD). Findings from this synthesis are anticipated to be applicable to a role for community pharmacy in ArLD identification. However, such a role does not appear to have been described in the research literature. The next work package described in Chapter 5 builds on the findings of this synthesis through exploring stakeholder views on a pharmacy role in ArLD.

# Chapter 5 Exploring a role for community pharmacists in the identification of alcohol-related liver disease through qualitative interviews with stakeholders

## 5.1 Introduction to chapter

This chapter describes the third work package of my PhD, qualitative interviews with stakeholders. It builds on the previous chapter (my qualitative evidence synthesis) through exploring views on identification of ArLD through community pharmacy. It utilises knowledge of and access to stakeholders obtained through evaluation of the Southampton primary care liver pathway in Chapter 3. The qualitative interview work in this chapter incorporates the complex intervention development key actions of 'undertaking primary data collection', 'involving stakeholders', 'understanding context and 'drawing on existing theories'. This work has been peer reviewed and published in Alcohol and Alcoholism(267). The publication is included in Appendix O.

### 5.1.1 Background and rationale

As discussed in section 1.5, existing research has examined undertaking screening and brief interventions (SBI) for alcohol use in community pharmacy and, from a liver perspective, the identification of Hepatitis C. Despite a body of research examining SBI in community pharmacy, research into a role for community pharmacy in the identification of ArLD has not been a focus of research despite a rationale for it. (138) A case-finding approach for ArLD relies on identifying people who are at risk of ArLD from how much they drink and engaging them with testing.(82) This process is akin to that of SBI where a person's risk of health consequences due to alcohol is assessed and advice and support to encourage reduction in alcohol provided if at risk. In recognition of this similarity, my qualitative evidence synthesis examined the evidence base of SBI in community pharmacy to understand barrier and facilitators experienced in its delivery that may therefore be encountered in a role in identification of ArLD.

Through the comprehensive searches and screening process conducted as part of my qualitative evidence synthesis I did not come across any research examining the identification of (or other role in) ArLD in community pharmacy. This represents an evidence gap of clear

relevance to the complex intervention development work set out in this PhD and the rationale for this qualitative research study.

My interrupted time series study of the Southampton primary care liver pathway in Chapter 3 provided understanding of how patients with ArLD are currently identified in the local healthcare system and key players involved in this process. This in conjunction with the qualitative evidence synthesis and discussions with the local pharmaceutical negotiating committee (see section 2.5.3) identified groups potentially affected by my future complex intervention. As discussed in section 2.6.1, undertaking primary qualitative research with the target groups of an intervention is a key action in complex intervention development.(169)

### 5.1.2 Aim

The aim of this qualitative study was to explore the perceptions and attitudes of professionals, patients and the public to a role for community pharmacists in the identification of alcohol-related liver disease. This addresses the third objective of my PhD.

## 5.2 Methods

### 5.2.1 Study design

I aimed to gain an understanding of perceptions of such a role, what it could look like and potential barriers and facilitators to it by drawing on existing, contextualised experiences of professionals, patients and the public. This exploratory, idea generating aim using those with relevant lived experience is well-suited to qualitative enquiry.(225)

My decision to use one-to-one interviews was multifactorial. Alcohol and alcohol-related liver disease are delicate subject matters to discuss. One-to-one interviews – particularly in the context of personal experience – are viewed more appropriate for such sensitive topics as compared to focus groups.(225) Interviews were also favoured by my two PPI contributors with lived experience of ArLD. Both felt their experiences before their diagnosis a personal matter and expressed reluctance to the idea of discussing this in a group setting.

My conversations with pharmacists, the chief officer of the Local Pharmaceutical Committee (LPC), and my own known experience of working in the NHS means I am aware of how busy healthcare professionals can be. The flexibility for participants provided by interviews in terms of both location and timing can maximise potential for participation for this group. Additionally, the diverse range of professionals in the study meant there were differences in status e.g. a pharmacist vs pharmacy assistant or a hepatology consultant vs hepatology nurse. This can limit the utility of focus groups as these hierarchical differences may prevent views being shared.(225) Lastly, the complex nature of interacting with healthcare systems lends itself to interview through provide opportunity to seek clarification from participants and gain a more detailed understanding.(225)

### 5.2.2 Participants and sampling strategy

For this study I aimed to gain a breadth of views. As such I aimed to recruit two broad groups of participants: one of professionals and the other of patients and members of the public. Purposive sampling was used as described below with the aim to get a range of participants anticipated to provide the most useful and relevant data to achieve the study aims.(268)

#### 5.2.2.1 Professional participants

When considering the professionals group, I planned to recruit pharmacy staff (including pharmacy assistants given I noted a lack of such participants in my qualitative evidence synthesis) as well as clinicians involved in existing care pathways of ArLD. From discussion with

my supervisory team and my knowledge of liver pathways this included GPs and hepatology practitioners, including nurses and consultants. This reflects the professionals involved in current liver pathways as identified through my work in Chapter 3: GPs identify, assess and refer patients with suspected ArLD to secondary care and hepatology practitioners will see and further assess patients referred through liver pathways, as well as patients who present outside of pathways e.g. through a hospital admission. Recognising the changing landscape of both community pharmacy and liver disease management in the last 20 years I also aimed to get a range of years of experience in the professionals.

#### 5.2.2.2 Patient and public participants

For the patient and public (PP) group my PPI contributors saw it paramount for patients with lived experience of ArLD to be involved. So that findings were drawn from experience I recruited members of the public who had experience of using a community pharmacy in the last year. For PP participants I also aimed for a range of ages, sex and level of socioeconomic deprivation given these are known to be factors associated with different outcomes of alcohol-related liver disease and alcohol-related harms.(60,269)

#### 5.2.2.3 Sample size

A number of factors were taken into consideration to guide estimates of how many participants were required. The planned study participants are relatively heterogenous as an intended consequence of aiming to get a breadth of views. This can increase transferability of findings but means small samples are not appropriate.(270)

I aimed to achieve data saturation, this defined here as the point where no new themes are developed in the analysis.(271) However, the precise number of interviews required to achieve this prior to analysis cannot be known.(271) Additionally, as part of a PhD project I have recognised time constraints and (from a resource perspective) I was the only person recruiting to and conducting interviews, as well as leading all analysis. These are recognised factors to take into consideration when selecting a sample size.(270)

With these factors in mind and through discussion with my supervisor team I aimed to recruit 20-30 participants for interview, with a minimum of 10 participants from each of the two broad groups. This reflects the underlying pragmatic approach to the PhD and was anticipated to be sufficient to achieve data saturation whilst also avoiding having an unmanageable amount of data that may make thematic analysis too difficult.(272)

### 5.2.3 Recruitment

Recruitment of participants was multimodal and took place over a 6 month period from September 2022 to February 2023.

#### 5.2.3.1 Patient and public participant recruitment

Patients were recruited from hepatology outpatient clinics of a tertiary referral hospital (University Hospital Southampton - UHS). The clinicians were informed of the eligibility criteria and asked to provide a participation information sheet with contact details of the research team to eligible participants. Additionally, I was able to attend the clinic location and sit in a separate room with patients able to speak to me directly following their clinic appointment if interested in participating. Conscious that seeing a patient in a room close to where they were seen in clinic may create associations of me as another clinician I always dressed in casual attire, wore my university ID badge and always introduced myself as a researcher from the University of Southampton.

Recruitment of members of the public was achieved through adverts for participation placed in six community pharmacies in Hampshire as well as electronic version of the advert shared on Twitter using a study twitter account. This advert was also shared by a contact of the research team with a liver-research interested public group. The advert provided contact details of the research team if interested in participating. The poster used was developed with input from PPI contributors as was the participant information sheet.

#### 5.2.3.2 Professional participant recruitment

Recruitment of community pharmacy staff was through a gatekeeper - the chief officer (CO) of Community Pharmacy South Central (CPSC). The CPSC is the LPC for the locality of Hampshire and the Isle of Wight. Invite to participate was sent by the CO to CPSC pharmacies as well as advert to participate available on the CPSC website. Additionally I was invited to speak about my research at a CPSC webinar, attended by pharmacy staff across the CPSC locality and also a separate CPSC AGM attended by CPSC committee members. I was able to share contact details for participation at these meetings.

Recruitment of non-pharmacy professionals took a key informant approach, using two hepatology consultants at UHS as gatekeepers to identify and offer participation to other clinicians perceived to be information rich.(273)

### 5.2.4 Consent

Written consent was given by all participants prior to being interviewed, either in person for face-to-face interviews or using an electronic consent form when interviewed remotely. Ethical approval for the study was granted by University of Southampton Faculty of Medicine Ethics Committee (reference number 64726) and South Central - Oxford B Research Ethics Committee (reference number 22/SC/0222).

### 5.2.5 Topic guide development

I utilised a number of sources to develop the interview topic guides. Different topic guides were developed for each of the participant groups. I initially drew on the existing literature examined for my narrative review article and qualitative evidence synthesis alongside my own knowledge as a clinician in the field of hepatology and understanding gained from my study of the Southampton primary care liver pathway.

For the pharmacy staff interview guide, this was further built upon by discussions held separately with two community pharmacists as well as meetings with the CO of CPSC. These highlighted I may encounter a lack of experience of alcohol and liver disease conversations in community pharmacy. In response to this I incorporated asking about experience of wider health advice in community pharmacy in order to better understand views of participants and the context.

For the patient and public interview topic guides, I was also able to test my topic guides and further refine them. This was done with one of my PPI contributors who has lived experience of ArLD and separately with a member of the public as part of a qualitative research methods course. A key change in the topic guide following this was opening with a broader, more open question initially – 'Can you tell me about how you interact with healthcare services?' – as well as adapting my questioning technique to minimise closed questions when probing participants.

Finally, my developed topic guides were discussed with two of my supervisors before recruitment and iteratively revised during data collection as required to ensure newly arising phenomena were explored.

The topic guides are provided in Appendix H. They covered a number of areas including: experiences of community pharmacies providing health services and advice; experiences of existing alcohol and liver disease care in community pharmacy and healthcare in general; views on a hypothetical role for pharmacy staff identifying ArLD including what this could entail and how this could link with existing care.

### 5.2.6 Data collection

I conducted semi-structured interviews with all the participants from September 2022 to August 2023. Participants could choose whether this was in person or done remotely via telephone or using a video call on Microsoft Teams. If in person this was offered in the community pharmacy, at the University of Southampton or in the University Hospital Southampton clinical research facility. I utilised multiple locations and inclusion of a remote option to help facilitate participation and additionally as a contingency for any future COVID-19 pandemic that may make in-person interviewing impossible.

All interviews were audio recorded. Basic demographic data were recorded on a data collection form. All interviews were transcribed verbatim into text by myself or a transcription company and the transcripts were anonymised.

Immediately following the interview I wrote reflective notes, both noting early analytical ideas stemming from the interview as well as any thoughts on the interview in terms of the questions asked, the responses given, the interaction between me and the participant and any salient events during the interview.

### 5.2.7 Data analysis

To analyse the interviews I used thematic analysis. As a qualitative analysis technique, thematic analysis is known to be accessible and appropriate for use by researchers with limited qualitative research experience such as myself.(274)

I undertook thematic analysis based on the reflexive approach described by Braun and Clarke.(144)

I familiarised myself with the data firstly by checking transcriptions of all interviews against the recorded audio, with one interview transcribed by myself. I read my reflective notes made at the time of the interview before checking the transcription. I then read and re-read transcripts and throughout this entire process made notes of features and possible ideas in the data.

I then imported the transcriptions into NVivo (release 1.6.1) for inductive coding. I initially coded four interviews, creating a list of all the codes generated. This list was reviewed and refined after each interview to create a codebook. Notes were made of early potential clusters of codes and possible themes during this process. My qualitative supervisor Kinda Ibrahim (KI) also coded two of these interviews and this, as well as my coding, was discussed to share perspectives and interpretations of the data. Further regular meetings were held between KI and I throughout the analysis to discuss coding and the subsequently themes created.

I used the codebook to code all further interviews, iteratively reviewing and revising codes throughout. If new codes were generated in the coding of an interview, previously coded interviews were re-examined for this code. Alongside the iterative revision of codes, I constructed early themes and sub-themes. I also created a visual map of code clusters using MindManager 2020 (version 20.0.334). I found this visualisation of connections between codes or clusters of code help theme construction and subsequent revision of themes (see Appendix J).

Following their construction, I examined the coded data extracts within the themes and sub-themes to revise them further until each theme was coherent and did not appear to overlap with another. I then defined and named the themes. This I achieved by writing up a full analysis for each theme, further refining each theme during this process and discussing the narrative with supporting quotes with regular meetings with my supervisor (KI). The themes presented common patterns and important information reported by the different groups and under each theme potential barriers and facilitators were discussed.

As a second stage of analysis I extracted potential barriers and facilitators to a role for community pharmacists identifying ArLD that were described in my themes. These were categorised according to whether they were influences on pharmacy staff or patients. Each barrier or facilitator was mapped to the components of the COM-B model. The extracted barriers and facilitators and their subsequent mapping were discussed in meetings with KI to ensure they were representative of the data and mapped appropriately. Uncertainties in appropriate mapping were resolved through discussion and re-review of the relevant data where necessary. This mirrors the process utilised in my qualitative evidence synthesis. By using the same method to examine barriers and facilitators I can triangulate the results of both pieces of work. This furthers my understanding of factors to consider in the intervention design to create an intervention that can be more likely to succeed. The use of COM-B also enables the application of the behaviour change wheel to identify intervention functions that can be effective in changing behaviours to address barriers as is discussed further in Chapter 6.(238)

## 5.3 Results

A total of 26 participants were recruited and interviewed. 15 were female and the median age was 50 years (range 24-80) with 15 participants in the professionals group and 11 participants in the patients and public group. A summary of participant characteristics is shown in Table 5.1. Most interviews were conducted remotely using Microsoft Teams (n=12) or telephone (n=8). The face-to-face interviews were conducted in a private room in a community pharmacy (n=5) or in a private room in the UHS clinical research facility (n=1). Interviews lasted between 18 and 72 minutes with a median length of 39 minutes.

Table 5.1 Characteristics of interviewed participants

| **Characteristics** | **Group** | |
|---|---|---|
| | **Professionals (n=15)** | **Patients and public (n=11)** |
| *Age years; median (range)* | 48 (24-61) | 56 (43-80) |
| *Sex* | | |
| *Female* | 11 (73) | 4 (36) |
| *Male* | 4 (27) | 7 (64) |
| *IMD Quintile* | | |
| *1* | - | 2 (18) |
| *2* | - | 4 (36) |
| *3* | - | 0 (0) |
| *4* | - | 1 (9) |
| *5* | - | 4 (36) |
| *Profession* | | - |
| *Community pharmacy staff* | 8 (53) | |
| *Pharmacist* | 4 (27) | |
| *Pharmacy assistant* | 4 (27) | |
| *Clinician managing ArLD* | 7 (46) | |
| *Consultant in gastroenterology and hepatology* | 2 (13) | |
| *Hepatology nurse* | 2 (13) | |
| *Fibroscan® practitioner* | 1 (7) | |
| *GP* | 2 (13) | |
| *Years in current role; median (range)* | 12 (0.5-28) | - |
| *Lived experience of ArLD* | - | 6 (54) |
| *Ethnicity* | | |
| *White British* | - | 10 (91) |
| *White Irish* | - | 1 (9) |

Numbers are counts (percentage) or median with range where stated
IMD index of multiple deprivation, GP general practitioner, ArLD alcohol related liver disease

### 5.3.1 Themes

Three overarching themes emerged through the analysis with each theme containing a number of sub-themes as summarised in Table 5.2. The analysis is described according to these themes and sub-themes with illustrative quotes given to enhance this description. Further examples of quotes coded to each sub-theme and theme are provided in Appendix I.

Table 5.2 Summary of themes and subthemes from thematic analysis of interviews

| Theme | Sub-theme |
|---|---|
| Acknowledging, seeking help and engaging with a hidden problem | Stereotyping and self-awareness of drinking |
| | Seeking advice and revealing hidden conditions |
| | Honesty, taboo and routinely contextualising |
| | Enabling and facilitating motivated engagement |
| Professional roles, boundaries and attributes | Experience of providing general health, alcohol and liver disease advice in community pharmacy |
| | Perceived abilities of community pharmacy staff to take on a role in ArLD identification |
| | Bypassing GPs |
| | Utilising benefits and recognising challenges of the community pharmacy setting |
| | Optimising a service model of delivery in pharmacy |
| Communication, relationships, collaboration and support | Making referrals and pathways simple, clear and efficient |
| | Two-way inter-disciplinary communication |
| | Establishing relationships and collaborating |
| | Unmet support needs |

#### 5.3.1.1 Acknowledging, seeking help and engaging with a hidden problem

This theme incorporates participants views and experiences around how alcohol related health problems – including alcohol-related liver disease – are realised and the challenges relating to this. Perceptions around engaging patients with possible alcohol-related health problems with a process of assessment, identification and ongoing care area are also examined.

***Stereotyping and self-awareness of drinking***

Many professional participants acknowledged the healthcare burden that exists as a result of alcohol-related health problems. Community pharmacy staff were no exception and reflected on regular experience of people with overt alcohol misuse in their day to day work. Both professional and public and patient (PP) participants recognised a ‘park-bencher alcoholic’ stereotype of a person with alcohol misuse. However, there was also the common perception that many people who drink ‘too much’ (and may have alcohol-related health problems) do not

fit this stereotype and that their excess alcohol use and related health problems may be unrealised or hidden, either from the individual themselves or from healthcare professionals (HCP).

> *there's this sinister side of it where you've got this idea of an alcoholic who is someone who sits on a park bench with a brown paper bag, but in actual fact, people don't know that they become dependent on alcohol and they may have a glass of wine, or half a bottle of wine every night to wind down from a day, and not realise that they are becoming dependent on alcohol[…] Some people don't know they have an alcohol problem. Some people do know they have an alcohol problem but it's hard to admit it. C014/Assistant/50F*

Professional and PP participants described 'unaware drinkers' – people unaware of how much they drink and/or what amount of alcohol may cause health problems – with some perceiving this can be a result of not understanding alcohol units. Conversely, some professional and PP participants also described 'self-aware drinkers' i.e. people who recognise that they drink 'too much' alcohol. It was not clear if this self-awareness reflected a person's knowledge of a specific threshold (and exceeding it) or merely an individual's sense of drinking too much. Despite being self-aware of drinking too much, these 'self-aware drinkers' were perceived to commonly be in a state of denial about their drinking being a problem. Participants with lived experience of ArLD (all of whom could be described as 'self-aware drinkers' before their diagnosis) and some professionals saw this in part driven by social comparisons: firstly, by their drinking being normalised because others around them drank similarly. Secondly, by comparing and separating themselves from the socially undesirable 'park bencher alcoholic'

> *Put it this way, you associated an alcoholic with being somebody on a park bench, drinking a bottle every single day. That's what you did. That's what you associated. You think, I'm not because I'm not doing that. I know it sounds stupid but your mind finds an easy way out. Your brain finds an easy way out. That's not me because I don't do that. C015/Patient/59F*

***Seeking advice and revealing hidden conditions***

Whether self-aware or unaware there was the general perception that people who drink 'too much' do not tend to seek help or advice for their own alcohol use, as was reflected in the experience of community pharmacy staff. Moreover, experience of many participants with lived experience of ArLD as well as some professional participants was that some people who drink 'too much' do not seek out health advice in general unless they have significant symptoms. This was evident in participant experience of a well-recognised problem - that alcohol-related liver disease (ArLD) often only presents at an advanced, symptomatic stage.

> *the difficulties with them I think they often present quite late, and that may, and we all know that those with ALD, their first even contact is often within an acute admission with decompensated liver failure. C001/GP/48F*

Many PP and professional participants recognised that the often asymptomatic development of alcohol-related health conditions such as ArLD could perpetuate denial of alcohol misuse as a problem. All participants regarded the fact that drinking 'too much' can cause liver disease to be universally held knowledge, with some contrasting this to a perceived lack of public knowledge about alcohol as a cause of other conditions such as cardiovascular disease and cancer. Consequently, whilst 'unaware drinkers' and the general public were not perceived to be concerned about liver disease, many 'self-aware drinkers' were believed to have some underlying health concern about their liver. However, all participants with lived experience of ArLD described how the absence of significant symptoms allayed concerns about liver disease with a lack of awareness of its potential to be present in the absence of symptoms recognised. The effect of this was a perception of being unaffected and as such no reason to seek out HCP help or advice. It was also perceived by some clinician participants that younger (in their twenties and thirties) 'self-aware drinkers' may be even less concerned about liver disease.

> *Well, it wasn't a problem and I hadn't - it wasn't giving me any problem; I hadn't got any problems with it. I don't know. You don't know, do you? I wasn't aware…never thought about it. C017/Patient/80M*

Equally, some professional and PP participants perceived that underlying concern about liver disease could motivate 'self-aware drinkers' to take up opportunities for a liver assessment. Some clinicians and PP perceived an assessment that incorporated a physical test such as blood test or scan enhanced this motivation as described by a public participant who took up a free liver test offered by a liver charity.

> *What really inspired me was the fact that I was well aware that I drink too much, and it can hurt your liver. So my knowledge of that made me bite the bullet and say, 'Well, I'd better go and check this out.' C020/Public/71M*

Such tests may provide evidence of ArLD and as such an overt alcohol-related health problem. The presence or absence of an overt alcohol-related health problems was also perceived to influence identification of a person's alcohol use. Professional and PP participants recognised the need to establish a person's alcohol use given the often hidden nature of alcohol misuse and alcohol-related health problems. However, clinician participants perceived alcohol use was often only asked about reactively in the context of a clinical sign, symptom or health problem potentially due to alcohol rather than it being asked routinely of patients. This was seen in experiences of identifying ArLD in general practice where an alcohol aetiology may only be elicited from patients after incidentally finding an abnormal liver blood test or ultrasound scan.

***Honesty, taboo and routinely contextualising***

Complicating this was the view of a number of professional participants that many people who drink 'too much' do not want to speak about it or lie about how much alcohol they drink if asked by a HCP, something supported by some participants with lived experience of ArLD. Some PP and professional participants described various reasons for this including the aforementioned denial and stigma associated with excess drinking, the potential personal consequences of revealing their alcohol use, and the communication style of the HCP asking.

> *That is always on the notes, alcohol consumption, but those notes at that point in time, and sometimes, when people see me, they say, 'I didn't always tell the GP the truth', and that's fine because maybe it's easier to talk to me, I don't know C003/Hepatology/47F*

It was perceived that for some, honest reporting of alcohol consumption may be greater if being asked in the context of evidence of a potentially alcohol-related health problem, such as an abnormal blood test or clinical sign. Further reflecting this was the perception of most participants that alcohol use needed to be asked within a perceived relevant health context and not seemingly out of the blue, with the latter in community pharmacy evoking views of offence and resultant non-engagement.

> *If I was in the chemist tomorrow, and they said, 'Oh, we're doing this thing about alcohol, to see if you've got a liver problem. Would you be interested in answering a few questions,' or whatever, then I'd say, 'Yes, that's fine.' I wouldn't have a problem with that, because it's help, but if the chemist just asked me out of the blue, 'Hello, Mr X. How are you? Oh, how many pints...?' I'd think, well... C020/Public/71M*

This was seen in wider views of many professional participants about a taboo around alcohol conversations and concern of causing offence. This concern, along with feeling uncomfortable, were recognised barriers to asking and advising about alcohol use for HCPs and community pharmacy staff alike, with some clinicians managing ArLD perceiving this contributing to late diagnoses of alcohol-related health problems. The concern of causing offence was particularly prominent for pharmacy staff participants without reported experience of talking to customers about their alcohol use and also when envisaging customers with perceived overt alcohol misuse. In this circumstance the concern was specifically of aggressive reactions.

> *I think if people, if they did have problems with alcohol, then I think maybe they would like to talk to somebody. It'd just be the right way to approach them. Obviously not make them too angry! C007/Assistant/47F*

In reflection of concerns of causing offence, many professional participants saw a non-confrontational, non-judgemental approach essential and that using a relevant health context to bring up alcohol use could attain this. In consideration of a role in ArLD, some PP and

professional participants envisaged this could be achieved in community pharmacy specifically through offering some form of liver health check or 'MOT' service. It was perceived customers would expect to be asked about alcohol use – and see it relevant – if taking up such an offer, thereby reducing concerns of causing offence for both staff and customer.

> *You probably would have to offer it in a 'well person' type offer, so that people do know that they're likely to be asked those questions, or that that's something that could come up in the conversation. Because people don't like to be caught off guard I think, that's the thing. C008/Hepatology/52F*

When considering how to offer a 'liver health check', professional participants with experience of asking and advising on alcohol use perceived an 'offer everyone' approach more acceptable to avoid potentially stigmatising people through implied pre-judgement of an alcohol problem. This approach was also perceived to help uncover hidden alcohol use, as reflected by a GP on their practice's 'offer everyone' approach of all patients able to voluntarily self-report alcohol intake on electronic consultation request. Similarly, two pharmacists also perceived offering an optional self-completed assessment of alcohol use to be an acceptable route to engagement and way into further discussion.

> *we ask every patient who fills in an eConsult about their alcohol consumption and about their smoking habits. That picks up quite a lot. I've had a couple where I've seen that if somebody's written they're drinking 30-plus units a week in something completely unrelated, like a fungal nail infection, or something, and then that would spur a conversation. C004/GP/31F*

***Enabling and facilitating motivated engagement***

Regardless of how a person may be asked and given advice, the widely held view was that people need to be motivated to engage with any alcohol-related health advice or assessment. Professional participants perceived that trying to force advice or further management in the absence of motivation is futile as it is waste of resources and services time and won't lead to the desired outcomes. The goal for many professional participants was therefore perceived to be helping to generate motivation for patients and facilitate their engagement with care.

> *if the patient's not in a place where they want to engage with the service, it's a waste of the service's time. If they're not ready to do that, then actually, me trying to force it down their throat is only likely to ruin the relationship they have, and actually probably not having that advantageous outcome for any party. C004/GP/31F*

In a pharmacy setting, PP and professional participants perceived highlighting the availability of a pharmacy service to customers and the public more widely was an essential part of generating and facilitating motivated engagement. Pharmacy staff reflected on successful ways this had been achieved for existing services (in particular with the hypertension case finding service)

using text messaging, promotional materials (posters, leaflets and advertising on pharmacy's websites and social media) and by direct offer to customers. Additionally, highlighting a service and provision of information related to it was perceived to potentially plant a seed for those currently not wanting to engage that may result in engagement at a later date. Some PP and pharmacy participants perceived this could be achieved in relation to ArLD by providing information about the risk of ArLD in relation to amount of alcohol consumed and its asymptomatic nature. For many participants, this information was perceived to be needed not only in a pharmacy setting but also more generally in the public domain to raise awareness of ArLD, in particular the potential for it to develop without symptoms.

> *more knowledge of what having a few glasses of wine - accessibility, visuals, more knowledge of what it could do to you.[...] If they had a little chart that says, 'This is acceptable. This might be dangerous. This is very dangerous,' if they had that sort of information - oh, maybe I should get that tested, then. I just think it may help. I probably would have looked at that. I hope! Obviously, hindsight is a wonderful thing! C015/Patient/59F*

Those considering the notion of a liver health check service emphasised an expectation this could offer a physical liver test, with the perception that engagement of 'self-aware' customers would be motivated by, and possibly contingent on, getting such a test.

> *If it's just questions, there's probably little value in doing it because I could answer those questions for myself. I know sometimes being asked prompts the thought process, I understand that, but most people already know the answers.[...] but to have actual proof, and to have something on a piece of paper that goes, actually we've done this blood test, and it's come back, and you need to be a bit careful, or you need to go now and see a GP, or a specialist, then that's valuable. C019/Patient/44M*

When considering patients who may engage and undergo assessment, the impact of the result of a test specifically for ArLD on a patient's ongoing motivation was considered by both PP and professional participants. Many perceived that if ArLD is identified through testing this can motivate patients to engage with further care and reduce their alcohol use. Some PP and clinician participants considered that the process of assessing for ArLD may cause feelings of fear and anxiety for patients, perceiving this a potential harm, but also reflected how these feelings could drive patients' ongoing motivation to engage with care and reduce alcohol use.

> *Maybe you do need to put an element of, 'Gosh, your liver isn't so great', but I think that, for some people, they come in sweating and really fidgety and agitated because they actually think they're at death's door.[...]However, they have stopped doing the things that made them need to come for a liver assessment, so that's also quite interesting, but I don't think you need to make people anxious. C003/Hepatology/47F*

However, if a patient were to be assessed and not found to have ArLD, some clinicians and a participant with lived experience of ArLD perceived this could unintentionally perpetuate current drinking habits. Consequently emphasis was placed on the need for clear information about future risk as part of any ArLD assessment to try reduce this negative potential consequence.

#### 5.3.1.2 Professional roles, boundaries and attributes

This theme examines the experiences of health advice in community pharmacy in relation to alcohol-related health problems. It further explores views and perceptions of what role community pharmacy staff could play in identification of ArLD alongside other healthcare professionals and perspectives of the attributes of both pharmacy staff and the community pharmacy environment that may impact such a role.

***Experience of providing general health, alcohol and liver disease advice in community pharmacy***

Both PP and professional participants recognised community pharmacists as qualified healthcare professionals who were appropriate for assessing and advising on minor illness such as sore throats, rashes, coughs, with many PP and clinician participants reporting positive experiences of this. Pharmacy staff participants had confidence in their ability in such roles to either address a customer's health concern(s) in pharmacy or signpost them to a more appropriate health service as required. Many were motivated to provide health advice through being able to help customers and enjoyment of a role different from the routine work.

> *I think it's just a different thing to do in the day. I think different from the run of the mill stuff. Also, if it was making a difference to people. It's exciting when someone changes or things get better or they find out a way to do something and help themselves. C014/Assistant/50F*

PP and professional participants perceived that health advice provided by pharmacy staff was usually 'customer-led', that is given in response to customers seeking advice for a specific health concern, either through their own volition or having been directed to pharmacy from another health service as done in the community pharmacy consultation service (CPCS). Other advanced pharmacy services – New Medicines Service (NMS), Medicines Use Review (MUR – now decommissioned) and in particular the hypertension case finding service (HCFS) – were a slight exception to this as they incorporate delivery of health advice but were reportedly offered directly to customers by some pharmacy staff rather than relying on customers asking for them.

*So it's really, it's mainly the patient who is in charge of seeking the advice. Although, having said that, sometimes when I'm doing like a New Medicine Service[...] that will then lead the conversation to me giving them health advice. C013/Pharmacist/50F*

In keeping with this and the earlier described view that advice on alcohol use is rarely sought from HCPs, most participants (both PP and professional) reported a general lack of experience of alcohol use being raised by customers or staff in community pharmacy. The only two pharmacy staff participants recalling customers seeking alcohol use advice reported this being customers raising concerns about a partners or relatives alcohol use rather than their own. With regards pharmacy staff experience of asking about alcohol use, this was mostly only described within advanced pharmacy services (NMS, MUR, HCFS). This was reflected by non-pharmacy participants, none of whom had used such services and whose only reported experience of alcohol being discussed was when told to avoid alcohol when taking certain medications.

Pharmacy staff experience of having alcohol conversations outside of advanced services appeared to reflect their years of working. Those with fewer years' experience did not recall alcohol being discussed at all but three pharmacy staff, each with over 20 years' experience (two pharmacists and one pharmacy assistant) had experience of offering a dedicated alcohol assessment and advice service in pharmacy, with one continuing to do so. However, with the exception of the one pharmacist continuing to offer an alcohol advice service, all other pharmacy staff participants did not feel they currently had sufficient knowledge to appropriately assess and advise on alcohol use or alcohol-related liver disease. Both these and non-pharmacy professionals recognised a need for training.

*as long as you got the right knowledge before and had some training then I think it would be okay C007/Assistant/47F*

Whilst there was mixed experience of assessing and providing alcohol advice in community pharmacy, no PP or professional participants had any experience of alcohol-related liver disease (ArLD) being discussed in pharmacy. Moreover, pharmacy staff had little or no experience of speaking with customers about any form of liver disease, again recognising a need for training to improve their knowledge. Where experience was described, this was superficial with the exception of one pharmacist who discussed Hepatitis C with customers on methadone prescriptions. Notably this was when customers sought advice themselves, in keeping with the earlier described 'customer-led' structure of pharmacy health advice.

*On occasion, somebody will speak to me about their concerns. They're worried they haven't gone through the hepatitis C screening, or they have, and they were supposed to have started their medication, and they've not been taking it. [...] they are my only clients that I do speak to directly about any sort of liver disease. That would be the methadone patients. C013/Pharmacist/50F*

***Perceived abilities of community pharmacy staff to take on a role in ArLD identification***

In the context of having had appropriate training, pharmacy staff generally perceived they would be able to discuss and advise on alcohol use and ArLD. Those with prior experience of an alcohol assessment and advice service perceived how existing communication skills used in their current day-to-day work were transferrable to alcohol and ArLD conversations.

> *I would be able to speak to them because we're always having different and difficult conversations. [...] I probably would need to refresh my knowledge, and make sure that I'm giving them the correct information and more up-to-date information. In terms of ability, I think once I have the correct information, I don't think I'd have a problem having the conversation.*
> *C013/Pharmacist/50F*

For PP and clinician participants, perceptions of capabilities of pharmacy staff were dependent on what was to be discussed and undertaken in relation to alcohol and ArLD as well as which staff were involved. Asking and appropriately advising about alcohol use was seen by most to be within the capabilities of pharmacists, with this belief often influenced by perceptions of pharmacists as qualified health professionals with the required skills.

Views of capabilities of pharmacy assistants were different, with some PP participants believing them to be insufficiently qualified to ask or advise on alcohol. Conversely, pharmacists acknowledged the training many pharmacy assistants have undertaken in relation to interacting with customers and perceived them able to appropriately engage customers in relation to alcohol use. Pharmacy assistant participants were familiar with engaging customers with pharmacy services and perceived that with further training to improve their knowledge and communication skills relating to alcohol use they would be able to engage customers with conversations about their alcohol use. This was reflected in the experience of one pharmacist providing an alcohol advice service in which trained pharmacy assistants performed the initial assessment of alcohol use, with advice subsequently provided by a pharmacist if a customer was identified as drinking at risk. Another pharmacist saw the involvement of pharmacy assistants to be essential, as was practiced for smoking cessation, recognising this prevented dependence on a busy pharmacist. Despite differing views on what was appropriate for pharmacy assistants to perform, professional and PP participants generally acknowledged they are typically the first (and often only) point of contact for customers and so would have to play a role in engaging customers.

> *Nine times out of ten, the pharmacist is actually behind a little counter[...] He's busy doing his drugs bit and it's the girls that come and see you. They're not medically qualified. Most of them aren't, anyway. C015/Patient/59F*

When considering ArLD, and in comparison to just alcohol assessment and advice, there were mixed views and uncertainty about what aspects of identifying ArLD were within pharmacists' capability. Views around this surrounded perceptions that assessing and identifying ArLD required specialist knowledge and, for some clinician participants, that this is not always evident in existing primary care practice. For PP participants there was uncertainty whether pharmacists were sufficiently qualified to assess for and discuss ArLD. Ideas of assessment were often tied to perceptions and expectations of a physical examination, blood test or scan and that these – as also acknowledged by pharmacy staff – were not something that happens routinely in community pharmacy. Clinician participants also recognised this and whilst some perceived pharmacists able to be trained to conduct a liver test in the form of a Fibroscan® or blood test, a lack of adequate space in most community pharmacies, the time to do such a test and the cost of testing were believed to make this unfeasible. As such most professional and PP participants saw the role of a pharmacist to be that of finding and engaging people appropriate for testing and then referring for it, rather than conducting testing themselves – in essence a case-finding role.

> *I think, certainly, the pharmacist is going to be an excellent person to trigger the initial referral to other services. Whether they would have the time or the ability to perform any further kind of ongoing assistance, or [..] some of the testing for liver disease, they are either venous blood tests or performing a Fibroscan®.[...] I think, probably, their role would be more as that initial engagement, signposting on, educating, breaking down that first initial barrier of we have got people that can help you with this. C005/Hepatology/52F*

***Bypassing GPs***

When considering getting a test and its subsequence management, a minority of PP and professional participants perceived it appropriate for pharmacists to provide customers a test result. The more commonly expressed view was that testing and further discussion should be with a different HCP with more perceived ability in ArLD. Whether testing and discussion should be via a GP was considered by PP and clinician participants and most were of the view that bypassing GPs for a more specific liver HCP was preferable. This view was influenced by wider attitudes and beliefs about GPs' roles and abilities, in particular that they are not the best person for specialised advice, that GPs themselves do not want to always be the gatekeepers to other services, and that it is increasingly difficult to get a GP appointment.

> *GP means general practitioner, so anything that's specific is usually outside their experience or their knowledge. Otherwise they'd have specialised in something. So they are a general practitioner, the first port-of-call, if you've got past triage of course C020/Public/71M*

Difficulties getting GP appointments was in part perceived a systems capacity issue, something similarly perceived a challenge in secondary care liver services by clinicians. Clinician participants expressed concern about the potential to outstrip the already stretched existing capacity in the system if a pharmacy role was not planned in consideration of this. In reflection of this, clinician participants who held the view that bypassing GPs for a specific liver HCP was preferable did not believe this could be direct to a hospital consultant clinic. The alternatives envisaged were accessing a liver assessment service in the community or a nurse-led clinic but existing services such as these were not available to some clinician participants and instead seen as an 'ideal' situation.

> *why can there not be a pathway that, say, is from the pharmacist identifying someone drinks a lot [...] there should be no reason why along with a commissioned service, for example, ok again its money, that then that patient can't be referred to say a community hepatology team, to provide them...to do their bloods, to follow them up, to do Fibroscans® if they need to and give that advice and then refer to secondary care if they need to. C001/GP/48F*

Whilst there was the overriding preference for GPs to be bypassed for a specific liver HCP, the majority of PP and professional participants were also of the view that a patient's GP should still be informed of the outcome of any assessment done. This appeared paramount for two public participants that reported having a number of chronic health conditions and perceived their GP to be at the centre of their care. A contrasting view of informing a person's GP was raised by both a public and clinician participant specifically in reference to alcohol use. Both participants perceived there may be customers for whom the appeal of an assessment relating to alcohol through pharmacy may be that it is not shared with GP or go on their GP record.

> *I would say fairly frequently some people don't want their GP to know a lot of things which I'm privy to, and that's fine too because if they don't want their GP to know, they don't. C003/Hepatology/47F*

***Utilising benefits and recognising challenges of the community pharmacy setting***

Difficulties of seeing GPs were contrasted by many PP participants with the perceived ease of going to a pharmacy and seeing a pharmacist face to face. This was in reference to geographic location i.e. being close to home or work and through the ability to get 'walk-in' healthcare advice without appointment and at weekends when many GP surgeries are closed. This convenience and accessibility were an evident driver of pharmacy use for health advice by PP participants.

> *Convenience. It's at the bottom of the road, there's someone there that could answer me straightaway, rather than going through the rigmarole of the doctor stuff. C020/Public/71M*

This was mirrored in some clinician participants' experience of community liver assessments for people who drink 'too much', where the geographic proximity was perceived to have maximised patient attendance. The accessibility of community pharmacy was also raised by some professional participants in relation to stigma, with some perceiving it a less stigmatising location for people who drink 'too much' as compared to hospital or GP, which consequently could increase engagement. This view was in part a result of experience of working with pharmacies for treating patients with hepatitis C.

> *a lot of our patients go to the pharmacy because they might be getting their methadone from the pharmacist, but also a lot of our patients that aren't on methadone, they will still go to a pharmacist rather than a GP, rather than the hospital. There doesn't seem to be the same stigma around your pharmacy C005/Hepatology/52F*

With the aforementioned concerns of stigma and taboo relating to talking about a person's alcohol use, privacy was seen by PP and professional participants to be paramount in any such discussions, something perceived attainable in pharmacies through use of consultation rooms. Conversely the main area of a pharmacy was perceived to be too busy with other customers to provide adequate privacy with the belief this would prevent many customers engaging in any such discussions.

The busyness of community pharmacy was widely seen as a barrier to delivery of any new service or role. Both PP and professional participants acknowledged that pharmacy staff are often busy with their existing workload and perceived a lack the time or sufficient staff to offer more, as reflected by one pharmacy assistant's ability to offer a diabetic risk assessment within the hypertension case finding service.

> *In theory, we should be doing it with everybody but, as I said, time is such a problem. It's not time, it's lack of other members of staff. So if I disappeared off into the room for 20 minutes, then it's going to put pressure on everyone else. C014/Assistant/50F*

Time and busyness were also described in reference to that of customers. Time waiting for prescriptions and purchasing over-the-counter (OTC) medication were widely perceived opportunities to engage customers with other services but pharmacy staff and PP participants held the view that many customers attending for these reasons want to minimise their time spent in pharmacy. Changes in pharmacy dispensing practice, namely electronic prescriptions and prescription vending machines, were also perceived to mean customers' time in pharmacy was minimised.

As such some PP and pharmacy staff participants believed any role in ArLD should be able to minimise extra time spent in pharmacy for customers when first engaging. This was perceived to

be achievable through integration with another service being used by the customer or by being able to offer customers to return at designated time. The latter was also a posed solution to the busyness of pharmacy staff through allowing extra workload to be planned for.

> *I suppose if we gave a timeslot that we know throughout the day, maybe, I don't know if it was like one hour a day that you could set aside and that would be the time that you would have your meetings with them C007/Assistant/47F*

The opportunity of OTC medication or prescription collection to engage people who drink 'too much' was emphasized by participants with lived experienced of ArLD. Prior to their diagnosis these participants only recollected using pharmacies for collecting a prescription (for some only on behalf of a partner of relative) or purchasing OTC medication, often pain relief.

> *only if it's prescribed by the doctor I would [go to a pharmacy].[…] my wife's on about four million pills a day, do you know what I mean? I'd definitely go to the pharmacy with her because she picks up this huge bag of pills C017/Patient/80M*

Most professional and PP participants perceived that the pharmacy-using public have a 'usual' pharmacy they visit and, in the context of repeat prescriptions, customers have more interaction with staff in their pharmacy than their GP, meaning more opportunities for engagement. Additionally, this regular customer base was recognised by some professional and PP participants to create familiarity between staff and customers, with some PP and pharmacy staff participants perceiving a sense of an established relationship. When considering a role in alcohol and ArLD, this regular, familiar contact was perceived by professional participants to be an attribute through being able to provide ongoing support following engagement. Additionally, the familiarity could help pharmacy staff feel more comfortable offering a service or advice to regular customers, helping overcome concerns of taboo.

> *people will come into the pharmacy, and they're visibly inebriated. If it's a regular customer, if it's somebody that I know, I will probably call them in and say, 'Is everything okay? […] we have had people who were concerned because they were probably people who are generally well-kept and tidy and everything. Then you see them slowly disintegrating, and you're thinking to yourself, what's going on? So we will have a conversation, and we will refer them to the drug and alcohol service if we're concerned. C013/Pharmacist/50F*

***Optimising a service model of delivery in pharmacy***

In consideration of a role of community pharmacy in ArLD being delivered as a commissioned pharmacy service, professional participants expressed views on general aspects of a service perceived to facilitate its delivery by pharmacy staff. Three aspects in particular were reported by most pharmacy staff and some clinician participants, namely: appropriate training provided

for all involved staff; readily available and ongoing support in case of problems encountered in delivering the service; and remuneration for service delivery.

The perceived need for pharmacy staff training in relation to alcohol and ArLD has been described earlier but when considering the provision and undertaking of training more generally, pharmacy staff perceived it beneficial for all staff, including locums, to be given training relating to a service to minimise disruption if some staff are unavailable. Additionally, two pharmacy staff from the same pharmacy perceived lengthy unpaid training undertaken in staff's own time to have prevented the delivery of a pharmacy smoking cessation service.

> *I think the training is quite lengthy, it's eight hours [...] then you've got to do a lot of learning on your own, your own pace, etc. As the service funding is quite low, I think it's only £5 per consultation, it's not worth me doing it, so that's why we get the dispensers to do it, as long as there's a pharmacy supervision. I guess because the dispensers haven't got a medical background as well and they don't get paid to do their learning in their own time, there's not much incentive for them to do it so they don't really bother. C006/Pharmacist/30F*

Where raised by professional participants, and as described in the above quote, the main view of remuneration for a pharmacy service was that it was appropriate for the time taken for pharmacy staff to deliver it. One pharmacy assistant perceived increased staff motivation to deliver services as a consequence of receiving a quarterly bonus for delivering sufficiently high numbers of services. However, this appeared an exception as other both professional and PP participants did not perceive pharmacy staff themselves to be incentivised by remuneration but believed it a necessity in the context of the business model of community pharmacy. This wider importance of remuneration for service delivery was reflected on by one pharmacist in relation to how the community pharmacy business model had changed to a one of service provision.

> *We're moving away from dispensing business model to more of a services business model. So we are always, always, always happy to provide services [...] if I'm spending ten minutes or 20 minutes providing a service that will pay us £30 or £20 or whatever it is for the 15 minutes, as opposed to me spending 15 minutes checking prescriptions, I'll only be paid £3 for, my time is obviously better well spent providing the service. Service provision and remuneration is very important C014/Assistant/50F*

Payment for a service was also considered in relation to maximising customer uptake of a service. When considering a service providing access to ArLD testing, three PP participants (all of whom resided in areas of lower deprivation) perceived this to be something customers may pay for. However, the more commonly expressed belief by PP and professional participants was that requiring customers to pay for any pharmacy service would largely prevent engagement and one pharmacist also highlighted the potential to create health inequalities.

#### 5.3.1.3 Communication, relationships, collaboration and support

This theme explores views regarding the links and communication between community pharmacy and other healthcare professionals. Further perceptions of needs in relation to this and also in relation to the wider interdisciplinary, collaborative care of patients with possible ArLD are also incorporated.

***Making referrals and pathways simple, clear and efficient***

As discussed, most PP and professional participants perceived that any community pharmacy role in ArLD would involve referral for more specialist input at some stage and as such require multi-disciplinary collaboration. A widely viewed essential aspect when considering any such referral was for the process to be relatively simple.

Pharmacy staff reflected on experience in their current practice and perceived that routine use of email in making referrals to GP (using NHSmail) to be positive. Pharmacy staff viewed email referrals to be a straightforward process and perceived further benefit through creation of an electronic audit trail, being able to delegate an email referral to other pharmacy staff if needed and, if non-urgent, being able to do it at a time convenient to work demands. Clinicians too were familiar with, and expressed a preference for, receiving referrals via email. In addition to use of email, professionals perceived it beneficial to have a dedicated referral form in order to help ensure necessary information was shared and avoid inappropriate referrals.

> *We have referral forms, which we used to fax, but now we send them through the NHS.net email, which is great, because then you've got an audit trail and you don't have to then store thousands of bits of paper C002/Pharmacist/53M*

The potential of inappropriate referrals and the ease of the referral process was reflected in many professionals perceived need for a clearly defined pathway for any community pharmacy ArLD role. Clinician participants reflected on experience of existing liver pathways in primary care, perceiving pathways with clearly defined eligibility and referral requirements to help ensure patients are tested and referred appropriately. GP and pharmacy staff participants reflected on experience of the community pharmacy consultation service (CPSC) where defined pathway eligibility was viewed to be important to recognise limitations of pharmacists' practice and prevent inappropriate work.

*It works really well for very straightforward, clear guideline role set, because there is an algorithm to follow, and so that works well. The ones that tend to get bounce back [...] would have a level of complexity that actually don't fit into a certain algorithm. [...] So I think if a similar service was to be set up for alcohol, it would just have to have clear structure to be followed. I've got friends who are pharmacists, who say it works well when they can follow the algorithm through, but actually, if they don't, they have no scope and no protection outside of that scope of deviating C004/GP/31F*

Clinician participants also placed importance on pathways in ArLD being simple in terms of minimising the number of patient-HCP visits required and maximising what is delivered at each visit. This view was influenced by the earlier discussed belief that people with alcohol misuse do not often seek health advice – and consequently a perceived need to make efficient use of any engagement – as well as the perception that a proportion of patients will disengage between visits.

*I'm a big believer in the fact that if you have got someone that is with you and they're engaged with you, if you are able to take further blood tests and perform a bit of an MOT at that stage, then you should do that, because that can only be a positive experience. From previous clinics that I've run, by doing that we have been able to diagnose various other issues that people might have, and I just think we know that liver disease is a real issue, and if you've got the opportunity to screen that patient, then you should do it as effectively, and gain as much as information, as you possibly can. C005/Hepatology/52F*

***Two-way inter-disciplinary communication***

When considering the potential to refer to liver services, all professionals perceived this acceptable and feasible although were not aware of any existing formal route. Community pharmacy staff saw this reflective of the wider situation in community pharmacy, having minimal experience of any formalised communication routes to non-GP healthcare services and a reliance on signposting.

Whether signposting customers or using established GP referral routes pharmacy staff described only gaining knowledge of the outcome through customers returning to the pharmacy, typically to collect a new prescription resulting from the earlier referral. Pharmacy staff were motivated by seeing the benefit of referrals to customers but some expressed frustration at a lack of direct feedback, perceiving this could improve future practice and, when concerned about a customer, alleviate worries about whether a customer received help.

*you don't get a thank you or any communication from them [GPs] about the patients you refer to them, which would be helpful because if they did refer back to you, then you'd know if your referrals could be finetuned, or better. Because you never get any feedback, you just hope for the best. C002/Pharmacist/53M*

This pharmacy staff experience of an absence of direct feedback reflected many professional participants' views of a lack of open two-way communication between community pharmacy and other HCPs, perceived to create a barrier to effective collaborative working causing frustration for staff and customers alike, reflected by some participants in their experience of the CPSC

> *quite often they just tell the patient you need to go back to your GP. Which is then the patient then either has to come back to us either in person and very grumpy, or they sit on a half-hour wait for the phone again when they've already done that already. [...] They are meant to e-mail us back and say 'I would recommend this prescription - can you do this?' and then we should send it off but I just don't think it's working like that. C001/GP/48F*

***Establishing relationships and collaborating***

For any collaborative working, many professional participants saw how establishing relationships between pharmacy and other HCPs was essential. These participants recognised difficulties in developing such relationships, with time to do so an evident barrier. Some also recognised how the structure of healthcare funding could inhibit collaborative relationships, as experienced in relation to vaccination services and also noted by a public participant.

> *both GP practices and pharmacies were doing jabs and it created a bit of conflict, because there was some funding that went with this. I think there was a case locally, [...] where a pharmacy and the GP practice really fell out over this. There was a notice from the GP practice saying, 'You must come to us,' and the pharmacy saying, 'Actually, no, you don't' C022/Public/54M*

Despite these challenges, pharmacy staff and clinician participants who had developed established pharmacy-HCP relationships recognised benefits including development of two-way communication channels, agreeing common goals, and enabling more effective care for patients. These were described in the context of engaging patients with Hepatitis C treatment, the hypertension case finding service, and providing opioid substitution therapy as highlighted in one pharmacist's experience of working with drug and alcohol services.

> *we tend to meet once a year. When we meet, the team at [local drug and alcohol service] will inform us what sort of things they would like us to do from our end, and we let them know what we would like. So, yes, it's a group meeting where we discuss what our priorities are for moving forward and what problems we have. We share the problems, and we come up with solutions to the problems. Say, with communication problems, they will tell us, 'Okay, here's a direct line number. You don't need to wait. [...] this is the person who you need to speak to.' C013/Pharmacist/50F*

***Unmet support needs***

Existing inter-disciplinary collaboration in relation to wider support for people with alcohol misuse (with or without ArLD) was perceived something of an unmet need by professional participants, recognising there are often a number of health and social issues experienced by people with alcohol misuse that may potentially be driving their alcohol use or a consequence of it. When considering ArLD, this unmet need was believed by clinician participants in part to be a consequence of a lack of incorporation of inter-disciplinary collaboration into pathways of care. ArLD pathways were seen by some clinician participants to be focused on diagnosis and not the wider support patients may require to reduce their drinking, consequently reducing pathways' effectiveness in preventing development or progression of disease. A lack of time of the HCPs in such pathways to provide the appropriate support was also described.

> *you're giving advice for a patient to make the changes, but there isn't enough support around how those changes are helping your patient, really, to make those changes, so I think there does need to be more investment in services within the community to be able to help with the changes that you're recommending. […] support groups for people that have got problems with alcohol, these are services that have been cut throughout the last ten years. There never seems to be any investment going into community services, so you do feel quite often with some of these pathways that you are just delaying the inevitable, rather than setting your patient up to succeed C005/Hepatology/52F*

In reflection of this unmet support need, both PP and professional participants widely perceived being able to provide access to support in addition to any assessment to be important for any community pharmacy role in alcohol and ArLD. The presence of existing relationships between some pharmacies and drug and alcohol services as highlighted earlier was perceived to be beneficial for this. However, some professional participants also reported a general lack of availability of suitable support services in the community for patients who drink too much, driven by perceptions of inadequate funding for such services and that existing services are often viewed as stigmatising by patients who drink 'too much'.

> *Our local service […] which is run by the NHS. Yes, they do substance misuse and alcohol misuse, and they offer help with reducing and cutting back. Otherwise, there are some local charities we can refer to. To be fair, there's probably not a lot. What we can offer is limited, and often comes with quite a stigma from patients, so there's quite a barrier to accepting. C004/GP/31F*

### 5.3.2 Identified barriers and facilitators mapped to the COM-B model

Across the themes that emerged from my analysis numerous perceived barriers and facilitators to a role for community pharmacists in identifying ArLD are described. These are presented below according to whether they are influences on pharmacy staff (Table 5.3) or pharmacy users (Table 5.4) and mapped to a component of the COM-B model.

Table 5.3 Perceived barriers and facilitators influencing a role for community pharmacists identifying ArLD described within thematic analysis and mapped to components of the COM-B model

| COM-B component | Facilitators – Pharmacy staff | Barriers – Pharmacy staff |
|---|---|---|
| **Capability** | + Pharmacy staff knowledge that alcohol misuse may not be visible<br>+ Pharmacy staff knowledge that drinking too much can cause liver disease<br>+ Prior experience and training of pharmacy staff in assessing and advising on alcohol use<br>+ Education for pharmacy staff about ArLD<br>+ Pharmacy staffs' existing non-confrontational and empathetic communication skills<br>+ Pharmacy staff existing ability to signpost patients to appropriate care | - Pharmacy staff lack knowledge, experience and training in assessing and advising about alcohol use and/or ArLD<br>- Pharmacy staff not currently competent to perform a liver fibrosis test |
| **Opportunity** | + Access to people with alcohol misuse and alcohol-relevant health issues in day-to-day pharmacy work<br>+ Customers waiting for OTC or prescriptions medication (their own or others)<br>+ Regular attendance at same pharmacy by many customers<br>+ Promotion of a pharmacist ArLD role to customers through display of information in pharmacy and directly informing customers through text messaging<br>+ Providing customers an optional self-completed risk assessment in pharmacy<br>+ Initial customer engagement by pharmacy assistants<br>+ Use of consultation rooms to obtain privacy<br>+ Customers raising concerns about a relative's/partner's/friend's alcohol use<br>+ Having educational written resources in pharmacy to give customers<br>+ Option of a dedicated time slot for pharmacy assessment<br>+ Pharmacy staff having ability to refer for liver testing<br>+ Use of secure electronic referrals (NHSmail or IT system) from pharmacy to other HCP<br>+ Clearly defined referral requirements and patient eligibility<br>+ Use of a dedicated referral form if referring from pharmacy to another HCP | - Alcohol use only routinely asked by pharmacy staff as part of an advanced pharmacy service or locally commissioned alcohol service<br>- Lack of privacy in main area of pharmacy<br>- Limited pharmacy personnel resources to perform extra work (other demands, time, staff numbers)<br>- Customers wanting to minimise their time in pharmacy<br>- Pharmacy staff do not have direct access to liver fibrosis testing<br>- Lack of suitable space in some pharmacies to perform a physical liver test or examination<br>- Cost of liver fibrosis testing equipment<br>- Lack of existing formal two-way communication routes between pharmacy and other HCPs<br>- Lack of existing relationships between pharmacy staff and other HCPs<br>- Stretched capacity in general practice and secondary care services<br>- Not usual practice to refer directly to secondary care based on ArLD risk alone<br>- Lack of existing inter-disciplinary collaboration for patients with alcohol problems in existing ArLD pathways |

| COM-B component | Facilitators – Pharmacy staff | Barriers – Pharmacy staff |
|---|---|---|
| **Opportunity** | + Existing relationships between pharmacies and drug and alcohol services<br>+ Readily available service support if delivering an ArLD service<br>+ Having a relevant health context to raise alcohol and ArLD in pharmacy e.g. within a pharmacy service<br>+ Increasing service delivery business model of community pharmacy<br>+ Collaborative working relationships between pharmacy staff and relevant non-pharmacy HCPs<br>+ Presence of a nurse-led liver clinic or community-based liver fibrosis assessment service | - Insufficient availability of suitable alcohol support services if required |
| **Motivation** | + Pharmacy staff enjoyment of providing health advice to customers<br>+ Pharmacy staff belief can have a role in ArLD if trained<br>+ Appropriate remuneration for the time required for pharmacy staff to deliver any ArLD role<br>+ Pharmacy staff familiarity with some customers<br>+ Pharmacy staff belief in own ability to help customers<br>+ Pharmacy staff seeing or learning of benefit to customers e.g. through customer contact or direct feedback of referral<br>+ Simple referral process | - Reliance on seeing an overt, potentially alcohol-related health problems to prompt asking customers<br>- Concern of causing offence to customers by enquiring about alcohol use<br>- Feeling uncomfortable asking customers about their alcohol use<br>- Concern of causing fear or anxiety for patients if informing them they are at risk of liver disease<br>- Requiring pharmacy staff training to be done in their own time<br>- Perceived lack of access to alcohol support for customers if this is needed<br>- Staff belief that testing and further discussion should be with a non-pharmacy HCP with more perceived ability in ArLD |

ArLD, alcohol-related liver disease; COM-B, Capability Opportunity Motivation – Behaviour; SBI, alcohol screening and brief intervention; GP, general practitioner; OTC, over the counter

Table 5.4 Perceived barriers and facilitators influencing pharmacy users engaging with a role for community pharmacists identifying ArLD described within thematic analysis and mapped to components of the COM-B model

| COM-B component | Facilitators – customers | Barriers – customers |
|---|---|---|
| **Capability** | + Customer knowledge of having a health problem due to alcohol<br>+ Customer knowledge that drinking too much can cause liver disease<br>+ Education for customers about future risk and potential complications of liver disease | - Customer lack of knowledge of own alcohol intake<br>- Customer lack of knowledge and understanding of thresholds of alcohol use that puts a person at risk<br>- Customer lack of knowledge that can have liver disease without symptoms |
| **Opportunity** | + Provision in pharmacy to self-assess alcohol consumption/risk<br>+ Accessibility of community pharmacies<br>+ Pharmacy less stigmatising location than GP, hospital or drug and alcohol service<br>+ Use of consultation room/private area to discuss personal alcohol use and ArLD risk<br>+ Promotion of a pharmacist ArLD role to customers through display of information in pharmacy and directly informing customers through text messaging<br>+ Option of a dedicated time slot for pharmacy assessment<br>+ Regular attendance at same pharmacy by many customers<br>+ Customers waiting for OTC or prescriptions medication (their own or others)<br>+ Any outcome/plan from pharmacy can be shared with customer's GP<br>+ Minimising number of patient-HCP face-to-face contacts required<br>+ Geographically convenient/accessible liver testing<br>+ Access to wider social support as part of any ArLD pathway | - Lack of privacy in main area of pharmacy<br>- Customers not having 'extra' time to spend in pharmacy beyond what they attended for<br>- Customers normalising their drinking through comparison with others<br>- Difficulty getting GP appointments (if required)<br>- Pharmacists not seen as a 'normal' source for alcohol or ArLD advice |
| **Motivation** | + Customer concern of having liver disease<br>+ Offer of access to a physical liver test such as blood test or scan<br>+ Non-confrontational, non-judgemental communication skills of pharmacy staff<br>+ Being asked about alcohol in a relevant health context, including a 'liver health check'<br>+ Provision of educational information in pharmacy about risk of ArLD and its' asymptomatic nature | - Being asked about alcohol use 'out of the blue'<br>- Concern of personal consequences of revealing alcohol use<br>- Concern of stigmatisation/being labelled an 'alcoholic'<br>- Pharmacy assistants not seen qualified by some customers to ask about alcohol use nor advise on ArLD<br>- Uncertainty of pharmacist ability to conduct a physical test for ArLD or discuss an ArLD diagnosis<br>- Advice only service/absence of a physical test offer<br>- Customers' fear of finding out they have liver disease |

| COM-B component | Facilitators – customers | Barriers – customers |
|---|---|---|
| **Motivation** | + Perception of pharmacists as qualified healthcare professionals to ask and advise about alcohol use<br>+<br>+ Optional for alcohol use/ArLD risk to be shared with GP<br>+ Concern of a relative/partner/friend about a customer's alcohol use<br>+ Some customers' familiarity with pharmacy staff<br>+ Ability to get direct access to more specialist input relating to ArLD<br>+ Free for customers to use service<br>+ Ask/offer made by staff to all customers<br>+ Having a 'positive' test for ArLD | - A negative test for ArLD may prevent further engagement with care and/or advice relating to alcohol use<br>- Requiring customers to pay for any service offered<br>- Negative perceptions of attending a DAAS if this is advised<br>- Customers having to see a GP for further care/investigation after any pharmacy assessment |

ArLD, alcohol-related liver disease; COM-B, Capability Opportunity Motivation – Behaviour; SBI, alcohol screening and brief intervention; GP, general practitioner; DAAS, drug and alcohol service

## 5.4 Discussion

### 5.4.1 Summary of main findings

To the best of my knowledge this is the first study to examine the perceptions and attitudes of stakeholders to a role for community pharmacists in identifying alcohol-related liver disease (ArLD).

Key findings in the first theme were how both PP and professional participants perceive that many people with alcohol misuse commonly do not acknowledge the risk to their health. An absence of an overt problem due to alcohol (such as dependency symptoms, physical illness or abnormal test results) was an evident reason for this, even though some people with alcohol misuse have underlying concerns about having ArLD. Absence of an overt problem and the perceived tendency for patients not to seek help meant PP and professionals recognised a need to enquire about alcohol use but to do so in a relevant context. This may be especially true in community pharmacy where there was concern of offence if asking about alcohol use out of the blue. An offer of a liver assessment service in pharmacy was seen as an appropriate context. It was believed that any such service would have to be well promoted to customers to help motivate their engagement, something that may be increased through incorporating access to liver testing.

The second theme included the important finding that both professional and PP participants perceive community pharmacists as qualified healthcare professionals. However, PP participants were less certain about pharmacists assessing for ArLD (as compared to just alcohol use) due to concerns of insufficient qualifications. This was an overriding PP perception of pharmacy assistants, who were generally not perceived to have the required capabilities to assess for ArLD. Clinicians expressed uncertainty about pharmacists assessing for ArLD but this was in relation to external influences of costs, space and time as opposed to ability. As evidence of this, professional participants generally considered pharmacists able to attain required capabilities through training. Both PP and professional participants mostly saw the role for community pharmacists in ArLD to be that of finding customers appropriate for further assessment and then connecting customers with it, the latter best done as a direct link to a liver service and to bypass GPs. Capacity in the healthcare system was a recognised challenge for GP and liver services alike for such a process. Additionally the pharmacy factors of staff time, remuneration, support, and pharmacy accessibility were all perceived to influence any pharmacy role in ArLD.

Important findings in the third theme surrounded considerations of how an envisaged role for community pharmacy in identification of ArLD would need to operate and integrate with existing care. Professional participants believed the use of electronic systems for referrals as vital, although examples of such systems currently only existed between pharmacy and GP. Professionals recognised the importance of establishing inter-professional relationships and enabling two-way communication, with improvements in each seen to create a positive cycle of better collaborative working. Conversely their absence, sometimes as a result on conflict from existing healthcare funding structures, could hinder this. Lastly was the finding of a perceived need for better integrated care with support services for patients who drinking too much and/or have ArLD. The perception of many professional and some PP participants was of a lack of suitable support services in current practice.

### 5.4.2 How findings relate to my qualitative evidence synthesis

The findings of this study support and build upon several findings of my qualitative evidence synthesis described in Chapter 4.

In this study and my synthesis I identified perceptions of 'unaware' drinkers and 'self-aware' drinkers with the latter indicated in my synthesis to be less motivated to engage with a brief intervention (BI). This interview study suggests that the motivation of such 'self-aware' drinkers to engage with a BI or advice is strongly influenced by the presence or absence of overt alcohol-related health problems. Additionally, both pieces of work indicate the comparison with (and distancing from) a stereotyped view of who is a person with an alcohol problem further drives self-perceptions of drinking as a non-issue even if informed of being an at-risk drinker. Together this suggest that only informing people with alcohol misuse of their risk without evidence of consequence is insufficient for some to change their drinking habits.

Perceptions of pharmacists as qualified health professionals capable of asking and advising on alcohol use with appropriate training, in particular given their existing appropriate communication skills, is a finding of the synthesis further supported by this study. This study has elaborated on this as it indicates this perception is not only held by many pharmacy users and staff but also by clinicians involved in the care of patients with ArLD. Notably, there was a general lack of experience of alcohol advice being sought or provided in community pharmacy in my study. This is likely a reflection that as few as 5% of community pharmacies in England offer an alcohol advice service.(125)

Both this study and my synthesis had similar findings in relation to aspects of the pharmacy setting that could influence the delivery of an extended role. The barriers of staff time and workload as well as the problem of privacy in a busy pharmacy (with consultation rooms able to address this) were further supported in this study, as was the importance of using attendance for prescriptions and OTC medications as an opportunity to engage patients. The latter was further emphasised in this work as the main opportunity recognised by patients with lived experience of ArLD when considering their use of pharmacy before their diagnosis.

Customer time as a potential barrier was not clear from the synthesis with suggestion that some customers do not have time for alcohol assessment in pharmacy. This was expanded on and supported by this interview study, revealing perceptions that some customers aim to minimise time spent in pharmacy and how changes in dispensing such as prescription vending machines are enabling this.

As was found in my synthesis, this study recognised pharmacy staff's concern of causing offence (as result of the perceived taboo of alcohol) can be barrier to engaging customers but that most customers are not offended or embarrassed when asked about their alcohol use in community pharmacy. Importantly, this study indicates the latter appears contingent on alcohol being asked about in a relevant context. Additionally, appropriateness of being asked by pharmacy assistants was questioned by PP participants. My synthesis studies had little data regarding pharmacy assistants. This study found that assistants themselves (and pharmacists) believe with appropriate training, they could be involved in a role for pharmacy in ArLD. However, largely negative PP perceptions about the suitability of pharmacy assistants having any role beyond engaging patients were evident.

This interview study provides several findings relating to referral of patients from community pharmacy to other services as well as wider communication and collaboration with other services. Little was found in relation to these aspects in my synthesis but a notable similarity was the finding of the perceived importance of having clear pathways for referral of patients to other services. The triangulation of this finding in the two pieces of work demonstrates its potential importance in a role in ArLD.

### 5.4.3 Comparison with wider literature

The existence of 'unaware' drinkers as described by both professional and PP participants is indicated in wider research. An interview study of 1008 participants recently diagnosed with alcohol use disorder from six European countries looked at reasons for not seeking treatment and found the most common reason was 'lack of problem' awareness, reported by 55.3% (n=251) of participants who gave a reason for not seeking treatment.(275)

The revealed perception that most people with alcohol misuse do not tend to seek help – and when they do this is in response to an overt problem – is supported by other research. A questionnaire study in the USA of 101 members of the public with alcohol abuse or dependence (according to DSM-IV criteria) examined the sequence of events prior to seeking help. The authors report an 87% probability that a health problem – encompassing alcohol withdrawal, physical health consequences, or emotional health problems – will have occurred before any help seeking.(276) Similarly, a qualitative interview study of 19 people with self-reported alcohol dependence in England identified life disturbance from alcohol (commonly health or relationship problems) as the primary reason to seek help and the absence of such disturbance delaying help seeking.(277)

The view revealed in my interviews that alcohol causing liver disease is widely held knowledge is supported by a public survey of 2,024 British adults in which 91% selected 'alcohol' as something that causes or increase risk of liver disease.(278) The suggestion in my analysis that ArLD is an specific underlying concern of some self-aware drinkers does not appear to be explored in other research and is suggested as an area for future research. Counter to my work, the potential physical health impacts from alcohol were described as a relative non-issue for people with alcohol misuse in a Swedish qualitative study of 32 people with possible alcohol dependence.(279) This different finding may reflect the liver-focussed nature of my study leading participants to give greater consideration to liver disease rather than more general health impacts.

My analysis revealed differing views about honesty of patients when asked about their alcohol use. Other research has shown similar mixed views but with a common belief that people do not answer honestly when asked about their alcohol use by an HCP. A cross-sectional survey study of 3499 members of the public in England found that the majority of respondents (54.2%) did not agree with the statement 'I believe people answer honestly when they are asked about their alcohol consumption at health care visits'.(280) The results of this study also support the suggestion from my analysis that alcohol should be discussed in a relevant context given 63.8% of participants agreed with the statement 'Health care providers should ask about patients' alcohol consumption but only if patients seek health care to discuss symptoms that could be related to high consumption'.(280) This concept has been seen in qualitative research of primary care professionals with authors of one study finding GPs 'stressed the importance of not asking the question 'out of the blue'(281) as was suggested by both PP and professionals in my analysis. Additionally, the acceptability of alcohol being raised in the context of a health check (as suggested in my analysis as a liver health check or MOT) was raised by some participants in a qualitative interview study examining primary care patients' views on drinking and its consequences.(282)

In relation to the concept of a liver assessment, my analysis revealed varying perceptions about the effect of providing a liver test both as a potential pull factor to engage patients and the potential for a result to influence changes in drinking both positively and negatively. As discussed in section 1.4.3 a number of studies have suggested a non-invasive liver test, particularly if positive, may help reduce alcohol use as a form of biofeedback but the evidence is limited by lack of suitable control groups or underpowered studies.

The role of biofeedback in influencing patients' behaviour in relation to their health has been examined in other conditions, notably the use of spirometry in smoking cessation and point of care tests in diabetes. Both of these have been utilised in community pharmacy.(283,284) Improving smoking cessation rates through use of spirometry feedback as part of a smoking cessation intervention compared to a smoking cessation intervention alone has been demonstrated in RCTs.(285) A community pharmacy study in Australia compared two screening methods for diabetes in community pharmacy and subsequent referral, finding pharmacy users undergoing a diabetic risk questionnaire and fingerprick blood glucose test had significantly higher uptake of subsequent referral to a GP than those undergoing the questionnaire alone (42.4% vs 20.5%, $p<0.01$).(286) This could suggest the biofeedback of an abnormal test result may increase engagement with ongoing care, as was considered by participants in this interview study when considering the effects of pharmacy providing offer of a liver assessment including a physical test.

This study is the first to examine perceptions of pharmacists' ability in relation to alcohol-related liver disease. As discussed, there was uncertainty about capabilities of pharmacies in this area. Concerns of pharmacists' capabilities in relation to extended services (as opposed to traditional dispensing roles) by both GPs and patients and the public has been noted in systematic reviews of the literature.(251,287) Within my study, clinicians generally perceived pharmacists could be trained to identify ArLD but their role would be limited by environmental issues such as costs and space for testing, rather than their capability. PP participants perceptions were more reflective of previous research findings in that physicians were perceived more appropriate as they are perceived to already have required capabilities and qualifications.(251) However, perceptions around the role of GP in relation to community pharmacy appear to show new findings compared to previous research. Previous qualitative research involving semi-structured interviews of 30 members of the public in Scotland highlighted participants may use pharmacies as a result of not wanted to waste a GPs time(288), something further noted in a systematic review of patient and public perceptions of community pharmacy.(251) My study found both PP and professional participants saw benefit of bypassing GPs, typically due to concerns about difficulty seeing a GP as opposed the previously noted concerns of wasting a GPs time. This different perception to what has been

seen in previous research may be a consequence of experiencing the recognised increasing workload pressures in UK primary care.(289)

### 5.4.4 Strengths and limitations

I believe a key strength in this study was the inclusion of multiple types of participants. My evaluation of the Southampton primary care liver pathway in Chapter 3 was key in helping inform which participants to include and in particular the key clinician informants recruited. The range of participants helped triangulate findings and can both increase the transferability of this work as well as its credibility.(270,290) I also believe the inclusion of pharmacy assistants in the work vital as this group are often not included in pharmacy research (as noted in my synthesis in Chapter 4) despite being a key stakeholder in the delivering of expanding pharmacy roles.

From a methodological perspective, a strength of the work with regards the analysis was the close working with an experience qualitative researcher - my supervisor Kinda Ibrahim. Regular meetings to discuss emerging ideas and themes from the data and the initial dual coding of transcripts (as I conducted) are recognised was to enhance the credibility of qualitative analysis.(290)

My study equally has limitations. I recruited pharmacy staff from independent, small and large chain pharmacies but not from supermarket-based pharmacies nor from any of the three largest pharmacy chains in England at the time.(291) However, I do not believe this to be a major limitation given that the majority of pharmacies in England are now small chain or independent and that these are preferred by the public.(291,292)

When considering the application of the work it is important to note that the participants were either working in healthcare or recruited via healthcare services and so the findings may not apply when considering people who do not currently access healthcare – something a recognised challenge in people with alcohol misuse. However, many of the participants had either personal experience of not accessing healthcare or working with people who don't tend to, which I believe will help increase the relevance of findings to this population.

In terms of conducting the interviews a challenge and subsequent limitation of the study as a whole is that participants were considering a hypothetical role for pharmacists. I will use the findings to further develop my complex intervention but recognising that there cannot be certainty about whether barriers and facilitators leading from this work will be born out in real world practice. To try and mitigate this when conducting the interviews I continually encouraged participants to reflect on their own experiences such that views expressed about a hypothetical role for pharmacists were grounded in real-world experiences.

## 5.5 Conclusion

The range of stakeholders interviewed recognized a potential role for community pharmacists in identifying ArLD, with the focus being on finding people at risk and engaging them with care. This was felt to best utilise existing skills of pharmacy staff, with recognition that further training for pharmacy staff would be essential. For a role in identifying ArLD to be possible, a collaborative approach with liver and alcohol support services was key, with access to community based liver testing an anticipated requirement. Coupled with the increasing drive for pharmacists to be a first port of call for illness in the community, a pharmacist role in ArLD identification could increase awareness and enable earlier diagnosis and subsequent care for ArLD and alcohol misuse in people who may not access healthcare elsewhere.

## 5.6 Next steps

The integration of the findings from this study with those of my qualitative evidence synthesis provides an understanding of factors that would influence a role for community pharmacists in the identification of ArLD. The application of the COM-B model in both pieces of work allows for application of the behaviour change wheel (BCW) to guide intervention design. The application of the BCW forms part of the fourth work package presented next in Chapter 6.

# Chapter 6 Designing a complex intervention to enable ArLD identification by community pharmacists using a theory-based and co-design approach

## 6.1 Introduction to chapter

This chapter builds on the findings from the work in previous chapters, using them to develop the components of a complex intervention through application of the behaviour change wheel. These components were subsequently reviewed, amended and refined with a group of stakeholders in a co-design process to construct an overall design of the intervention and a theoretical understanding of how it can work. The work reflects a number of the complex intervention development key actions: 'design and refine the intervention', 'involve stakeholders', 'draw on existing theories' and 'pay attention to future implementation of the intervention in the real world'.

### 6.1.1 Aim

The aim of this work package was to design and describe an implementable community pharmacy complex intervention to enable community pharmacists to identify people at risk of alcohol-related liver disease and connect them with pathways of care. This addresses the fourth objective of my PhD.

## 6.2 Methods

The work undertaken in this chapter was done in two phases as shown in Figure 6.1. The first phase was the design of a preliminary version of the intervention through application of the behaviour change wheel to the findings from Chapter 4 and Chapter 5. This is described in section 6.2.1. The second phase was a co-design workshop with stakeholders to revise and refine the theory-based design as described in section 6.2.2.

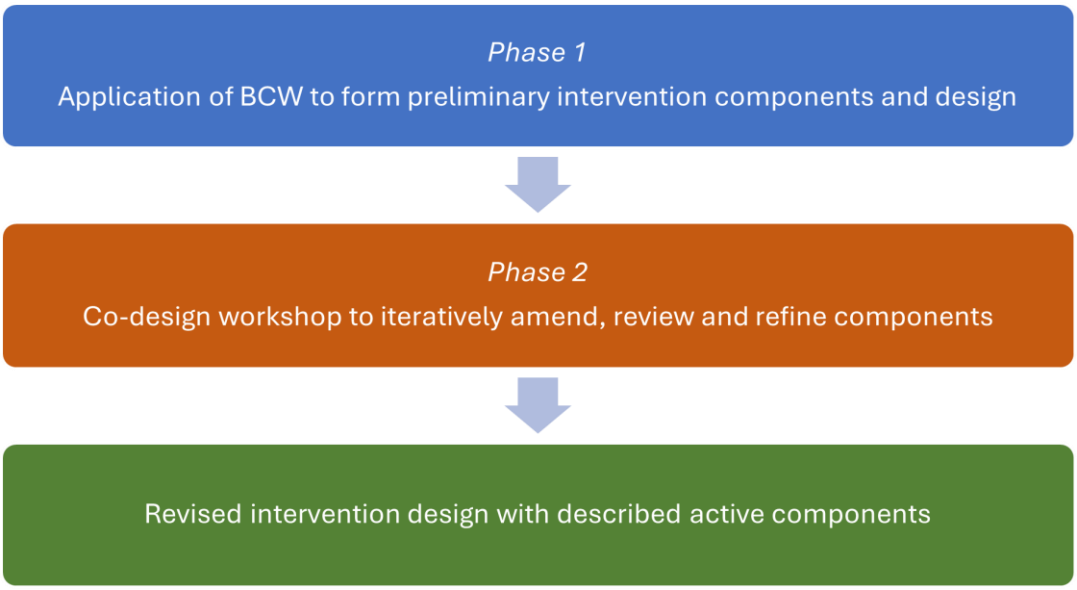



Figure 6.1 Phases of work undertaken in this chapter in the design of the complex intervention. BCW, behaviour change wheel

### 6.2.1 Phase 1: Preliminary intervention design through application of behaviour change wheel

#### 6.2.1.1 Overview of the behaviour change wheel

The behaviour change wheel (BCW) is a framework for understanding behaviour(s) and developing interventions and policies to change them. The COM-B model forms the basis of the BCW. The COM-B model (described in section 4.2.6.1) provides understanding of the nature of behaviour(s) by considering three components that are key influences on a behaviour, namely: capacity, opportunity and motivation.(238)

COM-B can be utilised in intervention design through identifying which influences could be targeted in order for a behaviour to occur. This is a 'COM-B diagnosis'.(240) The BCW considers

how these influences can be changed by providing a framework of intervention functions and policy categories that are linked to the components of the COM-B model.

The BCW contains nine intervention functions (hereafter 'BCW functions') and seven policy categories. The different BCW functions and how they link to the components of the COM-B model are shown in Table 6.1. This allows for selection of BCW functions most suited to address a COM-B component target. As shown in Table 6.1, each COM-B component can be addressed by more than one BCW function. An intervention (or part of an intervention) can incorporate more than one BCW function.(241)

Once an BCW function (or functions) has been selected, its content should be developed. This can be achieved by considering and applying behaviour change techniques (BCTs), described as the 'active components' of interventions.(241) There are 93 different BCTs described.(293) Determining appropriate BCTs is recognised to be a skilled task with detailed knowledge of the different BCTs required.(240,294) In the absence of this skill and knowledge, an alternative described approach to developing BCW function content is to use the 'NEAR' principles as a guide: normal, easy, attractive, routine.(240)

- 'Normal' is that people are more likely to do things that they see being done and approved of by others with whom they identify.
- 'Easy' is that people are more likely to do things if they are simple, within their capabilities and require little resources, time and/or effort.
- 'Attractive' is that people are more likely to do things they think will be enjoyable, serve a purpose or avoid something bad happening.
- 'Routine' is that people are more likely to do things if they are part of their routine and don't require thinking about doing them.

How NEAR principles relate to each BCW function is shown in Table 6.1. Given the expertise anticipated to be required to utilise BCTs, I instead used the NEAR principles to inform BCW function content that was drawn from findings from my work in Chapter 4 and Chapter 5 as described below in section 6.2.1.2.

Table 6.1 Behaviour change wheel intervention functions and how they map to the COM-B model components and to the NEAR principles

| **Intervention function (definition)**(241) | **Suitable target COM-B components** | | | **Relevant NEAR principles to guide function content**(240) |
|---|---|---|---|---|
| | **Capability** | **Opportunity** | **Motivation** | |
| *Education*<br>(increasing knowledge or understanding) | X | | X | Normal<br>Easy<br>Attractive |
| *Training*<br>(imparting skills) | X | X | X | Easy<br>Routine |
| *Enablement*<br>(Increasing means/reducing barriers to increase capability or opportunity) | X | X | X | Routine<br>Easy |
| *Restriction*<br>(using rules to reduce opportunity to engage in target behaviour or increase target behaviour by reducing opportunity to engage in competing behaviours) | | X | | Normal |
| *Environmental restructuring*<br>(changing the physical or social environment) | | X | X | Normal<br>Easy<br>Routine |
| *Modelling*<br>(providing an example for people to aspire to or imitate) | | X | X | Normal<br>Attractive |
| *Persuasion*<br>(using communication to induce positive or negative feelings or simulate action) | | | X | Normal<br>Attractive |
| *Incentivisation*<br>(creating expectation or reward) | | | X | Normal<br>Attractive |
| *Coercion*<br>(creating expectation of punishment or cost) | | | X | Normal<br>Attractive |
| COM-B, Capability Opportunity Motivation – Behaviour; NEAR, Normal, Easy, Attractive, Routine | | | | |

The seven policy categories of the BCW do not directly link to the COM-B model but instead link to the BCW functions as the influence of policy on behaviour is through enabling or supporting interventions. In intervention development, a policy category is often already decided, with the focus on creating the best intervention of that policy type.(240) This is the case in my PhD work, which would correspond to the 'service provision' policy category. The different policy categories and their definitions are shown in Table 6.2.

Table 6.2 Policy categories in the behaviour change wheel and their definitions

| **Policy option** | **Definition (taken from** (238)**)** |
|---|---|
| Communication/marketing | Using print, electronic, telephonic or broadcast media |
| Guidelines | Creating documents that recommend or mandate practice. This includes all changes to service provision |
| Fiscal | Using the tax system to reduce or increase the financial cost |
| Regulation | Establishing rules or principles of behaviour or practice |
| Legislation | Making or changing laws |
| Environmental/social planning | Designing and/or controlling the physical or social environment |
| Service provision | Delivering a service |

#### 6.2.1.2 Identifying and selecting intervention functions through application of behaviour change wheel to my work

My work in Chapter 4 and Chapter 5 produced barriers and facilitators mapped to components of the COM-B model. As discussed in Chapter 4, the process of identifying people at risk of alcohol-related harm (and providing advice) is akin to a process of identifying people at risk of ArLD. Chapter 5 built on the findings of Chapter 4 by specifically considering the identification of ArLD in community pharmacy, considering both the identification of people at risk and the ability to get such individuals testing and care.

The findings of Chapter 5 supported an ArLD identification role for community pharmacists that incorporates identifying and providing advice to people at risk of ArLD, and subsequently referring a person at risk for testing and care. In forming a COM-B diagnosis I considered this process as two broad sequential behaviours namely (1) establishing risk and (2) linking to testing and care. Furthermore, as in chapter 5, this was considered as to whether the behaviour being influenced was that of pharmacy staff or pharmacy users.

I re-examined the findings of Chapter 4 and Chapter 5 to form combined barriers and facilitators for the two behaviours separately for pharmacy staff and pharmacy users, all mapped to the COM-B components. This involved an iterative process of reviewing and where necessary combining and/or rewording the barriers and facilitators. This created a triangulated and concise summary of the barriers and facilitators identified to an alcohol-related liver disease (ArLD) intervention in pharmacy, forming an overall 'COM-B diagnosis'.

These barriers and facilitators were then considered in relation to the BCW functions appropriate to their mapped COM-B component. Facilitators were examined to identify which BCW function(s) they represent (if any) and which barriers they could address according to the suitable COM-B target(s) of a given BCW function (Table 6.1). This process formed potential intervention components where each had at least one BCW function, was informed by at least one facilitator, and addressed at least one barrier. An intervention component could influence both staff and customer behaviour. These potential BCW functions were then considered by stakeholders in the intervention co-design process.

### 6.2.2 Phase 2: Intervention co-design

#### 6.2.2.1 Overview of co-design

As discussed in section 2.5.1 there are varying definitions of 'co-design' as well as the sometimes interchangeably used terms 'co-production' or 'co-creation', with overlap between the two.(295,296) The distinction is further complicated by the use of the terms in reference to research design or to intervention (or service/product) design. In the setting of a research project, co-design may be used to describe practices used only in the planning phase of research or alternatively used to describe practices throughout the research cycle.(297)

In this chapter, the practice of co-design is in reference to intervention design for which I have utilised the definition of co-design provided by 'Think Local Act Personal,' namely that co-design is when 'people who use services are involved in designing services, based on their experiences and ideas. They have genuine influence but have not been involved in 'seeing it through''.(156)

#### 6.2.2.2 Approaches to co-design

In reflection of the varying definitions and applications of co-design there is no single agreed method to undertake co-design. However, a number of similar key principles underpinning approaches to co-design (or co-production) are described in varying government sources as shown in Table 6.3.

Table 6.3 Examples of key principles of co-design or co-production from three government sources

| Source | Key principles of co-design/co-production |
|---|---|
| Social Care Institute for Excellence(298) | • Equality<br>• Diversity<br>• Accessibility<br>• Reciprocity |
| Agency for Clinical Innovation(299) | • Equal partnership<br>• Openness<br>• Respect<br>• Empathy<br>• Design together |
| National Institute for Health and Care Research(300) | • Sharing of power<br>• Including all perspective and skills<br>• Respecting and valuing the knowledge of all those working together<br>• Reciprocity<br>• Building and maintaining relationships |

In addition to these key principles, approaches to co-design have been developed that provide more prescriptive guidance on applying co-design to health service design, although there is a lack of evidence regarding the effectiveness of different approaches.(295,297)

A well-recognised approach in the NHS is experienced-based co-design (EBCD).(301) EBCD describes a six stage cycle of (1) setting up the co-design project, (2) gather staff experiences through observation and in-depth interviews; (3) gather patient and carer experiences through observation and filmed narrative-based interviews; (4) bring staff and patients together to share their experiences and identify priorities for change prompted by a 20-30 minute 'trigger' film; (5) co-design work in small groups around those priorities; (6) a celebration and review event.(301) The use of filmed narratives and subsequent editing into a trigger film is recognised to be a limitation of EBCD given the associated costs, skill and time required to do this.(301) In consideration of this I did not believe it was suitable for application to my co-design work.

An alternative published co-design approach is the co-design framework described by Trischler et al.(302) The framework is a revision of an earlier framework developed in the co-design of a school-based alcohol education programme.(303) The revised framework was achieved through examination of application of the original framework to other service design projects concerning sensitive topics and/or vulnerable user groups. The revised framework consists of seven steps of co-design of a public service to follow in what they term the 'ideation' stage. The 'ideation' stage is synonymous with 'intervention design' i.e. the stage following exploratory research but prior to testing and refinement.(304) The seven steps of the framework and what each step constitutes is shown in Table 6.4.

I regarded this framework as suited to guide the co-design in my PhD given it was developed in a relevant topic area and allows for flexibility in the steps – something not evident in the EBCD approach. In particular the framework authors recognise that co-design activities can be adapted to be achievable in the context of time and resources available to both participants and organisers. This was important given I was working with a mix of stakeholders, including professionals with significant work commitments.

Table 6.4 Seven step co-design framework and application to my co-design work

| **Step** | **Description** (adapted from (302,303)) | **Application in my co-design work** |
|---|---|---|
| Resourcing | Experts or researchers gain initial understanding of the task or problem to be addressed | Qualitative evidence synthesis and qualitative interview study with combination of findings through BCW analysis |
| Planning | Planning of the recruitment, sensitization, facilitation and evaluation stages | Establishing intended workshop attendees<br>Creation of workshop activities (broad barrier sheets and potential component cards)<br>Organisation of venue |
| Recruiting | Identification and recruitment of suitable stakeholders to attend design meeting through communication with stakeholders and/or gatekeepers to access suitable co-design contributors | Communication and invitation of participation with known stakeholders, including through supervisor links and CPSC |
| Sensitizing | 'Setting the scene' to the design activity/meeting and task(s) as well as inspire preliminary ideas for the design | Introduction at co-design workshop<br>Barrier sheet activity |
| Facilitation | Co-design activities in which experts or researchers take a primarily passive role | Barrier sheet activity<br>Potential component cards activity<br>My observation-only role and use of supervisor as facilitator |
| Reflecting and building for change | Analysing insights from co-design activities and sharing with stakeholders | Examination of MoSCoW ratings and mapping of components<br>Meeting with CPSC<br>Further iterative refinements and future feasibility testing |

BCW, Behaviour Change Wheel; CPSC, Community Pharmacy South Central; MoSCoW, Must have Should have Could have Won't have

#### 6.2.2.3 Application of co-design to my intervention design

The application of the co-design framework in the design of my intervention was achieved through a co-design workshop with stakeholders. How this process aligned with the co-design framework is shown in Table 6.4. The stakeholders involved mirrored those identified for

inclusion in the interview study in Chapter 5 (see section 5.2.2). This included pharmacists, pharmacy assistants, patients, public, hepatology professionals, and GPs. This mix of stakeholders reflected the co-design principle of diversity/including all perspectives. I planned to have a maximum of two attendees from each of these stakeholder groups so that no single group is over-represented. This also meant the total number for the workshop would not exceed 12, which is suggested as a maximum group size to allow for meaningful input from all individuals.(305,306)

#### 6.2.2.3.1 Co-design workshop recruitment

Patient and public attendees were invited from my existing PPI contributors and from PPI contributors known to my supervisory team. Hepatology and GP attendees were invited through my contacts as well as those of my supervisor Dr Ryan Buchanan. Pharmacy staff were invited by my direct contact of those who I was introduced to through Community Pharmacy South Central and expressed an interest in being involved in the project going forward.

To maximise availability for attendance, the workshop was held in a convenient location for all attendees on a weekday evening 1830-2030 with food and drink provided. Participants were also provided a £50 shopping voucher for their participation, in keeping with NIHR guidance on payment rates for PPI.(307) This also helped achieve the co-design principle of reciprocity. I arranged for my supervisor (RB) to facilitate the session in order that I could take field notes of the discussions, views and ideas shared during the workshop. I took a passive role and did not have any direct influence on the stakeholder discussions, reducing any potential bias from my involvement.

#### 6.2.2.3.2 Co-design workshop delivery

At the start of the workshop I expressed my thanks to the attendees and explained the goal getting shared input on the work to date to help design the intervention, emphasising that everyone's input was to be valued equally in keeping with co-design principles. My input thereafter was only passive, with RB facilitating the workshop activities. As agreed prior to the workshop and to further maintain co-design principles, RB facilitated all stakeholders to have equal input in the activities and prevent any individual stakeholder dominating discussion. If a stakeholder was less vocal RB encouraged them to share their views.

In the first activity of the workshop the stakeholders were split into two groups and asked to discuss and consider potential solutions to twelve broad barriers (six per group), each summarising a number of those identified in the first phase of intervention design. The decision to present broad summary barriers was made in discussion with my supervisory team as I regarded the number of individual barriers (45 in total) to be unmanageable for group

discussion. The wording of these broad barriers was discussed and revised with one of my supervisors (RB). The stakeholders recorded any potential solutions to the broad barriers on A3 sheets provided as shown in Appendix K. Following the workshop I examined these potential solutions alongside my fieldnotes and summarised them. I then mapped these to my BCW-derived potential components, using the potential solutions to refine the components they were mapped to. If a solution did not map to an existing component it was regarded as a new potential component that should be included in the design.

In the second activity of the workshop stakeholders were provided with cards of the BCW-derived potential components. Stakeholders were asked to rate the components using the MoSCoW (Must have, Should have, Could have, Won't have) method and indicate which broad barriers they considered these components could address by sticking the card to the relevant barrier sheet(s). An example of this activity is shown in Appendix K. Any new potential components from the first activity were regarded as 'should have'.

The MoSCoW prioritisation method was originally created as part of a wider method of rapid software development.(308) It has since been widely used as part of project management, product development with stakeholders and more recently in co-design of health interventions.(309–311) I chose to use the MoSCoW system given its simplicity, making it approachable for all the stakeholders. It also helped achieve the co-design principle of shared power/designing together as it enabled stakeholders to directly influence intervention design. Table 6.5 shows the definitions used for each of the ratings as explained to the stakeholder group.

Table 6.5 MoSCoW method ratings and their definitions in the stakeholder workshop

| **Rating** | **Definition** |
|---|---|
| Must have | This component is essential for the intervention |
| Should have | This component is important but is not essential |
| Could have | This component is not important but may be beneficial |
| Won't have | This component should not be part of the intervention |

The results of the second activity were used to inform the components to be used in the intervention. In keeping with the definitions in Table 6.5 and recommended practice(312), all components rated as 'must have' were included in the intervention and any rated 'won't have'

were not. Components rated ‘should have’ and ‘could have’ were regarded as optional in the intervention design or their inclusion further guided by discussion with the local pharmaceutical committee as described below.

#### 6.2.2.3.3 Application of co-design workshop activities

The results of the two co-design activities were subsequently used to produce refined intervention components, further guided by the NEAR principles. The intervention components formed an overall design and structure of the intervention as a pharmacy service. This was reviewed at meetings with my supervisors to ensure it reflected the components. The design was then discussed at a design meeting with the chief officer of Community Pharmacy South Central (CPSC). As described in section 2.5.3, CPSC is the local pharmaceutical committee (LPC) for Hampshire and the Isle of Wight, representing community pharmacy owners in the area and ensuring satisfactory provision of services in community pharmacy.

This meeting served to establish if the intervention design was considered implementable from the perspective of an LPC and clarification was sought on uncertainties arising following the stakeholder workshop. Following this I created an example service specification that utilises the proposed design of the intervention and utilised the identified intervention components.

## 6.3 Results

### 6.3.1 Preliminary intervention design using behaviour change wheel

#### 6.3.1.1 Combining findings to form COM-B diagnosis

The result of combining barriers and facilitators identified from the results of Chapter 4 and Chapter 5 are shown in Table 6.6 for pharmacy staff and Table 6.7 for pharmacy users.

Most of the barriers and facilitators for both customers and staff were specific to either the behaviour of 'establishing risk' or 'linking to testing and care'. The vast majority of barriers and facilitators specific to 'linking to testing and care' and those specific to ArLD were derived from my qualitative interview study in Chapter 5. This was expected given the qualitative evidence synthesis concerned alcohol screening and brief intervention only.

The sequential nature of the behaviours means that a barrier or facilitator specific to establishing risk is indirectly a barrier or facilitator to linking to testing and care. However, some barriers and facilitators were not specific to one behaviour, in particular for the majority of facilitators influencing motivation of both staff and customers. For pharmacy staff this was the case for all but one motivation facilitator ('simple referral process') and reflected the other motivation facilitators being more general to delivering care as a whole to customers (i.e. incorporating both behaviours). For customers, some of the motivation-mapped facilitators not being specific to one behaviour were a consequence of them being underpinned by the incentive of the outcome of the two behaviours i.e. getting testing and care if indicated. As such both behaviours are facilitated as attaining the outcome is contingent on them. These facilitators were: customer concern of having liver disease, concern of a relative/partner/friend about a customer's alcohol use, offer of access to a physical liver test such as blood test or scan, ability to get direct access to more specialist input to ArLD if needed.

A number of barriers and facilitators were common to both staff and customer behaviour. For example, lack of privacy in the main area of the pharmacy was a shared barrier and providing dedicated time slots was a shared facilitator. All of the shared barriers and facilitators were in the opportunity component. This is in keeping with the COM-B model as the opportunity component describes factors that lie outside of the individual that influence behaviour. As such the same external factor may be an influence on different behaviours and/or different individuals, in this case pharmacy staff and pharmacy users.

For pharmacy staff, the greatest number of barriers and facilitators were within the opportunity component. This was also the case for customer facilitators. The greatest number of barriers for

customers were within the motivation component. However, this does not indicate greater importance of one component over the other given the COM-B model dictates that all three components are required to produce a behaviour; not addressing a barrier in one component may still prevent the behaviour even if all barriers in the other two components have been addressed. As an example if the capability barrier ‘Pharmacy staff lack knowledge, experience and training in assessing and advising about alcohol use’ was unaddressed then it would not be expected that pharmacy staff would establish a person’s risk of ArLD even if they were motivated and had the opportunity to do so.

Table 6.6 Barriers and facilitators to community pharmacy staff undertaking the two broad behaviours (establishing risk of ArLD and linking at-risk customers with testing and care) required for a role in ArLD identification mapped to the components of the COM-B model

| COM-B component | Pharmacy staff facilitators [source] (* = establishing risk specific,^ = linking specific) | Pharmacy staff barriers [source] (* = establishing risk specific,^ = linking specific) |
|---|---|---|
| **Capability** | + Having experience and training in asking and advising about alcohol use (including screening tools)* [QES, INT]<br>+ Staff knowledge of conditions and medications affected by alcohol use* [QES, INT]<br>+ Staff existing non-confrontational and empathetic communication skills (from experience and prior training)* [QES, INT]<br>+ Education for pharmacy staff about ArLD* [INT]<br>+ Pharmacy staff existing ability to signpost patients to appropriate care^ [INT] | - Pharmacy staff lack knowledge, experience and training in assessing and advising about alcohol use* [QES, INT]<br>- Pharmacy staff may not have the necessary communication skills for discussing alcohol use* [QES]<br>- Pharmacy staff lack knowledge, experience and training in assessing and advising about ArLD* [INT]<br>- Pharmacy staff not currently competent to perform a liver fibrosis test^ [INT] |
| **Opportunity** | + Access to people with alcohol misuse and alcohol-relevant health issues in day-to-day pharmacy work* [INT]<br>+ Regular returning customers (as consequence of repeat prescriptions)* [QES, INT]<br>+ Customers raising concerns to staff about a relative's/partner's/friend's alcohol use* [INT]<br>+ Aligning ArLD role with existing pharmacy services (medication dispensing, medication reviews, smoking cessation, health assessment and minor illness services)* [QES, INT]<br>+ Aligning with local/national alcohol awareness promotions* [QES]<br>+ Promotion of a pharmacist ArLD role to customers through display of information in pharmacy and directly informing existing customers through text messaging* [QES, INT]<br>+ Providing ArLD role as a dedicated pharmacy service e.g. as a 'liver health check or liver MOT'* [INT]<br>+ Initial customer engagement can be by pharmacy assistants* [INT]<br>+ Use of simple screening tools, with option for customers to self-complete* [QES, INT]<br>+ Easily accessible educational written materials about alcohol use and ArLD to provide customers* [QES, INT]<br>+ Use of private areas and/or consultation rooms* [QES, INT] | - Customers minimising their time in pharmacy (including use of automated prescription collection systems)* [INT]<br>- Aligning ArLD role with only a single existing pharmacy service* [QES]<br>- Alcohol use only routinely asked by pharmacy staff as part of an advanced pharmacy service or locally commissioned alcohol intervention service* [INT]<br>- Lack of privacy in main area of pharmacy* [QES, INT]<br>- Limited pharmacy personnel resources to perform extra work (other demands, time, number of staff) [QES, INT]<br>- Restrictions on what promotional materials can be used by pharmacy* [QES]<br>- (Excessive) service restrictions e.g. which customers to target and limits on number of service episodes [QES]<br>- Few or no established two-way communication routes between pharmacy staff and other healthcare professionals outside of general practice^ [QES, INT]<br>- Pharmacy staff do not have direct access to liver fibrosis testing^ [INT]<br>- Lack of suitable space in some pharmacies to perform a physical liver test or examination^ [INT]<br>- Cost of liver fibrosis testing equipment^ [INT]<br>- Lack of existing relationships between pharmacy staff and other HCPs^ [INT] |

| COM-B component | Pharmacy staff facilitators [source] (* = establishing risk specific,^ = linking specific) | Pharmacy staff barriers [source] (* = establishing risk specific,^ = linking specific) |
|---|---|---|
| **Opportunity** | + Having dedicated time slots for staff to perform ArLD role* [INT]<br>+ Clearly defined patient eligibility, referral requirements and referral pathways^ [QES, INT]<br>+ Use of a dedicated referral form if referring from pharmacy to another HCP^ [INT]<br>+ Use of secure electronic referrals (NHSmail or IT system) from pharmacy to other HCP^ [INT]<br>+ Pharmacy staff having ability to refer for liver testing^ [INT]<br>+ Collaborative working relationships between pharmacy staff and relevant non-pharmacy HCPs^ [INT]<br>+ Existing relationships between pharmacies and drug/alcohol services^ [INT]<br>+ Presence of a nurse-led liver clinic or community-based liver fibrosis assessment service^ [INT]<br>+ Service delivery in keeping with expanding pharmacy roles and business model [INT]<br>+ Readily available service support if delivering ArLD role as a service [INT] | - Stretched capacity in general practice and secondary care services^ [INT]<br>- Not usual practice to refer directly to secondary care based on ArLD risk alone^ [INT]<br>- Lack of existing inter-disciplinary collaboration for patients with alcohol problems in existing ArLD pathways^ [INT]<br>- Insufficient availability of suitable alcohol support services^ [INT] |
| **Motivation** | + Role legitimacy of pharmacists for a risk assessment, advice and referral role in ArLD [QES, INT]<br>+ Pharmacy staff enjoyment of providing health advice to customers [QES, INT]<br>+ Staff confidence in engaging customers with alcohol-related health advice/services [QES]<br>+ Pharmacy staff seeing or learning of benefit of their actions for customers [QES, INT]<br>+ Pharmacy staff believing they can help customers [QES, INT]<br>+ Appropriate remuneration for the time required for pharmacy staff to deliver any ArLD role [QES, INT]<br>+ Pharmacy staff familiarity with customers [QES, INT]<br>+ Simple referral process^ [INT] | - Staff concerns (or experience) of causing offence through asking about alcohol* [QES, INT]<br>- Staff feeling uncomfortable or embarrassed asking about alcohol use* [QES, INT]<br>- Concern of causing fear or anxiety for customers if advising they may have ArLD* [INT]<br>- Reliance on seeing an overt, potentially alcohol-related health problems to prompt asking customers* [INT]<br>- Staff belief that testing and further discussion should be with a non-pharmacy HCP with more perceived ability in ArLD^ [INT]<br>- Requiring pharmacy staff training to be done in their own time [INT] |

COM-B, capability opportunity motivation – behaviour; ArLD, alcohol-related liver disease; HCP, healthcare professional; QES, qualitative evidence synthesis; INT, interview study

Table 6.7 Barriers and facilitators to pharmacy users undertaking the two broad behaviours (establishing risk of ArLD and linking with testing and care if at-risk) required for a community pharmacist role in ArLD identification mapped to the components of the COM-B model

| COM-B component | Customer facilitators [source] (* = establishing risk specific,^ = linking specific) | Customer barriers [source] (* = establishing risk specific,^ = linking specific) |
|---|---|---|
| **Capability** | + Customer knowledge of having a health problem due to alcohol* [INT]<br>+ Customer knowledge that drinking too much can cause liver disease* [INT]<br>+ Educating customers about future risk and potential complications of liver disease [INT] | - Some customers may not be aware how much they drink or may not know how to report this in units* [QES, INT]<br>- Some customers lack knowledge and understanding of how much alcohol puts a person at risk* [QES, INT]<br>- Some customers lack the knowledge that can have a problem even if someone who drinks the same or more doesn't [QES, INT]<br>- Customer lack of knowledge that can have ArLD without symptoms [INT] |
| **Opportunity** | + Promotion of a pharmacist ArLD role to customers through display of information in pharmacy and directly informing customers through text messaging* [QES, INT]<br>+ Regular attendance at same pharmacy by many customers* [QES, INT]<br>+ Aligning ArLD role with existing pharmacy services (medication dispensing, medication reviews, smoking cessation, health assessment and minor illness services)* [QES, INT]<br>+ Provision in pharmacy to self-assess alcohol consumption/risk* [INT]<br>+ Use of consultation room or private area to discuss own alcohol use and ArLD risk* [QES, INT]<br>+ Option of attending a dedicated time slot for pharmacy assessment [INT]<br>+ Aligning with local/national alcohol awareness promotions* [QES]<br>+ Minimising number of patient-HCP face-to-face contacts required^ [INT]<br>+ Any outcome/plan from pharmacy can be shared with customer's GP^[INT]<br>+ Geographically convenient/accessible liver testing^ [INT]<br>+ Direct access for customers to more specialist input relating to ArLD if needed^ [INT]<br>+ Access to wider social support as part of any ArLD pathway^[INT]<br>+ Pharmacy less stigmatising location than GP, hospital or drug and alcohol service [INT]<br>+ Accessibility of community pharmacies [QES, INT] | - Customers not having 'extra' time to spend in pharmacy beyond what they attended for [QES, INT]<br>- Restrictions on promotional materials that encourage customers to engage* [QES]<br>- Lack of privacy in main area of pharmacy* [QES, INT]<br>- Customers normalising their drinking through comparison with others* [QES, INT]<br>- Pharmacists not seen as a 'normal' source for alcohol or ArLD advice* [QES, INT]<br>- Difficulties getting a GP appointment (if one required)^ [INT] |

| COM-B component | Customer facilitators [source] (* = establishing risk specific,^ = linking specific) | Customer barriers [source] (* = establishing risk specific,^ = linking specific) |
|---|---|---|
| **Motivation** | + Pharmacists seen as qualified and trusted HCP to ask and advise about alcohol use and risk of ArLD [QES, INT]<br>+ Non-confrontational, non-judgemental communication skills of pharmacy staff [QES, INT]<br>+ Ask/offer made by staff to all customers* [INT]<br>+ Some customers' familiarity with pharmacy staff* [QES, INT]<br>+ Being asked about alcohol in a relevant health context, including a 'liver health check'* [QES, INT]<br>+ Provision of educational information in pharmacy about risk of ArLD and its' asymptomatic nature [QES, INT]<br>+ Customer concern of having liver disease [INT]<br>+ Concern of a relative/partner/friend about a customer's alcohol use [INT]<br>+ Offer of access to a physical liver test such as blood test or scan [INT]<br>+ Ability to get direct access to more specialist input relating to ArLD if needed [INT]<br>+ Optional for alcohol use/ArLD risk to be shared with GP [INT]<br>+ Free for customers to use service [INT]<br>+ Having a 'positive' test for ArLD^ [INT] | - Uncertainty of pharmacist ability to conduct a physical test for ArLD or discuss an ArLD diagnosis [INT]<br>- Some customers would not speak to non-pharmacist staff about their alcohol use or risk of ArLD as they do not believe them to be suitably qualified* [INT]<br>- Some patients will not reveal their alcohol use if feel they are asked 'out of the blue'* [INT]<br>- Some patients may be concerned about personal consequences of revealing their alcohol misuse* [INT]<br>- Some customers may be concerned about being stigmatised as an alcoholic if identified as 'at risk'* [INT]<br>- Some customers who believe they drink too much would not engage with a ArLD risk assessment if advice was all that is on offer* [INT]<br>- Customers having to see a GP for further care/investigation after any pharmacy assessment^ [INT]<br>- Customers' fear of finding out they have liver disease^ [INT]<br>- A 'negative' test for ArLD^ [INT]<br>- Negative perceptions of attending a DAAS if this is advised ^ [INT]<br>- Customers having to pay for any service offered [INT] |

COM-B, capability opportunity motivation – behaviour; ArLD, alcohol-related liver disease; GP, general practitioner; HCP, healthcare professional; DAAS, drug and alcohol service; QES, qualitative evidence synthesis; INT, interview study

#### 6.3.1.2 Derivation of intervention components using BCW

The process of identifying and selecting BCW function(s) created a total of 27 potential intervention components of the pharmacy intervention. During the process of developing intervention components I could not map some facilitators to a BCW function. This was because they were attributes of either the physical and/or social environment or attributes of customers and staff. Some were pre-existing contextual factors that the intervention as a whole may utilise but would not be included in the intervention design e.g. the accessibility of community pharmacy. Other attributes could be seen as a goal of an intervention component e.g. pharmacy staff believing they could help customers. I used these attributes to consider how other facilitators may exert their effect and thereby what BCW function(s) they reflected. The potential intervention components, their relevant NEAR principles and the BCW functions the components incorporate are shown in Table 6.9.

The majority (n=13) of the intervention components could target both customer and staff behaviour. This was in part a consequence of the presence of shared barriers and facilitators as discussed earlier. The most frequently utilised BCW function overall was environmental restructuring. The three BCW functions coercion, restriction and modelling did not feature in the potential intervention components. For intervention components that only targeted customer behaviour, persuasion was the most frequently used. This aligns with the finding that the largest number of customer barriers were mapped to the motivation COM-B component, which can be effectively influenced by the persuasion BCW function (see Table 6.1).

22 of the 27 potential intervention components addressed more than one identified barrier. The intervention component ‘have written information available for pharmacy users and further resources to signpost to’ was found to address the greatest number of barriers (n=12). The next largest number of barriers addressed by an intervention component was nine, which was the case for three intervention components: ‘offering and undertaking assessment alongside advanced pharmacy services e.g. smoking cessation, blood pressure checks’; ‘pharmacy users being able to self-complete a risk assessment’; ‘provide training and education for all pharmacy staff who may be involved in delivering the service’. The barriers addressed by each of the 27 intervention components are shown in Appendix L.

Most of the identified barriers were addressed by two or more potential intervention components. 15 barriers were addressed by only one intervention component with seven different potential intervention components addressing these 15 barriers. These were: (1) clearly defined pharmacy user eligibility, referral requirements and referral pathway; (2) ‘have written information available for pharmacy users and further resources to signpost to’; (3)

'offering and undertaking assessment alongside advanced pharmacy services e.g. smoking cessation, blood pressure checks'; (4) 'payment for pharmacy staff delivering the service'; (5) 'pharmacy staff refer for a liver test rather than conduct it'; (6) 'pharmacy staff using non-confrontational, non-judgemental communication skills'; (7) 'provide training and education for all pharmacy staff who may be involved in delivering the service'.

### 6.3.2 Stakeholder co-design workshop and intervention refinement

The 27 intervention components developed were used at the co-design workshop for stakeholder review. As the stakeholder group was not expected to be familiar with the COM-B model or BCW the potential components were provided without this detail.

A total of 10 stakeholders agreed to attend the workshop, with 2 unable to attend on the day (one member of the public and one hepatology consultant). The composition of the 8 attendees is shown in Table 6.8.

Table 6.8 Co-design workshop attendees

| Workshop attendees |
|---|
| Community pharmacist x2 |
| Pharmacy assistant x1 |
| Hepatology nurse specialist x1 |
| General practitioner x1 |
| Public with lived experience of socio-economic deprivation and peer support work x2 |
| Patient with alcohol-related liver disease x1 |

#### 6.3.2.1 Barrier sheet workshop activity

The potential solutions posed and discussed by the stakeholder group could be mapped to the BCW-derived potential components with the exception of two potential solutions that were therefore regarded as new potential components. The summarised potential solutions and their mapping are shown in Table 6.9.

Throughout the first activity certain aspects were repeatedly raised by the group. There was recurring emphasis on the importance of non-judgemental communication skills but also that pharmacists and pharmacy staff typically already have these skills in their current work. Having the option for customers to anonymously self-complete an initial risk assessment was another recurring view, with suggestion this would incorporate details of how to get further help/advice. This was also raised as part of a further shared opinion - that educating and raising awareness of

customers was a vital part of the intervention. Related to this was that training and education for pharmacy staff was essential so that staff have the knowledge and confidence to give appropriate and standardised information to customers. Discussions were had about customers getting a liver test and onward care, which centred on two agreed points: that a test being available in a pharmacy was seen unfeasible (and so would need to be accessed elsewhere), and that requiring patients to see their GP to get a test would only be appropriate if there was an agreement for the GP practice to do this as part of funded pathway.

### 6.3.3 MoSCoW component rating activity

The MoSCoW ratings selected for each of the 27 potential intervention components by the stakeholder group are shown in Table 6.9. Twenty components were rated as ‘must have’, five as ‘should have’ and two as ‘could have’. None of the potential components were rated as ‘wouldn’t have’. The two components rated ‘could have’ were ‘pharmacy staff are provided feedback on the outcomes for customers’ and ‘pharmacy staff refer for a liver test rather than conduct it’. Stakeholder discussions to decide the rating of the former were driven by concerns of patient confidentiality and that if pharmacy staff were to be provided feedback about outcomes of individuals this would need to be with patient consent. The use of service level outcomes i.e. aggregated data was given as an acceptable alternative. Discussion and decision about ‘pharmacy staff refer for a liver test rather than conduct it’ were driven by uncertainty about capacity for this to be done in existing services, in particular through GP services as raised in the first activity. There was no mention of pharmacy staff conducting the testing themselves.

Table 6.9 Potential intervention components developed, their relevant NEAR principle(s), the targets and behaviour change wheel intervention functions of the components, the stakeholder MoSCoW ratings for each component, the new components suggested in the workshop and the mapping of solutions proposed by stakeholders in the co-design workshop to the potential intervention components

| **Potential intervention component [relevant NEAR principle(s)]** | **MoSCoW rating** | **Target of component and BCW intervention functions*** | **Mapped workshop potential solutions** |
|---|---|---|---|
| *Advertise the service using: displays/posters; texts to pharmacy users; pharmacy website [N,A]* | Must | Staff: ER, En<br>Customers: ER, Per, Ed | Use of display screens in pharmacy to display information about service<br>Available information about service for customers e.g. posters or leaflets<br>Use of QR codes as route to advertise service and provide educational material – including other languages<br>Promotion of the service outside of the pharmacy environment e.g. on the radio or in drug and alcohol centres<br>Use of badges to indicate qualified member of staff. This can empower staff to approach customers, justify any approach to customers, and help customers approach staff |
| *At-risk pharmacy users can be referred for more specialist input [E,A]* | Must | Customers: ER, In | Avoid reliance on GP action and instead refer directly to appropriate services/HCPs<br>Use of a 'care navigator' to help organise required next steps with identified customers and bypass GP |

| Potential intervention component [relevant NEAR principle(s)] | MoSCoW rating | Target of component and BCW intervention functions* | Mapped workshop potential solutions |
|---|---|---|---|
| *Clearly defined pharmacy user eligibility, referral requirements and referral pathway [E]* | Must | Staff: ER, En | Robust documentation across sectors such that any advice or actions are standardised with the aim of avoiding ad hoc advice or practices<br>Having clear criteria for when to refer a patient and to who<br>Having defined care pathway with clear points of contact and clear timeframes for when the next point of contact will be<br>Clear SOP so staff know what can be offered<br>Readily available information for staff on who to refer or signpost to act as a prompt to engage e.g. cue cards at the counter<br>If requiring GP action then creating an agreed pathway with the ICB as a locally enhanced service in order that GPs would receive funding for actioning a referral |
| *Emphasising to at-risk pharmacy users they can still get liver disease if test is normal [A]* | Must | Customers: Ed, Per | Education of customers is vital |
| *Have a dedicated referral form if referring patients to another HCP [E]* | Must | Staff: En | Use of direct communication with HCPs to relay information on identified patients with suggestion of dedicated proforma to achieve this. |
| *Have written information available for pharmacy users and further resources to signpost to [N,A]* | Must | Staff: ER, En<br>Customers: ER, Per, Ed | Use of QR codes as route to advertise service and provide educational material – including other languages<br>Education of customers vital aspect<br>Increase educational material in pharmacy to recognise may need help and how to get it |
| *Meetings between pharmacy staff delivering service and other HCPs [N]* | Must | Staff: ER | Essential to have two way communication between relevant HCP or service will stop<br>A clear point of contact in secondary care (or other referral destination) if directly referring customers or seeking advice |

| Potential intervention component [relevant NEAR principle(s)] | MoSCoW rating | Target of component and BCW intervention functions* | Mapped workshop potential solutions |
|---|---|---|---|
| *Offering and undertaking assessment alongside advanced pharmacy services e.g. smoking cessation, blood pressure checks [E,R]* | Must | Staff: ER, Per<br>Customers: ER | None |
| *Offering service to any pharmacy user and not just those suspected to be at risk [R]* | Must | Customers: Per<br>Staff: ER | None |
| *Payment for pharmacy staff delivering the service [A]* | Must | Staff: In | Providing remuneration for staff time taken in training is important |
| *Pharmacy staff able to offer direct access to a test for liver disease [E,A]* | Must | Customers: In, ER | Avoid reliance on GP action and instead refer directly to appropriate services/HCPs |
| *Pharmacy staff to have access to service support [E]* | Must | Staff: En | None |
| *Pharmacy staff using non-confrontational, non-judgemental communication skills [N]* | Must | Customers: Per | Staff must maintain non-judgemental approach as is in keeping with existing capabilities of pharmacy staff |
| *Pharmacy support staff role to engage rather than assess patients [N,E]* | Must | Staff: ER<br>Customers: ER | None |
| *Pharmacy users being able to self-complete a risk assessment [E]* | Must | Staff: ER En<br>Customers: ER, En, Ed | Having a self-assessment option for customers e.g. scratch card or app that also provides some education to customers<br>Giving basic self-completion questionnaires customers could take away<br>Use of self-assessment tool that helps customers realise they could be at risk and how they can get further help for this |

| Potential intervention component [relevant NEAR principle(s)] | MoSCoW rating | Target of component and BCW intervention functions* | Mapped workshop potential solutions |
|---|---|---|---|
| *Provide training and education for all pharmacy staff who may be involved in delivering the service [E,R]* | Must | Staff: Tr, Ed, En | Provide core training to all staff but have designated people to have a specialist interest / act as service champions who receive advanced training.<br>Providing training to enable expanded roles in pharmacy is in keeping with current practice<br>Training for staff to increase confidence and knowledge |
| *Use an approved alcohol use screening tool [N,E]* | Must | Staff: En<br>Customers: Per, Ed | None |
| *Use consultation room or private area for any conversations with a pharmacy user about their alcohol use [E]* | Must | Staff: ER<br>Customers: ER | Making it clear to customers that privacy will be maintained and always providing the option of using a private area<br>Expanding roles of pharmacy means that private rooms and appointment structure is commonplace in most pharmacies |
| *Use relevant health conditions to ask about alcohol / offer assessment [A]* | Must | Customers: Per | None |
| *Using secure email (e.g. NHSmail) or established IT system for referrals from pharmacy to other HCPs [E]* | Must | Staff: ER | Use of direct communication with HCPs to relay information on identified patients with suggestion of dedicated proforma to achieve this. |
| *Deliver service alongside local and national alcohol campaigns e.g. dry January, alcohol awareness week [N,A,R]* | Should | Staff: En<br>Customers: Per | None |
| *Have dedicated time slots for service provision [E,R]* | Should | Staff: ER<br>Customers: ER | Use of appointments to make sure private area/room is available as they may otherwise be in use for other services |
| *Offer the service with liver as the focus e.g. a 'liver health check' or 'liver MOT' [A,R]* | Should | Staff: En, ER<br>Customers: Per | None |

| Potential intervention component [relevant NEAR principle(s)] | MoSCoW rating | Target of component and BCW intervention functions* | Mapped workshop potential solutions |
|---|---|---|---|
| *Pharmacy users able to choose whether their risk assessment is shared with their GP [A]* | Should | Customers: Per | None |
| *Use waiting time of prescription collection to offer and perform assessments [E,R]* | Should | Staff: ER, En<br>Customers: ER | None |
| *Pharmacy staff are provided feedback on the outcomes for pharmacy users [A]* | Could | Staff: Per | None |
| *Pharmacy staff refer for a liver test rather than conduct it [N,E]* | Could | Staff: ER, En<br>Customers: ER | Use of direct communication with HCPs to relay information on patients identified at risk with suggestion of dedicated proforma to achieve this.<br>Use of a 'care navigator' to help organise required next steps with identified customers and bypass GP<br>Use of existing outreach liver van infrastructure used by Hepatitis C services to overcome unavailability of testing space in pharmacy |
| *New from workshop* | Should | Staff: En | Gradual implementation with auditing to monitor what is delivered |
| *New from workshop* | Should | Staff: ER | Having a pulsed/intermittent service delivery structure where the service is available for short, focused periods in a pharmacy |

*Functions abbreviated to: Ed, education; En, enablement; ER, environment restructuring; In, incentivisation; Mod, modelling; Per, Persuasion; Tr, training

BCW, behaviour change wheel; GP, general practitioner; HCP, healthcare professional; NEAR, Normal, Easy, Attractive, Routine; QR, quick response

### 6.3.4 Intervention refinement and overall structure

The refinement of the components following the workshop produced a total of 23 refined intervention components. These are shown in Table 6.10. An overall structure of the intervention as a process of steps required of customers and pharmacy staff is shown in Figure 6.2. This structure was guided by the refined intervention components and discussion with the chief officer of CPSC. Three components were key in shaping the service structure. Firstly, the ability for customers to access and self-complete an assessment using an approved alcohol screening tool. This component creates different potential routes to engaging with the service i.e. a customer self-screens and then speaks with staff (step 4b&c in Figure 6.2) or the screen is done with (or offered by) a member of pharmacy staff (step 2 & 4a in Figure 6.2). The second component key in shaping the service structure is that screening should be done by any member of staff but further assessment and advice should be provided by a pharmacists or pharmacy technician (step 7 in Figure 6.2). The final key component defining the structure is for direct referral to be made for liver testing to a community liver testing hub without action required of the GP (step 9 & 10 in Figure 6.2). This was a consequence of findings indicating testing in pharmacy was not feasible and that referral to GP or direct to secondary care was not thought acceptable.

CPSC review of the structure perceived it deliverable from the community pharmacy perspective. Specific aspects highlighted at the meeting with CPSC that further informed some of the refined components are shown in Appendix M and incorporated into the example service specification.

### 6.3.5 Example service specification

An example service specification is shown in Appendix N. This utilises the proposed structure and refined intervention components developed in this chapter. Where the refined components are represented in the service specification is indicated in Table 6.10.

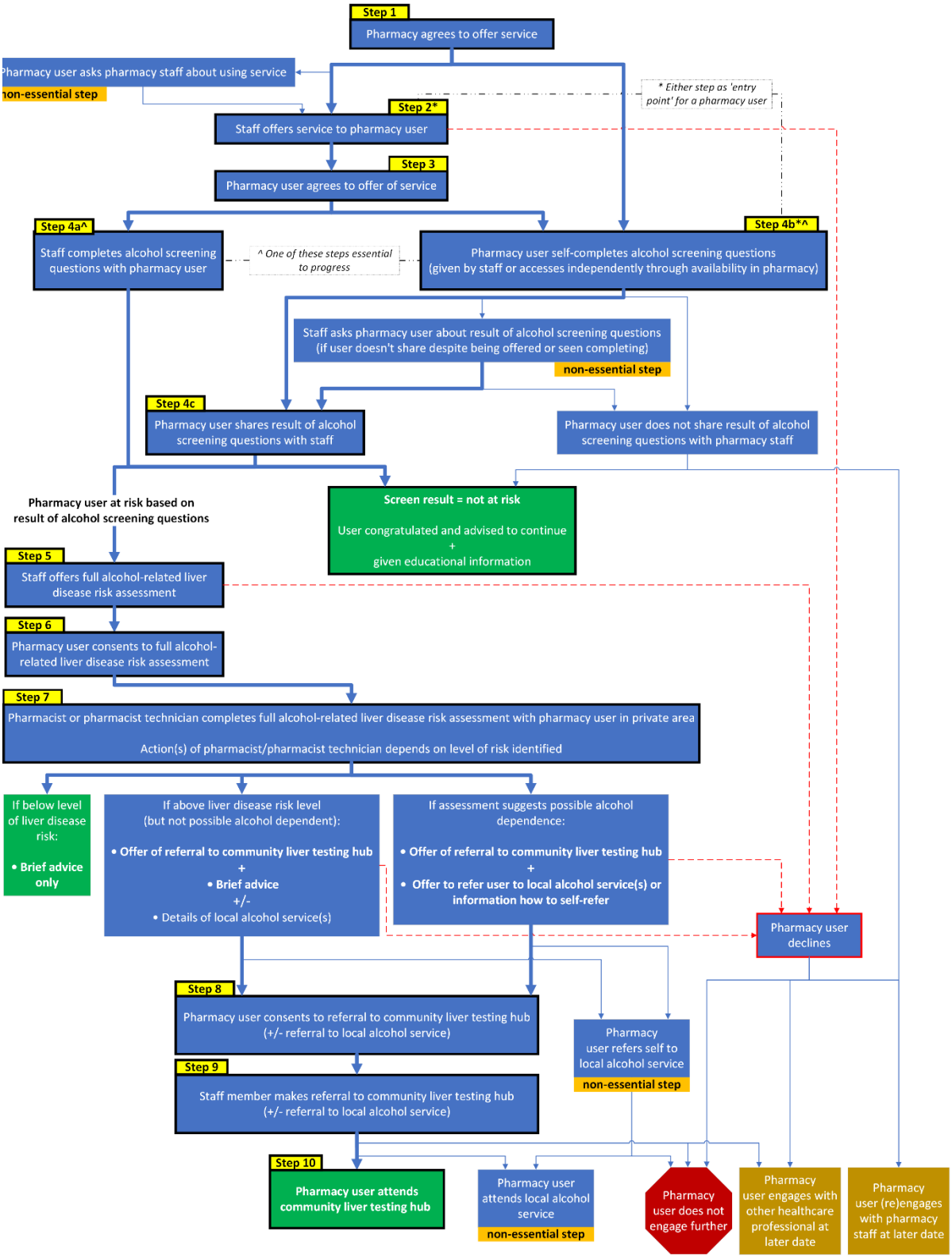



Figure 6.2 Intervention structure as a series of steps undertaken by pharmacy staff and customers. Intended result of service engagement for a customer are shown in green. Required steps to achieve these outcomes are labelled in yellow and linked by thick blue arrows. Non-essential but desirable steps are labelled and linked into the process by thin blue arrows. Potential results of a customer not completing all required steps are shown in orange and red boxes.

Table 6.10 Refined intervention components, the intervention steps enabled by the components and the location where the components are utilised in the example service specification

| Refined intervention component | Intervention step(s) enabled | Where utilised in service specification |
|---|---|---|
| All pharmacy staff who may be involved in delivering the intervention should undergo core training. Designated staff in a pharmacy should receive enhanced training and lead delivery of the service.<br>Training should include overview of alcohol guidance including recommended limits and levels of risk, use of screening tools, providing brief advice, an overview of ArLD including who is at increased risk, how it can be diagnosed, the potential consequences of it based the benefits of early identification. | Step 1<br>Step 2<br>Step 4a<br>Step 5<br>Step 7<br>Step 9 | 4.2 |
| Pharmacy staff delivering the service must maintain non-confrontational, non-judgemental communication skills | Step 3<br>Step 4c<br>Step 6<br>Step 8 | 5.1.1 |
| The service should be promoted to customers in the pharmacy using materials provided to the pharmacy (e.g. posters, leaflets with electronic versions) as well as on the pharmacy website and social media where permitted. Badges should be worn by trained staff to indicate they can deliver the service.<br>Direct offer to existing customers through text messaging or email should also be utilised where available. | Step 3<br>Step 4b<br>Step 4c | 3.1.5<br>4.1.3 |
| The service should be promoted as a service providing a liver health check. | Step 2<br>Step 3<br>Step 4b<br>Step 4c | 3.1.5 |
| Offer of the service should be made to all eligible customers with no suggestion of targeting people suspected of having an alcohol problem. | Step 3 | 3.1.2 |
| Pharmacy staff should utilise any waiting time as a consequence of prescription collection to offer the service to customers | Step 2 | 3.1.4 |
| Staff should offer and undertake the service when undertaking an advanced or locally commissioned service with a customer to make efficient use of time and room availability as well as any relevant context to speak about alcohol or liver disease | Step 4a<br>Step 6<br>Step 7 | 3.1.3 |
| Initial assessment of customer risk should incorporate use of an approved alcohol use screening tool. It should be possible for customer to access and self-complete this anonymously or with pharmacy staff. | Step 4a<br>Step 4b | 3.2.1-6 |

| Refined intervention component | Intervention step(s) enabled | Where utilised in service specification |
|---|---|---|
| If self-completed the tool should provide details of how to get help/advice if identified at risk | | |
| Any member of pharmacy staff should be able to engage a customer with the service and provide or complete the screening tool but any further assessment and advice for people who screen positive should be performed by a trained pharmacist or pharmacy technician. | Step 2<br>Step 4a<br>Step 7 | 3.2.7 |
| Conversations establishing a customer's alcohol use and risk of ArLD should be undertaken in a consultation room or private area. It should be made clear to customers that these are available for this purpose, recognising a customer may choose not to use the room/private area. | Step 6<br>Step 7 | 3.2.7<br>4.1.2 |
| Customers are able to choose whether any risk assessment undertaken in pharmacy is shared with their GP | Step 6 | 3.2.10 |
| Dedicated appointments in the pharmacy should be offered if the service cannot be delivered at the time the customer engages | Step 6<br>Step 7 | 3.2.9 |
| Pharmacy users are able to access educational material in pharmacy to help increase knowledge and awareness of alcohol guidance, risks of alcohol-related liver disease and other harms and how to assess own risk. Sources of information and further support should also be provided. Physical information should be available in the pharmacy as well as access to electronic information e.g. through use of QR codes | Step 3<br>Step 4c<br>Step 6<br>Step 8 | 3.2.4<br>3.2.6<br>3.2.10<br>3.2.16 |
| Pharmacy staff are able to offer eligible customers direct access to a test for liver disease with subsequent referral for specialist care if indicated without action required of a patient's GP. This may be through access to a liver testing hub in the community such as clinical testing vans used for hepatitis C or the NHS community liver health check pilot programme. | Step 3<br>Step 8<br>Step 9<br>Step 10 | 3.2.11<br>8.2 |
| A dedicated proforma will be used for any customer referral from pharmacy. This will be sent electronically using either NHSmail or via the IT system | Step 9 | 3.2.12 |
| If delivering the service there should be feedback provided to pharmacy staff about outcomes for customers. This can be as service level data to protect customer confidentiality. Customers could be optionally asked if they consent to the outcome of their referral being shared with referring pharmacy. | Step 2 | 3.2.15 |
| Remuneration should be provided for delivering the service in keeping with the time required to conduct it. It should also incorporate costs for staff to undertake required training. | Step 1 | 6 |
| Pharmacy staff delivering the service will have a clearly defined contact for service support | Step 1 | 5.2 |

| Refined intervention component | Intervention step(s) enabled | Where utilised in service specification |
|---|---|---|
| Regular meetings will be held between a pharmacy delivering the service and a representative of the service receiving referrals to facilitate collaboration and professional relationship building | Step 1<br>Step 9 | 5.2.2 |
| Pharmacy user eligibility, referral requirements and referral process are clearly defined | Step 1<br>Step 9 | 3.1<br>3.2 |
| A pharmacy must have a standard operating procedure for the service to ensure consistent delivery | All staff steps | 5.1.7 |
| Pharmacy staff should utilise local and national alcohol campaigns to further promote the service and encourage customer engagement | Step<br>Step 4b<br>Step 4c | 5.1.6 |
| The delivery of the service should be monitored through auditing | All staff steps | 7 |

## 6.4 Discussion

### 6.4.1 Summary of findings

The aim of the work in this chapter was to design and describe an implementable community pharmacy complex intervention to enable community pharmacists to identify people at risk of alcohol-related liver disease and connect them with pathways of care. By using the behaviour change wheel (BCW) and co-design with stakeholders I have been able to develop this complex intervention as a community pharmacy service with defined active components and an overall structure that could be tested in practice.

The application of the BCW first formed a 'COM-B diagnosis' in the form of barriers and facilitators to two sequential broad behaviours of both pharmacy staff and pharmacy users, namely: (1) establishing risk of ArLD and (2) linking to testing and care. 27 potential intervention components with underlying BCW functions were subsequently derived from the facilitators to address perceived barriers. The barriers and the potential components were then taken to a stakeholder co-design workshop. Further solutions to the barriers were suggested by the stakeholders who then reviewed the potential components and rated them according to importance for inclusion in the intervention. The components were refined following this workshop to produce a final 23 intervention components (see Table 6.10) and a series of steps that form the structure of the complex intervention as a community pharmacy service.

Three of these components were key in forming the structure of the service shown in Figure 6.2. These (abridged from Table 6.10) were: customers being able to self-complete an assessment for alcohol use; pharmacists or pharmacist technicians conducting any further assessment of ArLD risk and subsequent advice after initial screening; and direct referral to external liver testing without needing GP action. All of the 23 components reflected at least one BCW function, with the majority of the components reflecting multiple functions. Environmental restructuring was the most frequent BCW function, and the BCW functions of coercion and restriction were not relevant.

Whilst most of the identified barriers were addressed by multiple components, 15 were addressed by one of seven components - highlighting the potential importance of these components. These seven components (abridged from Table 6.10) were: (1) clearly defined pharmacy user eligibility, referral requirements and referral pathway; (2) appropriate remuneration for pharmacy staff; (3) direct referral to external liver testing without needing GP action; (4) staff maintaining non-confrontational, non-judgemental communication skills; (5) offer and undertake service alongside other pharmacy clinical services; (6) educational

materials for pharmacy users and further resources and support to signpost to; (7) training for pharmacy staff.

### 6.4.2 How does this compare to existing literature

Whilst the components I have described make up a novel service and hence something not previously described in the literature, some comparison can be drawn with existing literature examining features of other pharmacy services.

There is little published evidence comparing pharmacy service features to indicate if a certain feature is more effective than another to attain service success. This paucity of evidence was demonstrated in a 2022 systematic review that identified only 6 published studies that compared the effectiveness of different service features for achieving various implementation-related outcomes.(313) The importance of training as a service feature was highlighted by the review, finding that services that incorporated a training programme for staff, as compared to no training or only self-directed training, achieved better outcomes.(313) The importance of training is supported by the work in this chapter given training of staff was the component that addressed the most barriers, and in some instances was the only component to address a barrier.

The importance of remuneration for staff was another component that is reflective of the wider literature where remuneration has been frequently reported as a key feature for the success of a pharmacy service.(314,315) The proposed structure of remuneration indicated in the service specification was derived from discussion with the chief officer of the CPSC. This follows the fee-for-service model of remuneration, the most widely used in community pharmacy.(316) Other models are recognised but there is no evidence to support one model over another.(317)

The component of direct referral for testing external to pharmacy but without requiring GP involvement was both key in shaping the structure of the service as well as being one of the components that addressed the most barriers. Services incorporating referral onward from pharmacy to another HCP are well recognised but the referral is almost universally to a GP.(318) There is a paucity of UK studies examining rates of patient uptake of referrals to GP resulting from a pharmacy service.(116,319) One study examining the uptake of referral to GP for a test or consultation following a community pharmacist conducted NHS health check found 50% of those referred actually attended. Perceived difficulty getting a GP appointment was cited as a reason for not attending and the lack of referral uptake expected to limit effectiveness of attaining early diagnoses.(320)

Improving early diagnosis through direct referral to specialist services without depending on GP involvement has been a major part of the NHS cancer programme in the last 5 years.(321) This programme has commissioned a pilot of a community pharmacy service in which pharmacists can directly refer customers with signs of possible cancer to rapid diagnostic services or secondary care without needing to see their GP.(322) The pilot has only recently commenced (October 2023) with no evaluation or outcomes yet published. However, a feasibility study in Wales of a similar service in which pharmacists referred patients with symptoms of lung cancer directly for a chest x-ray highlighted the perceived benefit of this direct-to-test service through removing the delays and challenges resulting from having to first attend general practice.(323) With early diagnosis a goal in ArLD, the component of direct referral to community liver testing identified in the work in this chapter is in keeping with developing practices in the wider NHS.

### 6.4.3 Strengths and limitations

The work in this chapter formed the components and overall design of a complex intervention – a community pharmacy ArLD identification service.

My use of COM-B and BCW underpinned this work, which I believe to be one of its main strengths. Whilst it is uncertain if the use of theory results in more effective interventions,(169,324) the application of theory to the work in this chapter demonstrates the logic underpinning the components and resultant overall service design. This allows for this to be examined or challenged in future testing of the service to direct further refinement.(325) A potential limitation of use of theory in this chapter was that the process of mapping barriers and facilitators to the BCW functions was done by myself without a second person to compare mapping with. However, I had an unrivalled knowledge of the source data and so believe was best placed to ensure the mapping was reflective of the findings. I also minimised any personal bias in this process by discussing the mapping with my supervisors RB and KI.

The other strength in the work contained in this chapter is the use of co-design. Interaction between different stakeholders in the design process, as was achieved in the workshop, can lead to a more acceptable and relevant design solutions.(164) Half of the attendees at the co-design workshop had been participants in my interview study. This was a pragmatic decision to enable the workshop to be conducted in the timescales of the PhD. I recognise this may introduce a selection bias and potentially limit generation of new ideas. However, use of previous participants also serves to strengthen the work. Their existing knowledge of the project minimised the time required to explain the background and aims to my work, consequently maximising the time for their input. The use of previous participants is also beneficial in

maintaining relationships – a key principle of co-design(300) – and serves as a form of member checking, recognised to enhancing the credibility of research findings.(326)

The is no evidence to indicate the effectiveness of one approach to co-design over another(297) but the use of a described approach to co-design, as opposed to none, further enhances the credibility of my co-design work.(326). In consideration of forming consensus in a co-design process, the MoSCoW prioritisation method is in keeping with the collaborative approach of co-design. A limitation is in its lack of clearly defined guidance on how the 'should' and 'could' ratings are applied in subsequent design.(327) In my co-design work nearly all ratings were 'must' and therefore this limitation was not realised.

## 6.5 Conclusion

Through application of the behaviour change wheel and a process of co-design, the design, key components and structure of my complex intervention has been created – a community pharmacy ArLD identification service. The incorporation of a self-assessment for customers along with testing to be performed external to pharmacy and independent of general practice were key in shaping its structure. This work has provided the design of a service that could now move to the feasibility and piloting phase of the MRC complex intervention development cycle and consideration given towards its formal evaluation. This is discussed in Chapter 7.

# Chapter 7 Overall discussion of findings in this PhD

## 7.1 Introduction to chapter seven

This final chapter of the thesis provides a summary of the overall findings of this PhD that explored the development of a complex intervention to enable community pharmacists to have a role in ArLD identification. These findings are discussed in the wider context of implementation of community pharmacy services in England. Further to this, strengths, challenges and reflections on the work are discussed as well as potential supplementary work. Finally, implications for future research are considered.

## 7.2 Summary background and rationale for this thesis

The misuse of alcohol is a leading risk factor for ill health worldwide and is responsible for 5% of all global deaths.(105) In England alone, more working years of life are lost due to alcohol than for the 10 most common cancers combined.(5) It is alcohol-related liver disease (ArLD) that causes the majority of these working years of life lost. ArLD is the 5$^{th}$ leading cause of premature mortality in England and is the cause of over 80% of all alcohol-specific deaths.(6) Mortality from liver disease from all causes has increased by 400% in the UK since 1970 with ArLD the primary reason for this.(10)

In order to change this trend, international consensus has indicated a need for earlier diagnosis of liver disease so that patients can receive the care they need to prevent its progression and subsequent morbidity and mortality.(66,328) It is recommended that early diagnosis should incorporate assessing people with alcohol misuse for liver disease using non-invasive tests of liver fibrosis.(26,42) As well as enabling diagnosis at an earlier, asymptomatic stage, evidence has indicated such tests may also be beneficial through modifying drinking behaviour.(93,94,329)

Expanding the identification and assessment of people at risk of ArLD outside of 'typical' healthcare facilities of general practice and hospitals has been recommended.(106) Community pharmacy has been shown to be a geographically accessible location, in particular to more deprived populations, who experience more harm from alcohol misuse.(112) Evidence has demonstrated that community pharmacists can identify people with alcohol misuse.(138) What is more, community pharmacists in England are progressively taking on more clinical roles such as blood pressure case finding, prescribing hormonal contraception and treating minor illnesses independently.(109) Liver services have already worked effectively with community

pharmacists through testing programmes for Hepatitis C as well as pharmacist-led HCV treatment programmes.(330,331)

In combination, the existing evidence would indicate community pharmacists could have a potential role in the earlier diagnosis of ArLD. This potential has never been examined previously and the work in this PhD therefore aimed to explore this potential. This was done through a process of complex intervention development underpinned by behaviour change theory, incorporating exploration and understanding of existing context and stakeholder views.

## 7.3 Summary of thesis findings

### 7.3.1 Achieving the aim and objectives of this PhD

As described in section 1.7, this PhD aimed to develop a complex intervention that enables community pharmacy to identify people with undiagnosed ArLD and connect them with existing pathways of care. The objectives were:

1. Evaluate the existing Southampton primary care liver pathway, the primary ArLD pathway of care in Southampton
2. Understand the barriers and facilitators to delivering alcohol screening and brief intervention in community pharmacies
3. Explore the perceptions and attitudes of service providers, pharmacy users and patients with ArLD in the role of community pharmacy in ArLD pathways
4. Design an intervention with stakeholders that enables community pharmacists to identify patients at risk of ArLD and connect them with ArLD pathways of care

Through the work undertaken in Chapters 3-6 these objectives have been achieved. In Chapter 3 I undertook a natural experiment using controlled interrupted time series analysis to evaluate the Southampton primary care liver pathway (SLP). The focus of the evaluation was on the impact of the SLP on referrals to hepatology outpatients given the concerns in the wider literature about the potential impact of such pathways on referrals. The analysis found that the SLP was associated with a reduction in outpatient referrals following its implementation. The evaluation as a whole also provided important context for the complex intervention I planned to develop and informed the recruitment of stakeholders for the further work.

The qualitative evidence synthesis in Chapter 4 explored the barriers and facilitators to delivering alcohol screening and brief intervention (SBI) in community pharmacy. The use of the COM-B model as a framework provided an understanding of these barriers and facilitators from

a behavioural perspective, examining what component(s) of enacting a behaviour were being influenced.

The interviews undertaken in Chapter 5 built on the synthesis findings by exploring stakeholder views on a role for community pharmacists in the identification of ArLD. Three overarching themes emerged from the thematic analysis undertaken: 1) acknowledging, seeking help and engaging with a hidden problem; 2) professional roles, boundaries and attributes; 3) communication, relationships, collaboration and support. In addition, barriers and facilitators to a pharmacist role in ArLD were extracted from the themes and mapped against the COM-B model, mirroring the work done in the qualitative evidence synthesis.

Chapter 6 concerned the design of my intervention. Using the findings from Chapter 4 and Chapter 5 I applied the behaviour change wheel (BCW) to derive potential intervention components that utilised BCW functions. A workshop with stakeholders was conducted to examine and refine the intervention components, as well as produce other components believed required. 27 potential intervention components were refined into 23 required components. These were used to structure the complex intervention – a community pharmacy service – and produce an example draft service specification utilising the structure and components developed.

## 7.4 The work in this thesis from an implementation perspective

The importance of implementation being considered throughout complex intervention development is emphasised in the MRC complex intervention guidance(148). Ultimately, the work undertaken in my PhD can be regarded as having implementation at its heart. My controlled ITS study in Chapter 3 examined the impact of implementing a community liver service. The qualitive work in Chapter 4 and Chapter 5 directly and indirectly established factors affecting implementation. The application of the BCW to these findings and a stakeholder workshop produced intervention components, many of which can be seen as implementation strategies – defined as ‘the specific means and methods for adopting and sustaining interventions’.(332)

Within the field of community pharmacy, research has examined factors that influence implementation of community pharmacy services, recognising that understanding the factors that influence implementation can allow strategies to be developed to address them.(315,333,334) There appears to be less research examining implementation strategies themselves. This is not a reflection of lack of implementation strategies, as highlighted in a 2019 systematic review that identified 223 published articles that described at least one implementation strategy for a professional pharmacy service.(335) A problem highlighted was

that the implementation strategies identified are often not explicitly defined as such and may be poorly described, hence a challenge in being reproduced by others.(335)

A recognised way to report implementation strategies is through application of the nomenclature developed by the Expert Recommendations for Implementing Change (ERIC) project.(336) 73 strategies are described and have been grouped into nine categories.(337) These nine categories have been utilised in describing implementation strategies for community pharmacy services in other research.(335,338)

Table 7.1 shows the nine ERIC categories of implementation strategy and how these can relate to the (abridged) intervention components developed through the work in this PhD. I found the intervention components fit well with the ERIC categories despite being developed using a theory of behaviour change rather than a theory of implementation. The use of COM-B and BCW has been recognised as a way to identify implementation strategies, recognising that implementation of a new intervention can be viewed as a process of behaviour change.(333)

Table 7.1 Abridged intervention components according to their Expert Recommendations for Implementing Change (ERIC) category of implementation strategy

| **ERIC category of implementation strategy** | **ArLD intervention component** |
|---|---|
| Use evaluative and iterative strategies | Monitoring through auditing<br>Pharmacy staff are provided feedback on the outcomes for pharmacy users |
| Provide interactive assistance | Pharmacy staff to have clearly defined access to service support |
| Adapt and tailor to context | Offering and undertaking alongside other services including waiting for prescriptions<br>Any staff can engage customers with further assessment by pharmacist or pharmacy technician<br>Use relevant health conditions to ask about alcohol / offer assessment |
| Develop stakeholder interrelationships | Regular meetings between pharmacy staff and staff of service receiving referrals |
| Train and educate stakeholders | Core training for all staff with enhanced training for designated staff |
| Support clinicians | Clearly defined pharmacy user eligibility, referral requirements and referral pathway<br>Use of a dedicated proforma for referral sent using email (e.g. NHSmail) or established IT system<br>Pharmacy staff can refer directly for a test for liver disease<br>Pharmacy have a standard operating procedure for the service to ensure consistent delivery |
| Engage consumers | Promotion of service to customers<br>Offering service to all eligible customers<br>Deliver service alongside local and national alcohol campaigns e.g. dry January, alcohol awareness week<br>Pharmacy staff maintain non-confrontational, non-judgemental communication<br>Promote service as providing a liver health check<br>Pharmacy users able to choose whether their risk assessment is shared with their GP<br>Education material in pharmacy available |
| Utilize financial strategies | Remuneration for delivering the service including time taken for training |
| Change infrastructure | Use consultation room or private area for any conversations with a pharmacy user about their alcohol use unless user chooses not to<br>Option of dedicated appointments<br>Provision of an anonymous self-completion approved alcohol use screening tool |

### 7.4.1 Mechanisms of implementation for a pharmacy ArLD identification intervention

The ERIC implementation strategies represent a taxonomy and as such do not describe how the strategies may achieve implementation. My use of COM-B and BCW can provide a broad understanding of how the implementation strategies reflected in my intervention components could achieve implementation given each component contains one or more BCW functions that target at least one COM-B component. The implementation strategies can therefore be theorised to achieve implementation through influencing capability, opportunity and motivation. Figure 7.1 represents this for my intervention, indicating how the ERIC implementation strategies link with the BCW functions of my components and the COM-B components being influenced in order that implementation can be achieved.

Specific implementation strategies cannot be expected to be a one size fits all, in particular given the influence of context in which the intervention is being implemented. This is demonstrated in a study identifying implementation strategies for a pharmacy contraception service in Utah, USA. The study identified the strategy 'policy changes to allow pharmacy reimbursement for counselling' in the category of change infrastructure. This is due pharmacists not being identified as healthcare providers in national legislation in the USA, which can prevent pharmacists being reimbursed for healthcare services by insurance providers.(338) Such an implementation strategy would not be relevant to the UK community pharmacy context.

The intervention components developed in my work were developed to be specific to my intervention. However, the strategies and related BCW mechanisms derived from my work as represented in Figure 7.1 provide a broader theory of how my intervention could be realised and may allow for wider application of my work to a different pharmacy intervention.


Figure 7.1 Representation of mechanism of implementation of my intervention according to the COM-B model, BCW intervention functions and ERIC categories of implementation strategies. Blue circles indicate ERIC implementation strategy categories. Orange circles indicate BCW intervention functions. Black lines indicate how BCW intervention functions in my intervention are linked to ERIC implementation strategy categories. Large red, green and grey circle each indicate a separate component of the COM-B model being influenced, with red capability, green opportunity and grey motivation.

## 7.5 Service development and implementation in the wider community pharmacy context

The expansion of community pharmacy roles in England is accelerating. The changing Community Pharmacy Contractual Framework (CPCF) is a demonstration of this. The CPCF is used by NHS England to commission pharmacy owners to provide NHS pharmaceutical services. Nationally commissioned services are either essential services (that must be provided by all pharmacies) or advanced services (that pharmacies can choose to provide).

A decade ago there were four advanced services commissioned in the CPCF: medicines use review (MUR), New Medicines Service (NMS), Stoma Appliance Customisation (SAC), Appliance Use Reviews (AURs).(339) At present (February 2025) there are now nine advanced services commissioned, the majority of which were commissioned within the last 5 years.(340) A short description of all the advanced pharmacy services commissioned in the last 10 years is provided in Table 7.2. It is noticeable that the advanced services in 2014 were prescription-dependent whereas the new advanced services (with the exception of the services relating to COVID-19) are 'prescription-independent' and more clinical in nature, incorporating assessment, advice, and diagnostic and/or treatment processes. My intervention is clearly in keeping with this context.

Two services (excluding those relating to COVID-19) have been decommissioned in the last 5 years – MUR and the Hepatitis C antibody testing service. A lack of sufficient consideration of implementation has been cited as a key reason for problems with these services that ultimately led to their decommissioning.(341,342) Additionally, the MUR service has been criticised for not following a process of complex intervention development, with various problems identified during implementation that could have been addressed earlier had there been appropriate development and feasibility testing.(341) It is interesting to compare this with the NMS, which is based on an intervention developed using theory that underwent feasibility testing.(343) Unlike the MUR service, the NMS has been found to be effective and cost-effective.(344,345)

Table 7.2 Advanced pharmacy services commissioned in England from 2014 to 2024

| Advanced pharmacy service | Short description of service |
|---|---|
| *Medicines Use Review* | Adherence focused review of patient's medications aiming to increase the patient's knowledge and adherence to their medication.<br>Commenced 2005. Decommissioned 2021 |
| *Stoma Appliance Customisation* | The customisation of stoma appliances to ensure their proper use, comfortable fitting and improve duration or usage.<br>Commenced 2010 |
| *Appliance Use Review* | Review of a patient's prescribed appliance to help improve patients' understanding and use of the appliance.<br>Commenced 2010 |
| *New Medicines Service* | Series of discussions with a patient to provide support for people prescribed a medicine for a long-term condition to help improve patients' understanding of the medication and their adherence to it.<br>Commenced 2011 |
| *Seasonal influenza vaccination* | Administer flu vaccinations to all eligible adult patients as part of the NHS annual seasonal flu vaccination campaign.<br>Commenced 2015 |
| *Pharmacy First* | Advice and NHS-funded treatment for seven common conditions in addition to minor illness consultations and supply of urgent medicines. The latter is the incorporation the pre-existing Community Pharmacy Consultation Service (CPCS).<br>Commenced 2024 (CPCS commenced 2019) |
| *Hepatitis C (HCV) Antibody Testing* | Point of care testing for HCV antibodies to people who inject drugs who are not engaged with community drug and alcohol treatment services.<br>Commenced 2020. Decommissioned 2023. |
| *Pandemic Delivery* | Delivery of prescriptions to people self-isolating due to COVID-19<br>Commenced 2020. Decommissioned 2022 |
| *COVID-19 lateral flow device (LFD) distribution* | Provision of LFD tests for COVID-19 for asymptomatic people.<br>Commenced 2021. Decommissioned 2022 |
| *Hypertension Case-Finding* | Blood pressure testing service in pharmacy aiming to identify adults with undiagnosed hypertension and refer them to general practice to confirm diagnosis and further management.<br>Commenced 2021 |
| *Smoking cessation* | Smoking cessation support service to adults discharged from hospital (includes ongoing supply of nicotine replacement therapy and performing carbon monoxide breath test in addition to support).<br>Commenced 2022 |
| *Pharmacy Contraception* | Initiation and ongoing supply and monitoring of oral contraception.<br>Commenced 2023 |
| *LFD test supply* | Provision of LFD tests for COVID-19 to at-risk patients.<br>Commenced 2023 |

In terms of the newly commissioned clinical pharmacy services (hypertension case finding, Pharmacy first, contraception service and smoking cessation service) there is minimal publicly available detail with regards their development process. However, all have been piloted before being nationally commissioned, with the Department of Health and Social Care indicating evaluation of the pilots was performed and included assessment of feasibility and acceptability.(346) This would suggest a process of complex intervention development has been followed but the results of these evaluations have not been publicised and therefore leaves uncertainty about what is their potential impact.(346) Such evaluations could also provide invaluable insights for stakeholders in terms of how successful implementation may be achieved for these and other pharmacy services in real-world settings – something that I could have utilised in my PhD both in terms of designing my intervention and also to compare with my own model of implementation strategy mechanisms shown in Figure 7.1.

## 7.6 Strengths, challenges and reflections on this PhD

### 7.6.1 Overall strengths

A key strength of my work in this PhD is that it is underpinned by a process of complex intervention development. As discussed in the previous section, the success of the nationally commissioned pharmacy advanced service the New Medicines Service has been attributed in part to its creation through a process of complex intervention development. Through following a recognised process of complex intervention development in my work, the potential future intervention in the form of a pharmacy ArLD identification service should have the best chance of being implementable and effective in the real world.(169)

Within the complex intervention development work undertaken in this PhD I believe the work undertaken to gain understanding of context and the level of stakeholder involvement – both vital in complex intervention development work – were major strengths.

My background as a hepatology registrar means I am very familiar with patients with ArLD in context of the hospital environment (both patients admitted to hospital and those in outpatient clinics) but had less understanding of their route to being seen in clinic. Collaboration with the University Hospital Southampton hepatology consultant who is lead for the Southampton primary care liver pathway (SLP) alongside my evaluation of the SLP in Chapter 3 provided an in-depth understanding of how ArLD may be identified in the community and key players within that process, further informing participant selection for my interviews study and co-design workshop.

My understanding of the community pharmacy context was limited to what was in the literature and my infrequent experience as a pharmacy user. Collaboration and regular meetings with the chief officer of Community Pharmacy South Central (CPSC) throughout the work meant I had an up to date contextual understanding of current community pharmacy practices and challenges, which as discussed have been going through a significant period of change during this PhD.

Both these collaborations enabled access to a wider pool of stakeholders and their engagement with my work. The strength of the subsequent multiple different stakeholder participation in both my interview study and the co-design workshop is that the findings represent commonalities and agreement across the different stakeholders, reducing the likelihood of idealistic intervention design, which is a potential risk when conceptualising an intervention.(164)

### 7.6.2 Challenges, lessons learnt and reflections

Perhaps the greatest challenge to the development work in this PhD was the rapidly changing context of community pharmacy that has been taking place whilst I have been undertaking this PhD. At the time of registering for this PhD (September 2020) there were six advanced pharmacy services commissioned in England, only two of which had been commissioned in the prior 5 years. In the four years since I registered, eight new services have been commissioned. Furthermore, the pharmacy landscape has drastically changed with a dramatic decline in large chain pharmacies and a shift to small chain and independent pharmacies. In 2019 49.4% of pharmacies in England were large chain but as of 2023 this has fallen to 38%, primarily due to closures of large chain pharmacies, in particular the near-collapse of Lloyds pharmacy that closed or sold 90% of its 1,338 pharmacies in 2022.(347)

The subsequent impact on my work is that it has been conducted at a time of ongoing dramatic change in community pharmacy and as such the changing context may affect the generalisability of my work. However, my work is clearly in keeping with the wider context of a drive in England for clinical services in community pharmacy.

I have also considered that the evaluation of the SLP in Chapter 3 may limit the understanding of context to its locality. An alternative approach would have been to examine community pathways for ArLD across the UK, which potentially could have been achieved through a systematic review. However, there has been relatively few published reports of community liver pathways in the UK. A systematic review published during my PhD in 2022 identified only 10 published UK community liver pathways of which 5 involved patients with ArLD and just 2 were full articles reporting real-world pathways.(99,103,348) As such the contextual understanding from such a systematic review would be minimal and I believe far greater understanding was obtained through my evaluation of the SLP. Additionally, the urban nature of the locality in which the SLP sits is likely to add some generalisability to the findings.

Throughout my work I recognise that given the conceptual nature of the intervention being developed, my findings are dependent on what people say without objective evidence of what they do, with the exception of two of the studies included in my qualitative evidence synthesis that incorporated observation methods (see Table 4.5 in section 4.3). On reflection I have considered the possibility of undertaking observation as part of this PhD and this is discussed below.

## 7.7 Potential supplementary work to this PhD

### 7.7.1 Use of observation methods to enhance understanding of the pharmacy context

A potential limitation of the methods in this PhD is that they reflect what people say they do (or would do). The use of observation as an additional method, as compared to only interviews or focus groups, may improve understanding about what people actually do.(349)

There is some variation in the literature in defining observation relating to the level of researcher participation. I find the simple distinction of 'non-participant' versus 'participant' observation simplest to describe what is conducted.(350) The distinction between 'non-participant' and 'participant' observation is that in the former the researcher acts as an outside observer whereas in the latter the researcher participates in the activities being observed. Non-participant observation has also been called 'passive participant' observation.(351).

To apply this to the pharmacy setting, participant observation would involve undertaking observation whilst acting as a member of pharmacy staff or a pharmacy user. Non-participant observation would be observing the pharmacy environment, staff and customers as a bystander. Non-participant observation is a well-recognised technique to help build understanding of context when developing interventions.(169)

Both participant and non-participant observation can be 'covert' or 'overt' depending on whether those being observed are aware observation is taking place. Covert participant observation is also referred to as the 'mystery shopper' technique.(352) It is both ethically and practically challenging and requires extensive training to conduct it properly. Conversely the main concern of overt observation is the Hawthorne effect – that people may change their behaviour if aware they are being observed or studied.(350,353)

In relation to the work in this PhD, the addition of non-participant observation may enhance my understanding of the context that my intervention aims to fit into. However, observation research in relation to intervention development is typically observation of an intervention in action.(354) This was not possible in my work given it concerned the development of a conceptual intervention. The other challenge to undertaking observation in this PhD would be logistical. As well as getting relevant consents, the time taken to undertake meaningful observation can be significant given the need to observe different participants (i.e. staff and customers) in different sites (i.e. pharmacies) at difference times.(350) As the sole researcher in my PhD work, I do not believe it would have been feasible for me to undertake sufficient observation to produce meaningful results in addition to the work undertaken in this PhD.

## 7.8 Further research

### 7.8.1 Feasibility and effectiveness studies of a pharmacy ArLD intervention

#### 7.8.1.1 Feasibility study of a pharmacy ArLD intervention

In following the MRC complex intervention development guidance the next step for future research would be a feasibility study of my intervention. The focus of a feasibility study in relation to a complex intervention may concern the feasibility of the intervention itself, the feasibility of an evaluation study design of the intervention, or a combination of both.(159)

For an intervention to be ready for evaluation, there need to be few or only minor uncertainties about the intervention. There are still uncertainties about my intervention and as such a feasibility study would be needed to explore the feasibility and acceptability of my intervention when delivered prior to an evaluation. This would be done using mixed methods with a convenience sample of a small number of pharmacies in order to refine the intervention through identifying and addressing uncertainties.(159,355,356) Potential uncertainties of my intervention and how they could be assessed in a feasibility study are shown in Table 7.3. Further work with stakeholder groups would also be undertaken to establish uncertainties that should be assessed and establish criteria to determine whether the intervention is confirmed to be feasible to deliver.(159)

Table 7.3 Example uncertainties about my pharmacy ArLD intervention and how these could be assessed in a feasibility study

| **Intervention uncertainty** | **How uncertainty could be assessed in feasibility study** |
|---|---|
| Acceptability and impact of training programme to pharmacy staff | Before and after survey of knowledge<br>Focus groups with staff who receive training |
| Recruitment of pharmacies | Offer of intervention to pharmacies across a LPC network and number of responses to offer recorded and details of pharmacies recorded |
| Recruitment of participants to intervention | Record made of number of customers: offered; eligible; taking up the intervention; referred through intervention<br>Observation of pharmacies delivering the intervention |
| Which customers use intervention and why | Collect demographics of participants that use intervention<br>Interviews or focus groups with customers that engage with intervention<br>Interview or focus groups with customers that decline the intervention<br>Observation of pharmacies delivering the intervention |
| Acceptability of delivering intervention to pharmacy staff | Interviews or focus groups with staff from pharmacies delivering the intervention |
| Acceptability of intervention to customers engaging with it | Interviews or focus groups with customers that engage with intervention |
| Establishing outcome of intervention for customers | Follow up of customers engaging with intervention to establish retention rates.<br>Use a follow-up questionnaire to establish whether underwent liver disease testing, if diagnosed and if attended alcohol services and if alcohol use has changed<br>Obtain service use data from liver testing service and alcohol services of number attendees referred by community pharmacy |
| Acceptability and impact of intervention to liver services and general practice | Focus groups or interviews with GPs and liver service professionals during/following intervention delivery<br>Obtain service level data with potential for interrupted-time series analysis to examine for any impact |
| Cost of delivering intervention | Collect costs of all elements of intervention delivered |

#### 7.8.1.2 Effectiveness evaluation of a pharmacy ArLD intervention

If the feasibility of the pharmacy ArLD intervention was confirmed, the next step would be an evaluation of its effectiveness. Whilst the classic randomised control trial (RCT) is recognised as the gold standard for determining effectiveness, their use in the evaluation of complex interventions is recognised to face multiple challenges, not least the factors of cost and time that can be insurmountable barriers to getting research into clinical practice.(186) Contamination of any control group is an additional challenge in complex interventions.(357) It can be envisaged how if pharmacy users were randomised at an individual level in a pharmacy then control group participants may seek out ArLD assessment and testing elsewhere, reducing any effect size of the intervention. If randomisation was by pharmacy (or groups of pharmacy) contamination would remain a challenge given the walk-in nature of pharmacies i.e. pharmacy users may seek out a pharmacy offering the service if their pharmacy did not.

On top of these logistical challenges is the common practice of commissioning pharmacy services as pilot services without a prior effectiveness evaluation as discussed in section 7.5. With these factors in mind, a pragmatic effectiveness evaluation for the pharmacy ArLD intervention could be through use of natural experiment methodology and interrupted time series design through a 'multiple baseline' or a stepped-wedge design.(198,358) This would require the ArLD intervention delivered as a commissioned service but implemented sequentially in different areas of pharmacies after a baseline period.(177) As such each area starts as a control group and becomes an intervention group at different times as implementation occurs. This could be conducted as a truly experimental study – a randomised stepped-wedge trial – but can also be in keeping with a natural experiment study through incorporating planned experimentation into implementation i.e. by working with commissioners to have the intervention 'naturally' implemented area by area.(177)

A stepped-wedge design may be appealing to pharmacy commissioners as it would ensure pharmacies would have equal access to service delivery i.e. all pharmacies are able to offer the service.(359) It also may help with contamination as each group acts as its own control and the additional use of ITS analysis would account for temporal trends that can confound stepped-wedge design.(357). Each area would undergo an ITS analysis of the efficacy outcome to form a multiple group controlled ITS. This would provide strong evidence that the observed effect was caused by the intervention if there was a similar observation of effect following intervention implementation in each area.(198)

### 7.8.2 The impact of testing for ArLD on alcohol use and liver outcomes

In the field of hepatology the current global expert consensus is to pursue improving early diagnosis of liver disease because early diagnosis is beneficial.(82,328) This view underpins the rationale for the complex intervention work in this PhD but clear evidence of benefit can be questioned. Much of the evidence concerning early diagnosis of ArLD focuses on the benefit of identifying advanced fibrosis prior to the development of complications. The rationale is that in the setting of liver cirrhosis (in ArLD and other causes of liver disease) there is evidence of effective interventions to prevent or reduce harm from complications, namely surveillance for hepatocellular carcinoma(88), primary prevention of variceal bleeding(360), prevention of decompensation.(361)

However, the prevalence of cirrhosis in people with alcohol misuse has been estimated at 12.9%.(362) As such the vast majority of individuals at high risk of ArLD cirrhosis will not have it when tested. The expected benefit of early diagnosis of non-cirrhotic ArLD is that intervention can be made to prevent progression to cirrhosis. However, there are no current liver-specific treatments that achieve this and therefore the focus is on intervening on the cause i.e. alcohol misuse.(363) This action would be recommended for any patient with alcohol misuse, regardless of the presence of ArLD. An evidence gap I have identified in conducting my PhD is whether testing for ArLD in people with alcohol misuse decreases their risk of developing liver related events i.e. progression to cirrhosis, cirrhotic complications, and liver-related death.

Proving an intervention can prevent progression to cirrhosis is hampered by the timescales required to see progression to cirrhosis – a 2023 systematic review and meta-analysis estimated the annual progression rate of non-cirrhotic ArLD to cirrhosis at 4%.(362) What is more, progression is recognised to be influenced by a range of factors, both detrimental and protective. As such, trying to establish whether testing for ArLD in those at risk (with or without an additional intervention for alcohol misuse) can reduce progression to cirrhosis in a gold standard RCT design would be challenging.

An alternative RCT design would be to use an intermediate outcome – namely a change in alcohol consumption – recognising that ongoing drinking is a fundamental driver of progression of ArLD and development of liver related events. A research question can therefore be posed as ‘does testing for ArLD in people with alcohol misuse have an impact on alcohol use?’. This would need to be over and above any intervention for alcohol misuse given that interventions for alcohol misuse (in the absence of any assessment of ArLD) are known to decrease alcohol use.(78) This was a weakness I highlighted of a systematic review that considered this research question.(91,329) As discussed in section 1.4.3 this research question has been examined in a small number of studies with a signal that alcohol consumption is reduced following an ArLD

assessment(92–94,364). However, these studies lack control groups(92,93,364) or did not have the power to identify significant differences between groups assessed for ArLD and those not.(94)

The value of definitely answering this research question would be to provide clear justification for the practice of case-finding approaches for early diagnosis of ArLD. If the process of testing can reduce alcohol use (and development of liver related events) more than an alcohol intervention on its own then testing would warrant consideration as a public health intervention to improve alcohol-related health outcomes. The work contained within this PhD has indicated that a collaborative approached between liver services and community pharmacists could form part of such an intervention.

## 7.9 Overall conclusion

Many patients with alcohol-related liver disease remain undiagnosed until presenting to healthcare providers with complications of late-stage disease. Half of such patients with these complications will die from their liver disease in ensuing 2 years. This thesis has for the first time explored a role for community pharmacists in the identification of undiagnosed ArLD. This was achieved through following a process of complex intervention development.

Existing community liver pathways, themselves complex interventions, aim for earlier identification of ArLD and other liver diseases. Incorporation of community testing for liver disease in such pathways may be a key feature to ensure they can fit within the existing capacity of secondary care liver services. However, such pathways currently are only accessed through general practice. Community pharmacies and their staff are potentially more accessible to those who are at greatest risk of undiagnosed ArLD and related harm.

The work in this PhD has formed the design and key components of a complex intervention in community pharmacy in the form of a community pharmacy service. This has the potential to enable community pharmacists to identify those who may have ArLD, help them reduce their alcohol intake and engage them with existing care pathways for testing and further management. For this to be possible, close collaboration with liver services would be essential along with training and appropriate remuneration for pharmacy staff. Further research is required to examine the feasibility of such a service in the rapidly changing community pharmacy context and whether it would be more effective than current practices in ArLD. However, the increasingly clinical role of community pharmacists in England and the UK provides an undeniable opportunity for this conceptualised complex intervention to increase identification of undiagnosed ArLD and reduce alcohol-related harm.

# Appendix A Constituents of a non-invasive liver screen and red flags

| Non-invasive liver screen blood test | Positive result criteria |
|---|---|
| Hepatitis B (HBsAg) | Positive |
| Hepatitis C (HCV IgG) | Positive |
| Liver autoantibodies | Positive |
| Immunoglobulins | >ULN |
| Ferritin | >ULN |
| HBsAg = Hepatitis B surface antigen, HCV = Hepatitis C immunoglobulin G, Ig = Immunoglobulin, ALT = alanine transferase, ALP = alkaline phosphatase, ULN = upper limit of normal | |

| Red flags advised in Southampton primary care liver pathway |
|---|
| Suspected malignancy |
| Jaundice |
| ALT 5x ULN |
| ALP 5x ULN |
| Low platelets |
| Persistent low albumin |
| High INR |
| Ascites |
| Encephalopathy |
| Haematemesis |
| Sepsis |
| ALT, alanine aminotransferase; ALP, alkaline phosphatase; INR international normalised ratio; ULN, upper limit of normal |

# Appendix B General and acute specialities in NHS England Monthly Activity Return

General Surgery

Urology

Trauma & Orthopaedics

ENT

Ophthalmology

Oral Surgery

Restorative Dentistry

Paediatric Dentistry

Orthodontics

Oral & Maxillo Facial Surgery

Endontics

Peridontics

Prosthodontics

Surgical Dentistry

Neurosurgery

Plastic Surgery

Cardiothoracic Surgery

Paediatric Surgery

Accident & Emergency

Anaesthetics

Critical Care Medicine

General Medicine

Gastroenterology

Endocrinology

Clinical Haematology

Clinical Physiology

Clinical Pharmacology

Audiological Medicine

Clinical Genetics

Clinical Cyto & Molecular Genetics

Clinical Immunology & Allergy

Rehabilitation

Palliative Medicine

Cardiology

Paediatric Cardiology

Sports and Exercise Medicine

Acute Internal Medicine

Dermatology

Thoracic Medicine

Infectious Diseases

Tropical Medicine

Genito-Urinary Medicine

Nephrology

Medical Oncology

Nuclear Medicine

Neurology

Clinical Neuro-Physiology

Rheumatology

Paediatrics

Paediatric Neurology

Geriatric Medicine

Dental Medicine Specialties

Special Care Dentistry

Medical Ophthalmology

Gynaecology

Community Sexual and Reproductive Health

Clinical Oncology

Radiology

General Pathology

Blood Transfusion

Chemical Pathology

Haematology

Histopathology

Immunopathology

Medical Microbiology and Virology

Medical Microbiology

Medical Virology

Community Medicine

Occupational Medicine

# Appendix C Data structure for interrupted time series analysis

| Month-year | CCG | Referral count | Time | SLP intervention | Time after SLP | SCCG | SCCG_time | SCCG_pathway | SCCG_time_pathway |
|---|---|---|---|---|---|---|---|---|---|
| Apr-16 | SCCG | 30 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| May-16 | SCCG | 33 | 2 | 0 | 0 | 1 | 2 | 0 | 0 |
| Jun-16 | SCCG | 30 | 3 | 0 | 0 | 1 | 3 | 0 | 0 |
| … | … | … | … | … | … | … | … | … | … |
| Dec-17 | SCCG | 46 | 21 | 0 | 0 | 1 | 21 | 0 | 0 |
| Jan-18 | SCCG | 50 | 22 | 1 | 1 | 1 | 22 | 1 | 1 |
| Feb-18 | SCCG | 39 | 23 | 1 | 2 | 1 | 23 | 1 | 2 |
| Mar-18 | SCCG | 45 | 24 | 1 | 3 | 1 | 24 | 1 | 3 |
| … | … | … | … | … | … | … | … | … | … |
| Aug-19 | SCCG | 29 | 41 | 1 | 20 | 1 | 41 | 1 | 20 |
| Sep-19 | SCCG | 38 | 42 | 1 | 21 | 1 | 42 | 1 | 21 |
| Oct-19 | SCCG | 30 | 43 | 1 | 22 | 1 | 43 | 1 | 22 |
| Apr-16 | WHCCG | 29 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| May-16 | WHCCG | 23 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jun-16 | WHCCG | 36 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| … | … | … | … | … | … | … | … | … | … |
| Dec-17 | WHCCG | 31 | 21 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jan-18 | WHCCG | 14 | 22 | 1 | 1 | 0 | 0 | 0 | 0 |
| Feb-18 | WHCCG | 27 | 23 | 1 | 2 | 0 | 0 | 0 | 0 |
| Mar-18 | WHCCG | 30 | 24 | 1 | 3 | 0 | 0 | 0 | 0 |
| … | … | … | … | … | … | … | … | … | … |
| Aug-19 | WHCCG | 25 | 41 | 1 | 20 | 0 | 0 | 0 | 0 |
| Sep-19 | WHCCG | 25 | 42 | 1 | 21 | 0 | 0 | 0 | 0 |
| Oct-19 | WHCCG | 31 | 43 | 1 | 22 | 0 | 0 | 0 | 0 |

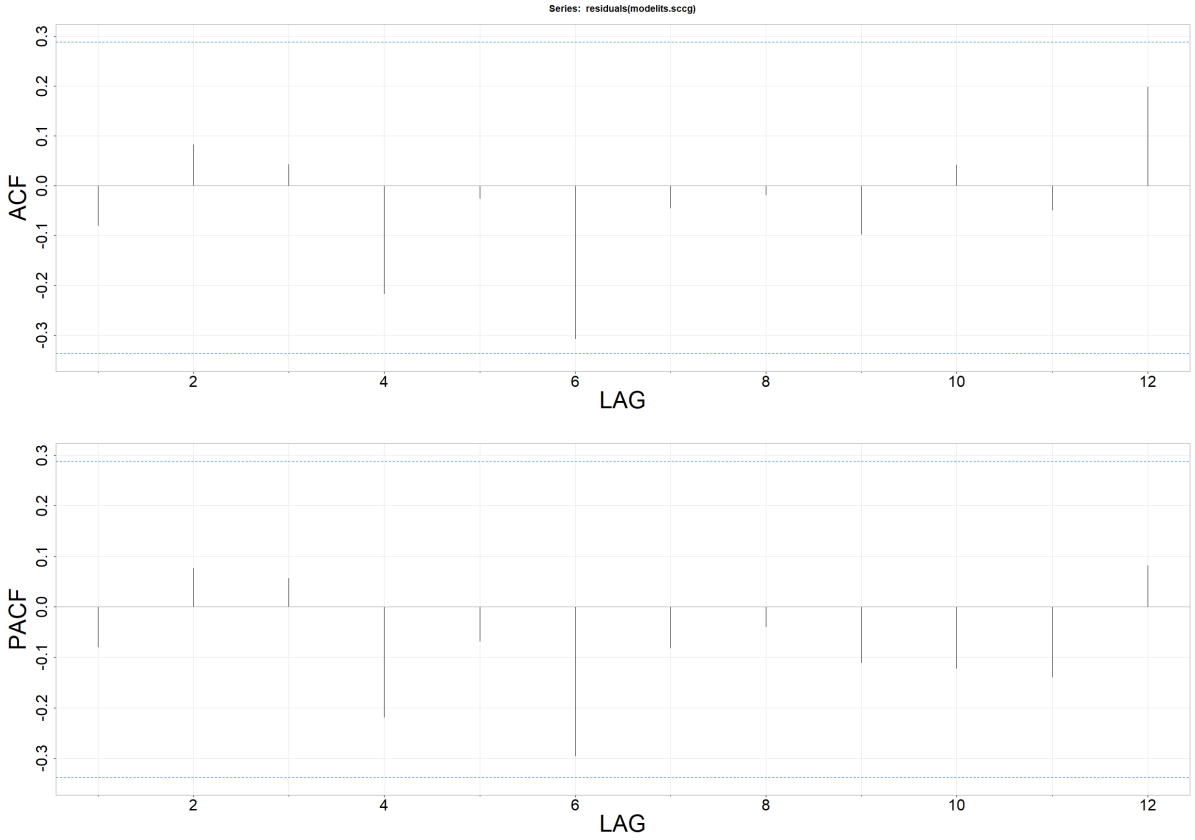
CCG, clinical commissioning group; SCCG Southampton city CCG; WHCCG, West Hampshire CCG; SLP, Southampton liver pathway

# Appendix D R code of controlled interrupted time series and auto-correlation function (ACF) and partial auto-correlation function (pACF) plots of each analysis

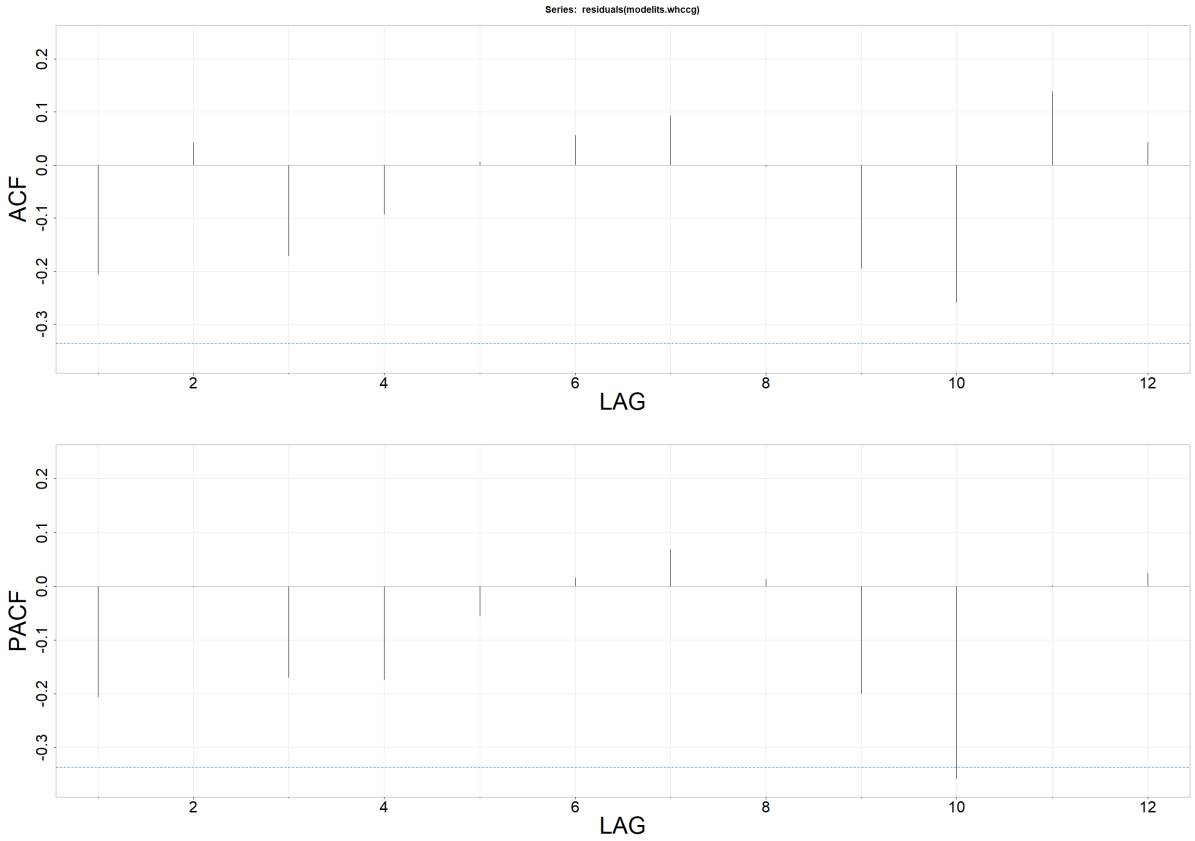
## D.1 R Code

```
#Load necessary libraries####
library(nlme)
library(car)
library(Epi)
library(astsa)
library(readxl)

#import data####
data <- read_excel (filename)

#Create dataset for each CCG####
dataA<-data[1:41,]
dataB<-data[42:82,]

#ITS for SCCG####
modelits.sccg<-glm(refcount~time+pathway+trendp,data=dataA,family="quasipoisson")

#ITS for WHCCG####
modelits.whccg<-glm(refcount~time+pathway+trendp,data=dataB,family="quasipoisson")

#CITS####
modelCITS<-
glm(refcount~time+pathway+trendp+area+areatime+areapathway+areatrendp,data=data,famil
y="quasipoisson")

#PACF and ACF plots####

acf2(residuals(modelits.sccg), max.lag=12)
acf2(residuals(modelits.whccg),max.lag = 12)
acf2(residuals(modelCITS),max.lag = 12)
```

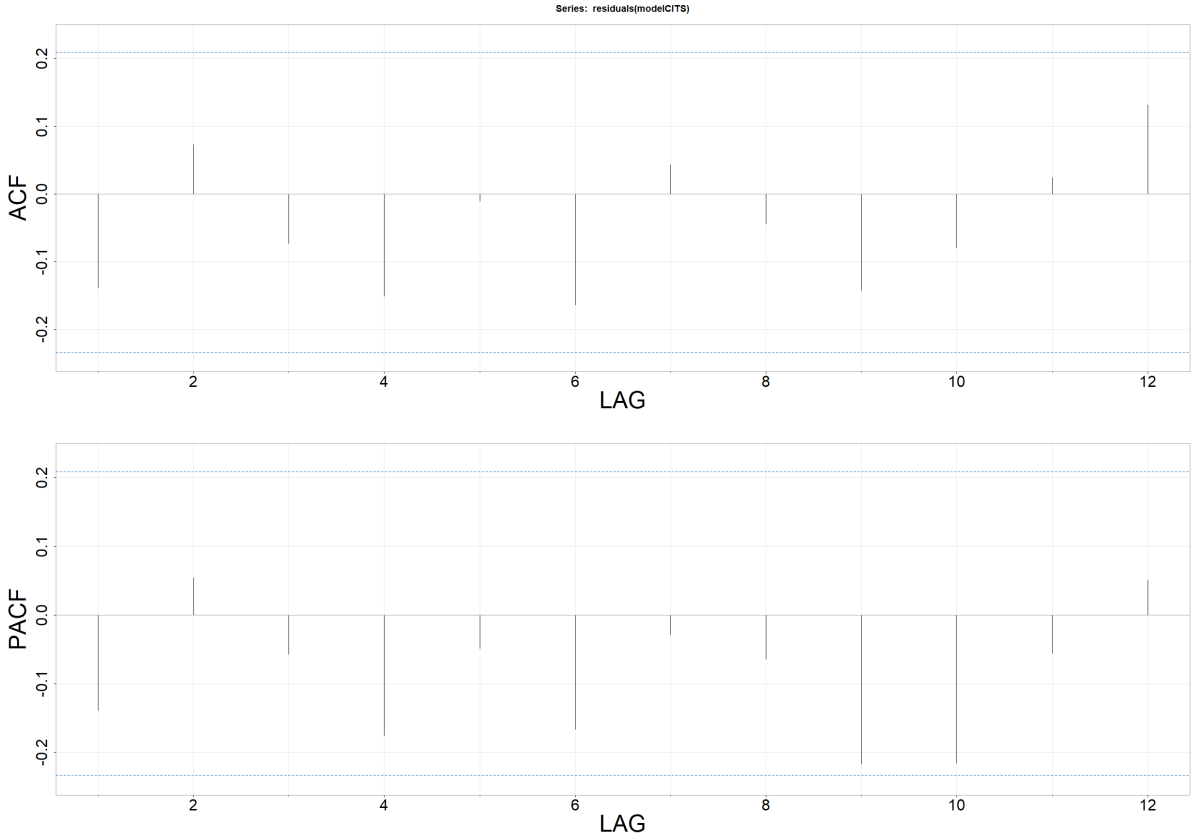
## D.2 ACF and PACF for SCCG ITS




## D.3 ACF and PACF for WHCCG ITS



## D.4 ACF AND PACF for CITS



# Appendix E Result of community Fibroscan® clinic sensitivity analysis using April 2017 as the start of the time series

| | IRR community Fibroscan® sensitivity analysis | IRR April 2017 community Fibroscan® sensitivity analysis | 95% CI for sensitivity analysis | p-value for sensitivity analysis |
|---|---|---|---|---|
| Slope change SCCG | 0.99 | 0.98 | 0.93 – 1.03 | 0.434 |
| Slope change SCCG vs WHCCG | 0.98 | 0.97 | 0.90 – 1.04 | 0.362 |
| Level change SCCG | 0.73 | 0.719 | 0.55 – 0.95 | **0.019** |
| Level change SCCG vs WHCCG | 0.87 | 0.82 | 0.54 – 1.25 | 0.362 |
| SCCG, Southampton City Clinical Commissioning Group; WHCCG, West Hampshire Clinical Commissioning Group; IRR, incidence rate ratio; CI, confidence interval | | | | |

# Appendix F Search strategy for qualitative evidence synthesis

**MEDLINE® ALL (via Ovid)**

1. (pharmacy or pharmacist* or pharmacies or communit*).ti,ab,kf.
2. Pharmacists/ or Pharmacy Technicians/ or Pharmacy/ or pharmacies/ or Practice Patterns, Pharmacists'/ or Evidence-Based Pharmacy Practice/ or Pharmacy Research/ or Education, Pharmacy/ or Education, Pharmacy, Continuing/ or Community Pharmacy Services/ or Community Health Services/ or Community Health Workers/ or Community-Based Participatory Research/ or Community Participation/ or Community Health Planning/
3. 1 or 2
4. Alcoholism/ or Alcoholics/ or Alcohol Abstinence/ or alcohol drinking/ or Alcoholic Beverages/ or Alcoholic Intoxication/ or Alcohol-Related Disorders/ or binge drinking/ or Drinking Behavior/
5. alcohol*.ti,ab,kf.
6. 4 or 5
7. (alcohol* adj2 (screen* or assess* or identif* or intervention* or advice or service*)).ti,ab,kf.
8. (ABI or SBI or IBA or SBIRT).ti,ab,kf.
9. (brief intervention* or brief advice).ti,ab,kf.
10. 7 or 8 or 9
11. 3 and 6 and 10
12. limit 11 to yr="2003 -Current"

**EMBASE Classic + Embase (via Ovid)**

1. (pharmacy or pharmacist* or pharmacies or communit*).ti,ab,kf.
2. pharmacist/ or clinical pharmacist/ or pharmacy technician/ or "pharmacy (discipline)"/ or "pharmacy (shop)"/ or pharmacy education/ or pharmacy practice/ or pharmacy research/ or evidence-based pharmacy/ or pharmacist attitude/ or pharmacist patient relationship/ or community pharmacist/ or community/ or community assessment/ or community care/ or community participation/
3. 1 or 2
4. alcohol/ or alcoholism/ or alcohol abuse/ or alcohol abstinence/ or alcohol consumption/ or alcohol tolerance/ or "alcohol use disorders identification test"/ or alcoholic beverage/ or alcohol intoxication/ or binge drinking/ or heavy drinking/ or drinking behaviour/
5. alcohol*.ti,ab,kf.
6. 4 or 5
7. (alcohol* adj2 (screen* or assess* or identif* or intervention* or advice or service*)).ti,ab,kf.
8. (ABI or SBI or IBA or SBIRT).ti,ab,kf.
9. (brief intervention* or brief advice).ti,ab,kf.

10. 7 or 8 or 9
11. 3 and 6 and 10
12. limit 11 to yr="2003 -Current"

**CINAHL Plus with Full text (via EBSCOhost)**

1. TI ( pharmacy or pharmacist* or pharmacies or communit* ) OR AB ( pharmacy or pharmacist* or pharmacies or communit* ) OR SU ( pharmacy or pharmacist* or pharmacies or communit* )
2. (MH "Community Assessment") OR (MH "Community Health Workers") OR (MH "Community Health Services") OR (MH "Community Programs") OR (MH "Communities")
3. (MH "Pharmacists") OR (MH "Pharmacy Technicians") OR (MH "Pharmacy, Retail") OR (MH "Pharmacy and Pharmacology") OR (MH "Pharmacist Attitudes") OR (MH "Education, Pharmacy") OR (MH "Education, Pharmacy Technicians") OR (MH "Pharmacy Administration") OR (MH "Pharmacy Service")
4. S1 OR S2 OR S3
5. TI alcohol* OR AB alcohol* OR SU alcohol*
6. (MH "Alcoholism") OR (MH "Alcoholics") OR (MH "Alcohol Abuse") OR (MH "Alcohol Drinking") OR (MH "Alcohol Abstinence") OR (MH "Alcoholic Beverages") OR (MH "Alcoholic Intoxication") OR (MH "Alcohol-Related Disorders") OR (MH "Drinking Behavior") OR (MH "Binge Drinking")
7. S5 OR S6
8. TI alcohol* N2 screen* OR AB alcohol* N2 screen* OR SU alcohol* N2 screen*
9. TI alcohol* N2 assess* OR AB alcohol* N2 assess* OR SU alcohol* N2 assess*
10. TI alcohol* N2 identif* OR AB alcohol* N2 identif* OR SU alcohol* N2 identif*
11. TI alcohol* N2 intervention* OR AB alcohol* N2 intervention* OR SU alcohol* N2 intervention*
12. TI alcohol* N2 advice OR AB alcohol* N2 advice OR SU alcohol* N2 advice
13. TI alcohol* N2 service* OR AB alcohol* N2 service* OR SU alcohol* N2 service*
14. TI ( ABI or SBI or IBA or SBIRT ) OR AB ( ABI or SBI or IBA or SBIRT ) OR SU ( ABI or SBI or IBA or SBIRT )
15. TI ( "brief intervention*" or "brief advice" ) OR AB ( "brief intervention*" or "brief advice" ) OR SU ( "brief intervention*" or "brief advice" )
16. S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15
17. S4 AND S7 AND S16 *[Limiter Publication Year 2003-]*

**APA PsychInfo (via EBSCOhost)**

1. TI ( pharmacy or pharmacist* or pharmacies or communit* ) OR AB ( pharmacy or pharmacist* or pharmacies or communit* ) OR KW ( pharmacy or pharmacist* or pharmacies or communit* )
2. DE "Pharmacists" OR DE "Pharmacy" OR DE "Community Advocacy" OR DE "Community Attitudes" OR DE "Community Counseling" OR DE "Community Development" OR DE "Community Facilities" OR DE "Community Health" OR DE "Community Involvement" OR DE "Community Services" OR DE "Community Welfare Services" AND DE "Communities" OR DE "Communities of Practice"

3. S1 OR S2
4. TI alcohol* OR AB alcohol* OR KW alcohol*
5. DE "Alcoholism" OR DE "Alcohol Abuse" OR DE "Alcohol Drinking Attitudes" OR DE "Alcohol Drinking Patterns" OR DE "Alcohol Intoxication" OR DE "Chronic Alcoholic Intoxication" OR DE "Alcohol Treatment" OR DE "Alcohol Use Disorder" OR DE "Alcoholic Beverages" OR DE "Binge Drinking" OR DE "Drinking Behavior" OR DE "Sobriety" OR DE "Social Drinking"
6. S4 OR S5
7. TI alcohol* N2 screen* OR AB alcohol* N2 screen* OR KW alcohol* N2 screen*
8. TI alcohol* N2 assess* OR AB alcohol* N2 assess* OR KW alcohol* N2 assess*
9. TI alcohol* N2 identif* OR AB alcohol* N2 identif* OR KW alcohol* N2 identif*
10. TI alcohol* N2 advice OR AB alcohol* N2 advice OR KW alcohol* N2 advice
11. TI alcohol* N2 service* OR AB alcohol* N2 service* OR KW alcohol* N2 service*
12. TI alcohol* N2 intervention* OR AB alcohol* N2 intervention* OR KW alcohol* N2 intervention*
13. TI ( ABI or SBI or IBA or SBIRT ) OR AB ( ABI or SBI or IBA or SBIRT ) OR KW ( ABI or SBI or IBA or SBIRT )
14. TI ( "brief intervention*" or "brief advice" ) OR AB ( "brief intervention*" or "brief advice" ) OR KW ( "brief intervention*" or "brief advice" )
15. S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14
16. S3 AND S6 AND S15 *[Limiter Publication Year 2003-]*

# Appendix G Supporting quotes for themes and sub-themes of qualitative evidence synthesis

| Theme (COM-B component) | Sub-themes | Supporting quotes |
|---|---|---|
| **Awareness, training and communication skills (Capability)** | Non-confrontational, empathetic communication skills | "I didn't feel like I was under the spotlight, it was, more a relaxed conversation [...] I felt quite at ease and quite happy to speak to him" (customer, first order, Quirk et al.)<br><br>"Willingness to engage was associated with a personalised and caring approach by the pharmacist" (second order, Jaime et al.)<br><br>"some approached the consultation by asking a question which was more likely to result in a negative answer, i.e. did alcohol lead to the need for EHC? [emergency hormonal contraception], which fed into a very low uptake for those pharmacists" (second order, Brown et al.)<br><br>"it's more, amenable to talk here, about it because I - I can be honest and don't feel, that people are going to be judgmental"(customer, first order, Jaime et al.)<br><br>"It's not 'do you drink alcohol?' It's 'I'm just letting you know', and then 'well, oh yes I have a drink every night', and then we'll be like 'oh well I'll choose a different product for you', or 'don't take this at the same time', or something, so that you can keep the conversation going a bit....But that does need some training, because that's hardly a question, it's more giving information so it doesn't seem like a confronting interrogation." (pharmacist, first order, Dare et al.) |
| | Using alcohol screening tools | "…. being a really straight forward screening test works really well" (pharmacists, first order, Hattingh et al.)<br><br>"All pharmacists agreed that working through the AUDIT scores with the consumers provided an opportunity to talk about alcohol use" (second order, Hattingh et al.)<br><br>"The more you don't do it, the more and more you kind of, the knowledge kind of just slips away a little bit." (pharmacist, first order, Brown et al.)<br><br>"some staff expressed the view that question wording was too intrusive for the community pharmacy setting" (second order, Mackridge et al.) |

| Theme (COM-B component) | Sub-themes | Supporting quotes |
|---|---|---|
| **Awareness, training and communication skills (Capability)** | Alcohol-related knowledge | "the majority of participants felt they did not have sufficient knowledge and/or skills in assisting older people who may have alcohol-related issues, beyond advising them on medication and alcohol use" (second order, Dare et al.)<br><br>"… some people that were on high risk obviously and moderate risk we spoke to them if they had any blood pressure problems or, you know you usually have the medication next to you because you have dispensed something and have a little bit of a discussion how reducing alcohol intake can reduce blood pressure". (pharmacist, first order, Hattingh et al.)<br><br>"information's out there on interventions and that sort of thing but there's not really a … [guide] on how to do it" (pharmacist, first order, Dare et al.) |
| | Customers' awareness of their own risk | "many of them [customers] were not aware of the amount they were drinking and how that translated into units" (second order, Brown et al.)<br><br>"I actually found it quite interesting. I'm not a great drinker, well I wouldn't think so anyway, maybe a bottle of wine at the weekend . . . and that would last me the whole night and that would be me once a week. But I found it really interesting when she said that was actually coming under hazardous drinking." (first order, customer, Fitzgerald et al.)<br><br>"about half of the intervention group said that taking part had not changed their thinking or their drinking, because they did not perceive themselves to have a problem anyway" (second order, Quirk et al.)<br><br>"Someone with a problem might not want to talk about it, I don't know, denial and all that malarkey. But I felt quite at ease and quite happy to speak to him. I13." (customer, first order, Quirk et al.)<br><br>"I didn't find it challenging at all, like people that obviously like scored really high scores, knew they had a problem. They knew that, you know, it's not as if they were quite surprised by it. I think if you've got a drinking problem you generally know about it" (pharmacist, first order, Hattingh et al.)<br><br>"I would say it would be worthwhile to other people but I didn't really find it worthwhile. I don't feel I've got a problem with alcohol." (customer, first order, Fitzgerald et al.)<br><br>"I know a lot of heavy drinkers, in the building game there is a lot of heavy drinkers, and maybe I was one a few years ago, but I've never got up in the morning and been dependent on a drink, even when I was drinking heavily" (customer, first order, Quirk et al.) |

| Theme (COM-B component) | Sub-themes | Supporting quotes |
|---|---|---|
| **Physical and social opportunities for SBI (Opportunity)** | Time and competing demands | "… if there were any challenges it would be time because if we have many customers then it's a bit tricky". (pharmacist, first order, Hattingh et al.)<br><br>"Researcher field notes identified inconsistent availability of trained staff owing to other work activities or shift patterns" (second order, Mackridge et al.)<br><br>"The potential issue with that [lack of time] is people might be ready to have that conversation right now and they might [not have that] … desire to have that in … a weeks' time or they may not feel comfortable having that discussion with someone else, so that's a potential issue." (pharmacist, first order, Dare et al.)<br><br>"It's just another burden to be quite honest with you, on top of everything else, you know? We're that pushed for time as it is" (pharmacist, first order, Brown et al.) |
| | Existing pharmacy services | "More generic approaches were also followed such as prompting consumers to participate while the consumers were waiting for their prescriptions to be dispensed and some pharmacists targeted consumers who requested specific over-the-counter medicines"(second order data, Hattingh et al.)<br><br>"while you're waiting for us to find your prescription would you be able to help us out and fill in one of these scratch cards and here's a leaflet as well" (pharmacist, first order, Hall et al.)<br><br>"When alcohol use comes up it is invariably associated with prescription medication – "it is 'will it be ok to drink while I'm taking this?' There is never any other time where I would feel comfortable bringing it up." (Pharmacist, first order, Dare et al.)<br><br>I just always bring it up anyway in when we are doing the smoking [cessation] and I think they're a bit more honest … but when you're outside in the shop we just sort of, I think they get a bit more embarrassed about it." (counter assistant/smoking cessation advisor, first order, Hall et al.)<br><br>"I think there are lots of customers, I can tell them that when I'm doing their medicines use review they tell me they are drinking, I always give them advice. I tell them, you know, what are the consequences of drinking every day." (pharmacist, first order, Brown et al.)<br><br>"Most participants [pharmacists] also felt more confident raising the issue of alcohol consumption while undertaking scheduled health checks, when alcohol use could be addressed as simply one risk factor covered in a broader health-related conversation. This minimised client perceptions they were being 'singled out'." (second order, Dare et al.) |

| Theme (COM-B component) | Sub-themes | Supporting quotes |
|---|---|---|
| **Physical and social opportunities for SBI (Opportunity)** | Existing pharmacy services | "The present findings demonstrate that MURs represent appropriate and acceptable encounters in which to open such conversations" (second order, Jaime et al.)<br><br>"Staff did not offer the service on all occasions where strong potential existed to raise the topic or link to a purchase or other service" (second order, Mackridge et al.)<br><br>"wanting the EHC consultation to be dealt with swiftly, and not to have to spend any longer in the pharmacy than necessary" (second order, Brown et al.) |
| | Privacy and private spaces | "… maintaining that level of privacy while you're discussing very personal questions, that was probably a big challenge" (pharmacist, first order, Hattingh et al.)<br><br>"She [dispenser/technician] took me into a room. It was confidential as I was well out of the way. Like I say, when she told me and I was shocked what my rating was [increasing risk], it was nice to be in an enclosed area" (customer, first order, Mackridge et al.)<br><br>"There were no customers in so it wasn't too bad but if it had have been busy I wouldn't have done it..Just like err may be a private screened area just like you know like a photo booth style curtain or something just at the end of the counter – nothing more than that – I'm not talking about a private room or anything" (customer, first order, KRSKA)<br><br>"a private consultation space […] was very rarely used unless the intervention was already integrated within existing services, such as Medicines Use Reviews (MURs) or smoking cessation services" (second order, Hall et al.)<br><br>"not conducive to open conversations [about alcohol] with clients due to the clinical atmosphere, and client perceptions of being 'singled out'"(second order, Dare et al.). |
| | Existing relationships | "I think probably most of them [the clients who took part] know myself and the staff so I think they were comfortable with us discussing it." (first order, pharmacist, Fitzgerald et al.)<br><br>"Once … you have that regular contact with a person or you've spent a lengthy time with them, it's easier for them to be a bit more honest even though there is still a bit of shame" (first order, pharmacist focus group, Dare et al.)<br><br>"This is our regular pharmacy that we go to so it wasn't a problem, you know" (customer, first order, Mackridge et al.) |

| Theme (COM-B component) | Sub-themes | Supporting quotes |
|---|---|---|
| **Physical and social opportunities for SBI (Opportunity)** | Existing relationships | "Familiarity with regular pharmacy customers facilitated awareness of reported changes to drinking patterns and allowed staff from this setting to also monitor and reflect on the successful impact of intervention engagement on drinking behaviour" (second order, Hall et al.)<br><br>"some pharmacies reported having screened most of their regular customers early in the service rollout leading to difficulty in identifying new service users" (second order, Mackridge et al.)<br><br>"The one patient that comes to mind is someone whose husband used to come into the pharmacy and so we got to know them a lot better, and as soon as he passed away I think she started to get quite a bit of an alcohol problem, and I think it's very difficult to bring it up and talk to her about it." (pharmacist, first order, Dare et al.)<br><br>"in some cases the pharmacists made a judgement about whether or not to approach the topic with them, based on their knowledge about whether they had a regular partner and whether they were a potential candidate for an alcohol IBA" (second order, Brown et al.) |
| | Promotional and written materials | "I've had two or three incidents where the poster's actually led the person to say "oh yeah that's me." (pharmacist, first order, Brown et al.)<br><br>"if the adverts and the promotional material are there sort of for people to see that can sort of lead for them to come in to speak to us rather than having to approach people about it" (CP5, P) (Pharmacist, first order, Hall et al.)<br><br>"… they were well received and some information that I give them was new. So this gave them more information on alcohol intake…. Some of them you could see that they were happy, that it was new information for them: 'Hey, I know where I'm at and I should cut back.'" (pharmacist, first order, Hattingh et al.)<br><br>"There are a couple of links … [but] the problem with all those is finding (a) a free computer, (b) a printer, (c) time to print, and (d) – making sure the patient is still there by the time [it is] printed." (pharmacist, first order, Dare et al.)<br><br>"There are a couple of links … [but] the problem with all those is finding (a) a free computer, (b) a printer, (c) time to print, and (d) – making sure the patient is still there by the time [it is] printed." (pharmacist, first order, Dare et al.)<br><br>"It was more the wheel, there was a leaflet as well, rather than the conversation. I think the conversation was probably more directed at someone who maybe had experienced issues of severe, heavy drinking and things or other social issues around it." (customer, first order, Quirk et al.)<br><br>"still looked at it from time to time because the information was very useful" [second order, Quirk et al.] |

| Theme (COM-B component) | Sub-themes | Supporting quotes |
|---|---|---|
| **Physical and social opportunities for SBI (Opportunity)** | Corporate restrictions | "Researcher field notes identified [...] restrictions on numbers of service episodes per week/month and eligibility criteria for customers as factors that might impact on service provision" (second order, Mackridge et al.)<br><br>"A variety of promotional methods were observed, but these were limited in some cases by company policies, despite their obvious effectiveness, as shown by two of the ten service users interviewed" (second order, KRSKA)<br><br>"The pharmacists who participated in the alcohol SBI provided positive feedback and highlighted that flexibility in approaching and working with consumers worked well" (second order, Hattingh et al.) |
| **Balancing beliefs of benefits and appropriateness with concerns of taboo (Motivation)** | Belief in ability to help | "I'd say people aren't used to being asked about their drinking habits and I think there is a lot of information you can actually provide for people." (pharmacist, first order, Fitzgerald et al.)<br><br>"It's job satisfaction isn't it, it's fulfilling when you feel you can help somebody more, sort of by discussing things." (pharmacist, first order, Brown et al.)<br><br>"I think doing the alcohol study and the screening process it sort of, it makes the invisible visible. It brings that out ... It allows the person to evaluate their own condition more objectively. ... It will definitely allow them to think about what they're doing and their whole lifestyle so it may have an implication on their health, eating habits as well because often alcohol is associated with going out" (first order, pharmacist, Hattingh et al.)<br><br>"They all take the advice on board seriously, you know, and you get the impression from their facial expression and the body language that they are concerned and they realise and they will try and do something about it." (pharmacist, first order, Brown et al.)<br><br>"it's the people who are looking to sort of modify their intake or looking to make changes in their life where us giving information to them about will sort of help them" (pharmacist, first order, Hall et al.)<br><br>"Not everyone was really wanting to cut down even though they knew they were drinking more than was recommended. But I mean everyone I think learned something from it." (pharmacist, first order, Fitzgerald et al.)<br><br>"I suppose it allowed us to build that relationship with that person as opposed to just asking them, we're going beyond that. ... that shows the customer that you're actually interested in their health and not just there to do a task" (pharmacist, first order, Hattingh et al.) |

| Theme (COM-B component) | Sub-themes | Supporting quotes |
|---|---|---|
| **Balancing beliefs of benefits and appropriateness with concerns of taboo (Motivation)** | Alcohol as taboo | "[apart from when dispensing medication] there is never any other time where I would feel comfortable bringing it [alcohol use] up even if I know somebody has a problem with alcohol or substance abuse" (pharmacist, first order, Dare et al.)<br><br>"There are certain patients where you can smell the alcohol on them and they are regulars and you know they do have an issue, and bringing it up is sometimes a little bit difficult and uncomfortable, so generally we don't like to" (pharmacist, first order, Dare et al.)<br><br>"Okay, um, I take it that you've never failed to do something that was expected because of drinking?" (pharmacist, first order, Mackridge et al.)<br><br>"negative attitudes and hostile reactions from clients, and fear of offending and appearing judgemental, were also significant barriers to engaging clients in ARHD" (second order, Dare et al.)<br><br>"... some of the customers might think that we are actually invading their privacy if we ask too much about alcohol drinking so we try to maintain and retain the relationship with the customers". (pharmacist, first order, Hattingh et al.)<br><br>"service users did not report concerns regarding discussing alcohol in the pharmacy" (second order, Mackridge et al.) |
| | Staff role legitimacy | 'in discussions about dispensing medication or home medication reviews, there was a general consensus that asking about older clients' alcohol use was a legitimate as well as routine part of a community pharmacists' professional role' (second order, Dare et al.)<br><br>"Clients' attitudes to being offered screening were also largely positive, and they felt that it was appropriate to be asked about alcohol consumption by pharmacists" (second order, Brown et al.)<br><br>"Healthy living its part of what we have to do as part of our contract anyway and as well as being a healthy living pharmacy, it's an additional requirement now." (pharmacist, first order, Hall et al.)<br><br>We do enjoy doing all the service and different promotional activity that we do here (Small town, multiple, male pharmacist) (pharmacist, first order, Brown et al.)<br><br>"I definitely found everybody quite honest and open and I think people especially with all this publicity about pharmacies people do sort of see you as a health professional." (pharmacist, first order, Fitzgerald et al.)<br><br>"I think maybe because we are sort of in charge of their medicines and their health maybe they feel they didn't want to be totally honest" (pharmacist, first order, Hall et al.) |

| Theme (COM-B component) | Sub-themes | Supporting quotes |
|---|---|---|
| **Balancing beliefs of benefits and appropriateness with concerns of taboo (Motivation)** | Impact on staff | "One pharmacist reported that involvement in the alcohol IBA service had shifted perceptions of other staff in his pharmacy to proactively approaching and engaging customers and that this might have a positive impact on other services"(second order, Mackridge et al.)<br><br>"Experience of intervention delivery was reported to have increased confidence in engaging members of the public in discussions about alcohol across all settings" (second order, Hall et al.)<br><br>"… it made the pharmacists to be more aware and to be more proactive as well when they approach customers" (pharmacist, first order, Hattingh et al.) |
| | Remuneration | "Without clear financial incentives, screening and brief intervention cannot be expected to be undertaken during busy times"(author, Hattingh et al.)<br><br>"It wouldn't make any difference to me how much we got paid. I would do the service if I felt it was the right thing to do)" (pharmacist, first order, Brown et al.) |

# Appendix H Topic guides used in stakeholder qualitative interviews

## H.1 Topic guide for patients with alcohol-related liver disease

1. Can you tell me about how you came to be diagnosed with alcohol related liver disease?

*Prompts/probes*

- How did you get assessed?
    - What made you take this up?
- How did you feel when your liver was discussed?
- (If referred) Can you tell me more about this
- How were you told you had liver disease?
    - Who was this?

2. Can you tell me about your experience of using community pharmacies before you were diagnosed? (if at all)

*Prompts/Probes*

- What would you visit them for?
    - How often?
- Type of pharmacy (commercial e.g. chain such as boots or an independent?)
- Regular pharmacy or different pharmacies?
- Can you tell me how you interacted with pharmacy staff?
- What was your relationship with staff?

- (If didn't use pharmacies) Why didn't you use pharmacies?

3. What was your experience of being asked about your health in a pharmacy?

*Prompts/Probes*

- Can you describe the experience(s) further?
    - Who asked and how?
    - What was good/bad about it?
    - What encouraged you to take up any assessment?

4. (if not brought up in Q3) What was your experience about being asked about your alcohol use in pharmacy?

*Prompts/Probes*

- Can you tell me more about this? (as per Q3)
- Was your liver ever discussed?

- (If no experience) How would you have felt being asked about your alcohol use in pharmacy?
    - How might this be done?
    - What might have encouraged you to take up an assessment?
    - What would stop you?

5. How would you have felt about your risk of liver disease due to alcohol being assessed and discussed in pharmacy?

*Prompts/Probes*

- From your experience in using pharmacies what might be the barriers to this?

6. If you were thought to be at risk of liver disease due to alcohol how might pharmacy get you further assessed?

*Prompts/Probes*

- Who might have that conversation with you?
- Would your GP be involved?

7. As a final question what role do you think community pharmacy could have had in getting you diagnosed?

*Prompts/Probes*

- (If couldn't have) why do you think that?
- Explore if think it is a good idea
- Barriers and facilitators?
- What would make you think it was worthwhile?

8. So to summarise

9. Thank you for answering my questions, did you have any for me?

## H.2 Topic guide for public participants

1. Can you tell me about how you interact with healthcare services?

*Prompts/probes*
- Experience of referrals?
- What has worked/not worked for you?

2. Can you tell me about your experience of using community pharmacies?

*Prompts/probes*
- Why would you go into a pharmacy?
- Type of pharmacy? (chain/independent)
- What is your relationship with pharmacy staff?
- What health services have you seen offered?
    - How do you know these are available?
- What health promotion have you seen?
    - [if seen] What makes you notice these?

3. What is your experience of being asked about your health when visiting a community pharmacy?

*Prompts/Probes*
- Can you tell me more about the experience?
    - Who spoke to you?
    - How did you feel about being asked?
    - What was good/bad about it?
    - What made you take it up?

4. (if not brought up in Q2) Have you been referred or directed to other services/healthcare providers from pharmacy?

*Prompts/Probes*
- Can you tell me more about this?

5. (if not brought up in Q2) What is your experience about being asked about your alcohol use in pharmacy?

*Prompts/Probes*
- Can you tell me more about this?
- Was your liver ever discussed?

- (If no experience) what are your thoughts on being asked about your alcohol use in a pharmacy?
    - How might you be asked?
    - From your experience what would be the barriers/facilitators to this?

6. How would you feel about your risk of liver disease due to alcohol being assessed and discussed in pharmacy?

*Prompts/Probes*
- What would encourage you to take up an assessment? What would stop you?
- Which staff might be involved?

- Where in pharmacy?
- From your experience in using pharmacies what might be the barriers to this?

7. If it was advised in pharmacy that you were at risk of liver disease due to alcohol and further assessment of your liver suggested, what would you want to be the next steps?

*Prompts/probes*

- What would make/encourage you take up a further assessment or referral?
- What barriers might there be?
- How would you want your GP involved?

8. So to summarise

9. Thank you for answering my questions, did you have any for me?

## H.3 Topic guide for pharmacy staff

1. Could you tell me about your typical day at work?

*Prompts/probes*
- How do you interact with pharmacy customers?

2. What is your experience of talking to pharmacy customers about their health in your day to day work?

*Prompts/probes*
- If example given – can you tell me more about that?
    - What makes you do it/not do it?
    - Barriers/facilitators
    - How does it fit in with your everyday practice?

3. What is your experience of referring or signposting pharmacy users to other services?

*Prompts/Probes*
- If example – can you tell me more about this?
- Barriers/Facilitators
- Have you made direct referrals to health services?
    - Can you tell me more about this?

4. (if not brought up in Q2) What is your experience of asking pharmacy customers about their alcohol use?

- Explore as per Q5
- Do you have any experience of offering a service?
    - If yes - can you tell me more about it?
    - How did it fit in with your everyday practice?

5. How do you think alcohol use could be assessed in pharmacy customers?

*Prompts/Probes*
- Which customers might you chose to assess?
    - If target group(s) suggested – why those customers?
- Staff to do assessment?
- What opportunities to promote assessment?
    - Displays/posters?
- What challenges are there?
- What are your thought on having a digital assessment?
- Would you think this important/valuable?
- How would you feel about speaking to a person about their risk of alcohol related liver disease?
- What skills are needed or already present
- How would this fit in with your everyday practice?

6. If a pharmacy user was identified in pharmacy as at risk of alcohol-related liver disease, how would you feel about referring them directly to liver services?

*Prompts/Probes*

- How could that work?
- Do you think the GP would need to be involved?
- What about referring to GP?

7. How would (answers in number 6) fit in with your everyday practice?

8. What features of a pharmacy service to identify people at risk of alcohol liver disease would affect whether you provided the service?

*Prompts/probes*

- Remuneration?
- What support would be needed?
- How would you see it was effective?

9. So to summarise

10. Thank you for answering my questions, did you have any for me?

## H.4 Topic guide for clinicians involved in existing care pathways of ArLD

**PRIMARY CARE PROFESSIONALS**

**1.** What is your regular experience with liver disease in day to day practice?

**2.** Can you tell me your experience of diagnosing people with liver disease in your day to day practice?

*Prompts/probes*
- What are the challenges?

**3.** What is your experience of local or national guidance or pathways for assessing people for liver disease?

Prompts/probes
- If example given – can you tell me more about that?
- Can you tell me about these?
  - What is good/bad?
  - Probe LFT comments if made

**4.** What is your experience of assessing people for liver disease based on their risk?

*Prompts/probes*
- If example given – can you tell me more about that?
- What are the challenges to this?
- Do you see benefit to this?

**5.** (if not in Q4) Can you tell me about your experience for assessing for alcohol related liver disease based on risk?

*Prompts/probes as Q4*

**6.** Can you tell me your experience of working/interacting with community pharmacies in your everyday practice?

*Prompts/Probes*
- If example could you tell me more about how this works?
  - ? Minor ailment service
  - If work (or not) explore why
- Have you been referred patients from community pharmacy?
  - If yes – can you tell me more about this?
- Can you tell me about your working relationship with community pharmacies?

**7.** What are your thoughts on people having their alcohol use assessed in community pharmacies

*Prompts/Probes*

- Are you aware of it taking place?

**8.** If a person was identified as at risk of alcohol related liver disease in a community pharmacy where do you think that person should be referred to for further **assessment?**

*Prompts/Probes*

- What do you think about them being referred directly to liver services/GP?
    - How could that work?
        - What would be the challenges?
    - What information would you need?
    - How would you want to receive a referral?
    - How might this fit in with your everyday practice?
- What might make [suggestion given] work or not work?

**9.** If not in risk identification, are there others role you think community pharmacies could have in alcohol-related liver disease pathways of care?

**Prompts/Probes**

- If none explore why believe this
    - Would you have confidence in pharmacy assessment?
    - Would you see it as beneficial?
- Where roles suggested ask to elaborate how fulfil that role

**10.** So to summarise

**11.** Thank you for answering my questions, did you have any for me?

## HEPATOLOGY PROFESSIONALS

**1.** What is your experience of community referrals for liver disease?

*Prompts/probes*
- Experience of referrals received from places other than general practice?
    - How do these work?
- Referrals based on risk?

**2.** Who do you think should be involved in identifying liver disease?

*Prompts/probes*
- (if not mentioned) What about for alcohol related liver disease?

**3.** What is your experience of local or national guidance or pathways for assessing people for liver disease?

*Prompts/probes*
- Can you tell me more about these?
    - What is good/bad?

**4.** Can you tell me your experience of working with/interacting with community pharmacies in your day to day practice?

*Prompts/Probes*
- Could you tell me more about how these work?
- If work (or not) explore why
- If none explore why

**5.** What are your thoughts on people having their alcohol use assessed in community pharmacies

*Prompts/Probes*
- Are you aware of it taking place?

**6.** If a person was identified as at risk of alcohol related liver disease in a community pharmacy, where do you think that person should be referred to for further assessment?

*Prompts/Probes*
- What do you think about them being referred directly to liver services/GP?
    - How could that work?
        - What would be the challenges?
    - What information would you need?
    - How would you want to receive a referral?
    - How might this fit in with your everyday practice?
- What might make [suggestion given] work or not work?

**7.** If not in risk identification, are there other role you think community pharmacies could have in alcohol-related liver disease pathways of care?

*Prompts/Probes*

- If none explore why believe this
    - Would you have confidence in pharmacy assessment?
    - Would you see it as beneficial?
- If other roles suggested ask to elaborate how fulfil that role

**8.** So to summarise

**9.** Thank you for answering my questions, did you have any for me?

# Appendix I Further supporting quotes for themes and sub-themes of qualitative interview analysis

| Theme | Sub-theme | Supporting quotes |
|---|---|---|
| **Acknowledging, seeking help and engaging with a hidden problem** | Stereotyping and self-awareness of drinking | “I have the occasional experience, like with a customer who would say come in. Maybe they've already evidently had a bit too much to drink, which in this area, the area I work in is currently not uncommon” C012/Assistant/24M |
| | | “I've been told by lots of people, 'Cut down on your alcohol' - which I've done that to start with. Do I have to do anything further? I don't know, do I have to give up beer for instance, which is one or two pints a day. One mostly, and half a bottle of wine in the evening. That's all I'm drinking. That's it. That's not a great deal, is it really?” C017/Patient/80M |
| | | “I can never understand the points thing.[...] I can't do it in units. I just can't follow that. Some lagers are 3.5, and some are 5.6. How can you compare the two? I'd struggle with this unit thing. That's an aside.” C020/Public/71M |
| | | “A lot of people, where I was particularly, drank lots, more than me even” C019/Patient/44M |
| | Seeking advice and revealing hidden conditions | “I don't go to the doctors unless I'm really bad or anything, you know. Any other time I won't go“ C016/Patient/47F |
| | | “I think people are generally surprised when they find out they've got a liver problem. They just more or less think because they can't see it, they don't have really noticeable symptoms” C022/Public/54M |
| | | “People like a tangible thing, they do love having a fibroscan, it's a tangible thing, it's like I'm going to be told today something about me that's either going to make me think seriously about changing things, or it's going to reassure me” C008/Hepatology/52F |
| | | “It's probably just because it doesn't come up in every consultation. Things like depression, automatically, you always think to ask about alcohol. If somebody comes in yellow, I would ask about alcohol, or with abdominal pain. I guess there's quite a few hidden alcoholics out there, which is probably the target audience that we all miss[...] it just doesn't get discussed as much as it should be.” C004/GP/31F |

| Theme | Sub-theme | Supporting quotes |
|---|---|---|
| **Acknowledging, seeking help and engaging with a hidden problem** | Honesty, taboo and routinely contextualising | “Well, because no one admits it. They don't admit it. They only admit it when they've been told, 'Because you've been doing it, this is...' and then you're like, 'Well, yes. Okay, I have...'” C015/Patient/59F |
| | | “There's that kind of, whether or not people will be, want to be honest about it, and also there is maybe a bit of anxiety about whether people want to officially document what they drink, in case it does create problems with things like life insurance and so on.” C022/Public/54M |
| | | “I think the honest answer is that I'd feel that was invasive. If I go in there for something, cough medicine or something like that, I don't want to be questioned about my lifestyle. That's the honest answer. So they'd have to be pretty delicate.” C019/Patient/44M |
| | | “I feel the main challenges would be assessing whether or not it's the right person to ask. There would be a lot of people who would be sensitive about that sort of - it's quite a personal question, so you've got to make sure that you know the person or know how the person is going to react, because we don't want to be offending people in our pharmacy. We don't want to be causing unnecessary upset.” C012/Assistant/24M |
| | Enabling and facilitating motivated engagement | “there’s probably shed loads of people who drink too much, but the patient has to take ownership. And, there's no point me getting in touch with the patient and bringing them in for a patient who does not want to be helped or who’s not ready to seek help” C001/GP/48F |
| | | “Maybe there needs to be more information in the public domain actually about how unhealthy your liver can get, before you start showing symptoms, so maybe some public information around that would encourage me[...] If there was some information that said, did you know that even if you just drink this much over this period of time, this is what can happen, and once this has happened it can be difficult to sort out, whatever it is.” C022/Public/54M |
| | | “as soon as the GP says to the patient, 'We think your liver is...', you know, they always hear the word, 'severe fibrosis', and then it's like, 'Oh my God', so they take getting blood tests quite seriously at that point, the patient does.” C003/Hepatology/47F |
| | | “she said, 'Well, yes, you've got some scarring but that's about all', she said. 'You haven't got cirrhosis or anything like that.' I said, 'Well, that's good but I'll stop the spirits directly when I get home.' I gave it all away. I literally came in the front door and gave it to my neighbour, 'There you go!'” C017/Patient/80M |

| Theme | Sub-theme | Supporting quotes |
|---|---|---|
| **Professional roles, boundaries and attributes** | Experience of providing general health, alcohol and liver disease advice in community pharmacy | “I think people do regard pharmacists as [...] an untapped resource who know an awful lot about health and illness...but then that changes the role of the pharmacist, doesn't it? Maybe the pharmacist wants that role to change. It makes it more interesting I would have thought.” C003/Hepatology/47F |
| | | “If I'm completely honest, no one really talks about their alcohol intake, it's mostly smoking people come in and ask. I guess no one would really come to a pharmacy to ask about their alcohol intake so I don't really play much role at the moment [...] The only time I've spoken to people about their alcohol intake is during an old service called the Medicines Use Review” C006/Pharmacist/30F |
| | | “We have a duty of care for our patients and their partners. Normally, it's the partners that complain about excessive drinking of their spouses and their siblings” C002/Pharmacist/53M |
| | | “Certain tablets for antibiotics, and pretty strong pain meds, they advise you not to drink, so they check, 'You're not drinking, are you?' Of course, it's, 'No.'” C024/Public/49F |
| | Perceived abilities of community pharmacy staff to take on a role in ArLD identification | “I'd feel quite comfortable, as long as I had the right information to start with, and I knew what I was talking about. Yes, I think I've got the right empathy, because I think you need to have. [...] with the right training, anyone would be able to hopefully do that, if they've got the right communication skills“ C014/Assistant/50F |
| | | “I'd say, 'What's it got to do with you?' if the person on the counter asked me that. If a professional, qualified chemist, who was sitting privately talking to me in one of those little booths or something asked about it, I would answer truthfully.” C020/Public/71M |
| | | “I just think the doctors specialise in it more. A pharmacist has got to have a lot more general knowledge [...] You go to a doctor if you don't feel well. I couldn't imagine me going to the pharmacist and saying, 'I think my liver is hurting,' or something. I just can't imagine. I'd go to the doctor. Is that insulting them?” Probably... C015/Patient/59F |
| | | “I think you could easily train pharmacists to do Fibroscanning, definitely. You've got a level of knowledge. Their A&P is probably better than ours isn’t it? More the physiology than the anatomy, but they understand the way the body works, and I don't think it would be a big jump for them to then learn about what a fibroscan means and what the liver is.” C008/Hepatology/52F |

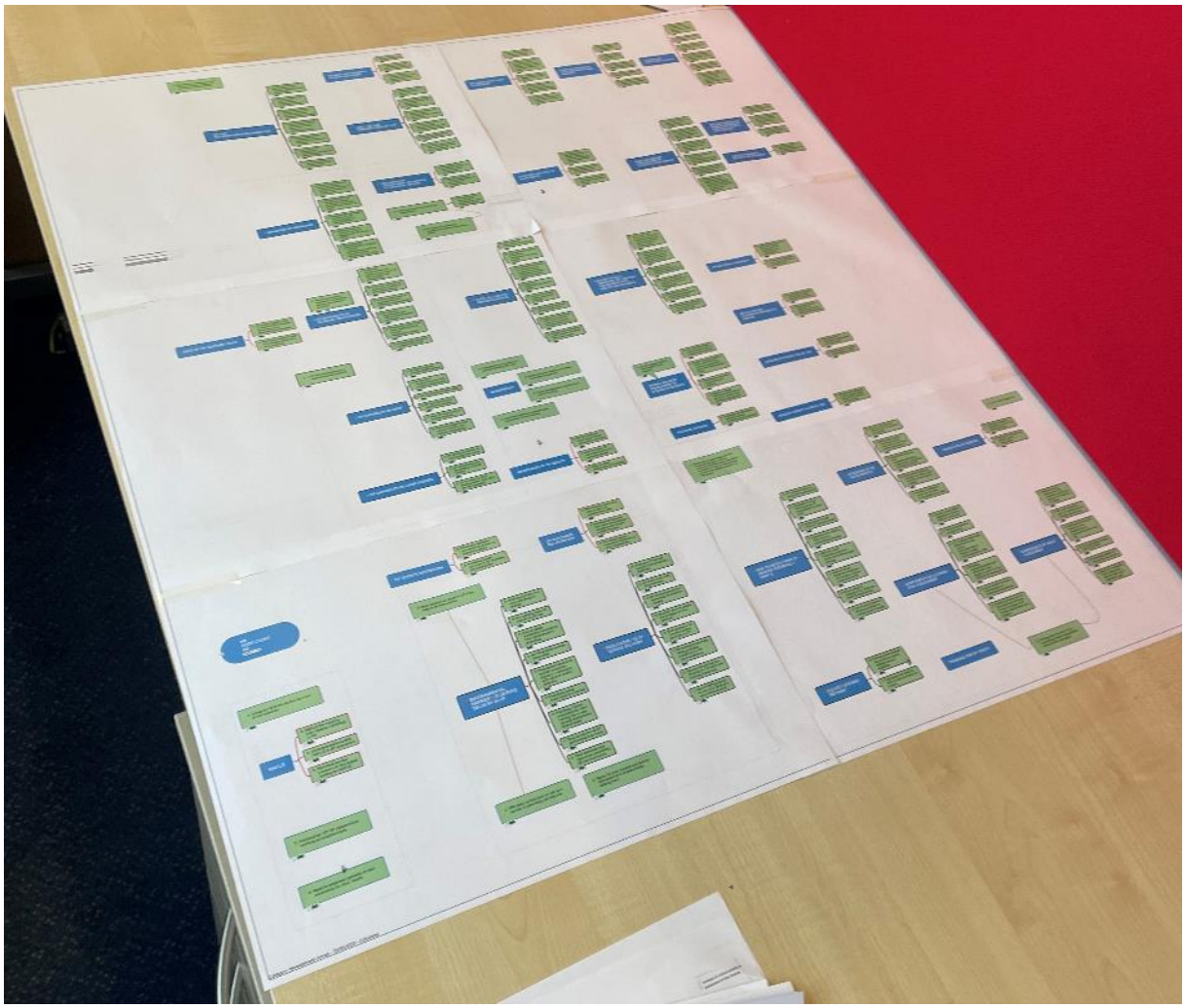
| Theme | Sub-theme | Supporting quotes |
|---|---|---|
| **Professional roles, boundaries and attributes** | Bypassing GPs | “GPs are stretched at the moment, so going to a GP, [...] if you've already got validation there's something not quite right, all they're going to do is go, yes, I can see that, so let's refer you. So what's the point in that middle man” C019/Patient/44M |
| | | “Potentially, there's a huge number, aren't there, of people who could come out of the woodwork. [...] So it could potentially be overwhelming, and if you do identify people who have liver disease, they then need to come in to get picked up by the system, so there's a capacity issue.” C023/Hepatology/55F |
| | | “I think there certainly has to be an in-between area of community work, where further assessment can take place. So I think the pharmacy would certainly offer a great starting place, and then there would need to be a referral onto some kind of community setting” C005/Hepatology/52F |
| | | “being as stretched as we are, adding another service into primary care [...] we're going to stretch the system further and further, and it's already at breaking point. So the whole project could fall down, probably, because there’s just not enough capacity to safely sustain it” C004/GP/31F |
| | | “I think the GP should always be informed, whether they're going to do anything about it, it's just good for them to have it on their records. Then everybody knows, don't they? [...] Yes, everything should go back to the doctor, I think. The doctor should be aware of everything because then they've got a complete picture” C014/Assistant/50F |

| Theme | Sub-theme | Supporting quotes |
|---|---|---|
| **Professional roles, boundaries and attributes** | Utilising benefits and recognising challenges of the community pharmacy setting | “you could be going in there to get a packet of plasters. If you bump into your neighbour on the way out, they don't know you've been there to chat to them about the fact that you're drinking too much. Where if you're in a hospital, or if you're going into drug and alcohol service, people will ask you why you're there.” C008/Hepatology/52F |
| | | “I wouldn't like to be asked if there were other customers in the pharmacy at the time.[...] Not because I've got anything to hide, but I just wouldn't like to be asked in front of other customers” C021/Public/79F |
| | | “First thing, everyday nowadays is short-staffed. Second thing and most of the health setups, including pharmacies, surgeries, they are very busy. So every time, even if you don't have prescription, you've got phone calls, you've got a customer coming in, so you hardly find time for it” C010/Assistant/32M |
| | | “People don't often want to pick things up, they just want to come in and get their stuff.” C014/Assistant/50F |
| | | “people that come in to get their prescriptions[...] We probably see them more than the doctors, if I'm honest, so in terms of building relationship and rapport, we definitely have that more than the GPs.” C006/Pharmacist/30F |
| | Optimising a service model of delivery | “Obviously one to my company would be funding, two would be obviously training, three would be obviously support from whatever” C006/Pharmacist/30F |
| | | “We've had so many great launches happen but then the support fizzled out, so then the service fizzles out and everybody calls the service a failure, and really, it's been the fact that the company then pulled for support” C002/Pharmacist/53M |
| | | “Well, the way we work here in this pharmacy is everyone does help out in the shop, so this sort of training would apply to everyone in the pharmacy. [...] We'd all have to have some knowledge of it, at least.” C012/Assistant/24M |
| | | “the pharmacies have to buy into it, and they will want money, because they're commercial, they're a business, they're not like the NHS. [...]They will feel that they want to offer better service to their customers, but at the end of the day they're still businesses, and they'll want to be remunerated for that work.” C008/Hepatology/52F |
| | | “You can't pay for it otherwise nobody'd have one done, would they? If it was free, I'd go and have one” C011/Patient/64M |

| Theme | Sub-theme | Supporting quotes |
|---|---|---|
| **Communication, relationships, collaboration and support** | Making referrals and pathways simple, clear and efficient | “I think you need to think very carefully about the guidelines that you put around referring, because, one, it can't be too intensive, because people just won't do it. It needs to be easily done, and [...] it does need to be an appropriate referral, as well” C005/Hepatology/52F<br><br>“I've been to a couple of training GP sessions that have been run in this area, and they will be the first to admit that, obviously, they don't have time to be specialists in every disease group, and what helps them is really having a very clear pathway for referral, certainly, but also for tests that they can readily perform” C005/Hepatology/52F |
| | Two-way inter-disciplinary communication | “Doctors, there is a direct link through the NHS.net but everywhere else, there isn't. You just give them a number and an address.” C010/Assistant/32M<br><br>“I do feel - especially if I'm really concerned about the patient or I'm concerned that they might not get in touch with them - then I do feel, oh, why am I doing this? I'm not getting anything back in return. I feel that I've done my bit of the service in terms of identifying and referring them to the relevant people. It would be good if we could get feedback or something back. We could be able to relay more positive stories or even negative stories” C013/Pharmacist/50F |
| | Establishing relationships and collaborating | “We've now got a couple of community pharmacists in with us in our PCN and I think it again it's varying experiences isn’t it, really, but as I say we've got two [...] so I think that generally is creating a better relationship” C001/GP/48F<br><br>“I think we had to really speak to the pharmacists and really just explain how we could work together to - and what specifically we were wanting to achieve, and how they could help us achieve that without interrupting their service as much as possible” C005/Hepatology/52F<br><br>“I think there's now quite a lot of rivalry, because they've taken most of the vaccines! Vaccination money! So I think between the partners and the private pharmacy” C004/GP/31F |

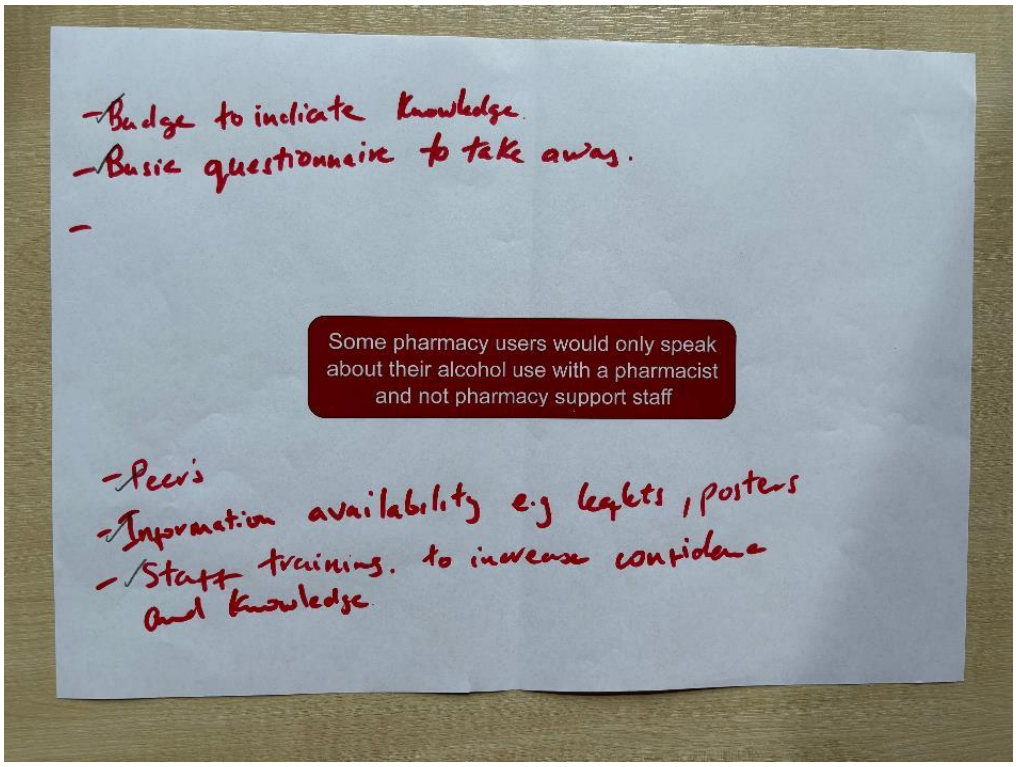
| Theme | Sub-theme | Supporting quotes |
|---|---|---|
| **Communication, relationships, collaboration and support** | Unmet support needs | "I think that a lot of personal and social issues are around alcohol. It's part of the problem too. Anyone that lives alone or people that have big family issues, economic issues. There are a lot of factors that can affect people taking alcohol, is the problem. That has to be kept in mind when you do a service for their alcohol intake" C009/Pharmacist/61M |
| | | "So I think it would be that say, for example, 'patient advised to make a routine appointment with the GP' – did you discuss this? 'But in the meantime I have given them information on the following websites' and they might have a list of websites, a list of the alcohol services in the area that the patient can self-refer." C001/GP/48F |
| | | "Because we know that when we have people that we meet through our services that are drinking a bit more than they should, but they're your, I don't know, middle-aged housewife, they would not go to a drug and alcohol service, because they don't see themselves in that light. The odd ones that you persuade to go along there, they go, 'Oh, it was horrible, a lot of people with drug issues' and it wasn't somewhere that they felt comfortable, and they felt stigmatised by it almost instantly." C008/Hepatology/52F |

# Appendix J Example of mind mapping used to aid interview analysis

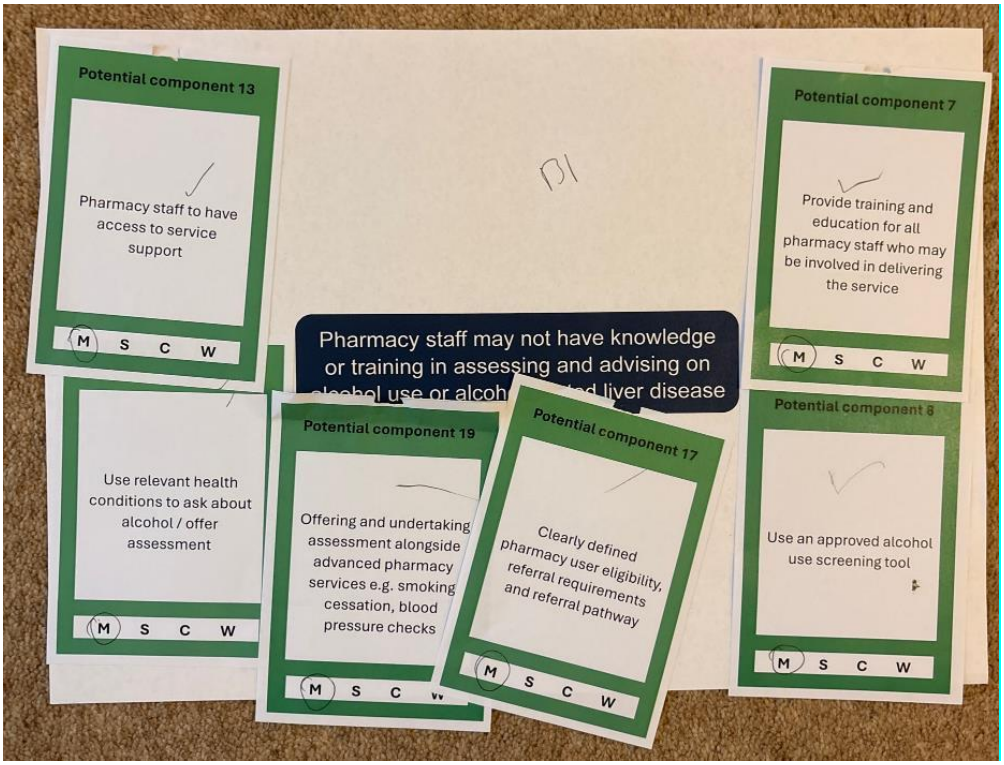


# Appendix K Co-design workshop activity examples

## K.1 Barrier sheet activity




## K.2 Facilitator card activity



# Appendix L Potential intervention components, their intervention functions and potential barriers addressed by the component

| Potential intervention component | Intervention functions (target) | Barriers potentially addressed |
|---|---|---|
| *Pharmacy staff able to offer direct access to a test for liver disease* | Incentivisation (customers) | Some customers who believe they drink too much would not engage with a ArLD risk assessment if advice was all that is on offer |
| | Environmental restructuring (customers) | Customers having to see a GP for further care/investigation after any pharmacy assessment<br>Difficulties getting a GP appointment |
| *Pharmacy users able to choose whether their risk assessment is shared with their GP* | Persuasion (customers) | Some patients may be concerned about personal consequences of revealing their alcohol misuse |
| *Emphasising to at-risk pharmacy users they can still get liver disease if test is normal* | Education<br>Persuasion (customers) | Some customers lack knowledge and understanding of how much alcohol puts a person at risk<br>A 'negative' test for ArLD |
| *At-risk pharmacy users can be referred for more specialist input* | Environmental restructuring<br>Incentivisation (customers) | Uncertainty of pharmacist ability to conduct a physical test for ArLD or discuss an ArLD diagnosis<br>Some customers who believe they drink too much would not engage with a ArLD risk assessment if advice was all that is on offer<br>Customers having to see a GP for further care/investigation after any pharmacy assessment<br>Difficulties getting a GP appointment (if one required) |
| *Pharmacy staff using non-confrontational, non-judgemental communication skills* | Persuasion (customers) | Some patients will not reveal their alcohol use if feel they are asked 'out of the blue'<br>Some patients may be concerned about personal consequences of revealing their alcohol misuse<br>Some customers may be concerned about being stigmatised as an alcoholic if identified as 'at risk' |

| Potential intervention component | Intervention functions (target) | Barriers potentially addressed |
|---|---|---|
| *Offering service to any pharmacy user and not just those suspected to be at risk* | Persuasion (customers) | Some patients will not reveal their alcohol use if feel they are asked 'out of the blue' |
| | Environmental restructuring (staff) | Pharmacists not seen as a 'normal' source for alcohol or ArLD advice |
| *Provide training and education for all pharmacy staff who may be involved in delivering the service* | Training<br>Education<br>Enablement<br>(staff) | Pharmacy staff lack knowledge, experience and training in assessing and advising about alcohol use<br>Pharmacy staff may not have the necessary communication skills for discussing alcohol use<br>Pharmacy staff lack knowledge, experience and training in assessing and advising about ArLD<br>Alcohol use only routinely asked by pharmacy staff as part of an advanced pharmacy service or locally commissioned alcohol intervention service<br>Staff concerns (or experience) of causing offence through asking about alcohol<br>Staff feeling uncomfortable or embarrassed asking about alcohol use<br>Concern of causing fear or anxiety for customers if advising they may have ArLD<br>Reliance on seeing an overt, potentially alcohol-related health problems to prompt asking customers<br>Limited pharmacy personnel resources to perform extra work (other demands, time, number of staff) |
| *Use an approved alcohol use screening tool* | Enablement (staff) | Pharmacy staff lack knowledge, experience and training in assessing and advising about alcohol use |
| | Persuasion<br>Education<br>(customers) | Some customers would not speak to non-pharmacist staff about their alcohol use or risk of ArLD as they do not believe them to be suitably qualified<br>Some customers lack knowledge and understanding of how much alcohol puts a person at risk |
| *Pharmacy support staff role to engage rather than assess patients* | Environmental restructuring (staff) | Limited pharmacy personnel resources to perform extra work (other demands, time, number of staff) |

| Potential intervention component | Intervention functions (target) | Barriers potentially addressed |
|---|---|---|
| | Environmental restructuring<br>(customers) | Some customers would not speak to non-pharmacist staff about their alcohol use or risk of ArLD as they do not believe them to be suitably qualified |
| *Pharmacy staff are provided feedback on the outcomes for pharmacy users* | Persuasion<br>(staff) | Staff concerns (or experience) of causing offence through asking about alcohol<br>Concern of causing fear or anxiety for customers if advising they may have ArLD |
| *Payment for pharmacy staff delivering the service* | Incentivisation<br>(staff) | Limited pharmacy personnel resources to perform extra work (other demands, time, number of staff)<br>Requiring pharmacy staff training to be done in their own time |
| *Pharmacy staff refer for a liver test rather than conduct it* | Environmental restructuring<br>Enablement<br>(staff) | Pharmacy staff not currently competent to perform a liver fibrosis test<br>Lack of suitable space in some pharmacies to perform a physical liver test or examination<br>Cost of liver fibrosis testing equipment<br>Staff belief that testing and further discussion should be with a non-pharmacy HCP with more perceived ability in ArLD |
| | Environmental restructuring<br>(customers) | Uncertainty of pharmacist ability to conduct a physical test for ArLD or discuss an ArLD diagnosis<br>Customers not having 'extra' time to spend in pharmacy beyond what they attended for |
| *Pharmacy staff to have access to service support* | Enablement<br>(staff) | Lack of existing relationships between pharmacy staff and other HCPs |
| *Have a dedicated referral form if referring patients to another HCP* | Enablement<br>(staff) | Pharmacy staff lack knowledge, experience and training in assessing and advising about alcohol use<br>Pharmacy staff lack knowledge, experience and training in assessing and advising about ArLD |
| *Meetings between pharmacy staff delivering service and other HCPs* | Environmental restructuring<br>(staff) | Few or no established two-way communication routes between pharmacy staff and other healthcare professionals outside of general practice<br>Lack of existing relationships between pharmacy staff and other HCPs |

| Potential intervention component | Intervention functions (target) | Barriers potentially addressed |
|---|---|---|
| *Using secure email (e.g. NHSmail) or established IT system for referrals from pharmacy to other HCPs* | Environmental restructuring (staff) | Few or no established two-way communication routes between pharmacy staff and other healthcare professionals outside of general practice |
| *Clearly defined pharmacy user eligibility, referral requirements and referral pathway* | Environmental restructuring Enablement (staff) | Pharmacy staff lack knowledge, experience and training in assessing and advising about alcohol use<br>Pharmacy staff lack knowledge, experience and training in assessing and advising about ArLD<br>Few or no established two-way communication routes between pharmacy staff and other healthcare professionals outside of general practice<br>Stretched capacity in general practice and secondary care services<br>Not usual practice to refer directly to secondary care based on ArLD risk alone |
| *Have dedicated time slots for service provision* | Environmental restructuring (staff) | Limited pharmacy personnel resources to perform extra work (other demands, time, number of staff |
| | Environmental restructuring (customers) | Customers not having 'extra' time to spend in pharmacy beyond what they attended for |
| *Offering and undertaking assessment alongside advanced pharmacy services e.g. smoking cessation, blood pressure checks* | Environmental restructuring Persuasion (staff) | Limited pharmacy personnel resources to perform extra work (other demands, time, number of staff)<br>Aligning ArLD role with only a single existing pharmacy service<br>Alcohol use only routinely asked by pharmacy staff as part of an advanced pharmacy service or locally commissioned alcohol intervention service<br>Lack of privacy in main pharmacy<br>Staff feeling uncomfortable or embarrassed asking about alcohol use<br>Staff concerns (or experience) of causing offence through asking about alcohol |
| | Environmental restructuring (customers) | Some patients will not reveal their alcohol use if feel they are asked 'out of the blue'<br>Customers not having 'extra' time to spend in pharmacy beyond what they attended for<br>Lack of privacy in main area of pharmacy |

| Potential intervention component | Intervention functions (target) | Barriers potentially addressed |
|---|---|---|
| *Pharmacy users being able to self-complete a risk assessment* | Environmental restructuring<br>Enablement<br>(staff) | Alcohol use only routinely asked by pharmacy staff as part of an advanced pharmacy service or locally commissioned alcohol intervention service<br>Limited pharmacy personnel resources to perform extra work (other demands, time, number of staff)<br>Staff concerns (or experience) of causing offence through asking about alcohol<br>Staff feeling uncomfortable or embarrassed asking about alcohol use |
| | Environmental restructuring<br>Enablement<br>Education<br>(customers) | Customers not having 'extra' time to spend in pharmacy beyond what they attended for<br>Lack of privacy in main area of pharmacy<br>Some customers would not speak to non-pharmacist staff about their alcohol use or risk of ArLD as they do not believe them to be suitably qualified<br>Some patients may be concerned about personal consequences of revealing their alcohol misuse<br>Some customers lack knowledge and understanding of how much alcohol puts a person at risk |
| *Use consultation room or private area for any conversations with a pharmacy user about their alcohol use* | Environmental restructuring<br>(customer and staff) | Lack of privacy in main area of pharmacy |
| *Use waiting time of prescription collection to offer and perform assessments* | Environmental restructuring<br>Enablement<br>(staff) | Customers minimising their time in pharmacy (including use of automated prescription collection systems) |
| | Environmental restructuring<br>(customer) | Customers not having 'extra' time to spend in pharmacy beyond what they attended for |
| *Advertise the service using: displays/posters; texts to pharmacy users; pharmacy website* | Environmental restructuring<br>Enablement<br>(staff) | Customers minimising their time in pharmacy (including use of automated prescription collection systems)<br>Staff concerns (or experience) of causing offence through asking about alcohol |

| Potential intervention component | Intervention functions (target) | Barriers potentially addressed |
|---|---|---|
| | Environmental restructuring<br>Persuasion<br>Education<br>(customers) | Customers not having 'extra' time to spend in pharmacy beyond what they attended for<br>Pharmacists not seen as a 'normal' source for alcohol or ArLD advice<br>Some patients will not reveal their alcohol use if feel they are asked 'out of the blue'<br>Some customers would not speak to non-pharmacist staff about their alcohol use or risk of ArLD as they do not believe them to be suitably qualified |
| *Have written information available for pharmacy users and further resources to signpost to* | Environmental restructuring<br>Enablement<br>(staff) | Pharmacy staff lack knowledge, experience and training in assessing and advising about alcohol use<br>Pharmacy staff lack knowledge, experience and training in assessing and advising about ArLD<br>Limited pharmacy personnel resources to perform extra work (other demands, time, number of staff) |
| | Environmental restructuring<br>Persuasion<br>Education<br>(customers) | Some customers may not be aware how much they drink or may not know how to report this in units<br>Some customers lack knowledge and understanding of how much alcohol puts a person at risk<br>Some customers lack the knowledge that can have a problem even if someone who drinks the same or more doesn't<br>Customer lack of knowledge that can have ArLD without symptom<br>Customers not having 'extra' time to spend in pharmacy beyond what they attended for<br>Customers normalising their drinking through comparison with others<br>Some patients may be concerned about personal consequences of revealing their alcohol misuse<br>Customers' fear of finding out they have liver disease<br>A 'negative' test for ArLD |
| *Use relevant health conditions to ask about alcohol / offer assessment* | Persuasion<br>(customers) | Some patients will not reveal their alcohol use if feel they are asked 'out of the blue'<br>Pharmacists not seen as a 'normal' source for alcohol or ArLD advice |
| *Offer the service with liver as the focus e.g. a 'liver health check' or 'liver MOT'* | Enablement<br>Environmental restructuring<br>(staff) | Alcohol use only routinely asked by pharmacy staff as part of an advanced pharmacy service or locally commissioned alcohol intervention service<br>Reliance on seeing an overt, potentially alcohol-related health problems to prompt asking customers |

| Potential intervention component | Intervention functions (target) | Barriers potentially addressed |
|---|---|---|
| | Persuasion (customers) | Some patients will not reveal their alcohol use if feel they are asked 'out of the blue' |
| *Deliver service alongside local and national alcohol campaigns e.g. dry January, alcohol awareness week* | Enablement (staff) | Alcohol use only routinely asked by pharmacy staff as part of an advanced pharmacy service or locally commissioned alcohol intervention service |
| | Persuasion (customers) | Some patients will not reveal their alcohol use if feel they are asked 'out of the blue' |

# Appendix M Intervention components with points specified at CPSC meeting

| Abridged intervention component | Points specified |
|---|---|
| Remuneration | Initial payment expected to cover set up fees (including training of staff).<br>Further payment advised to be on a per-user basis with stages of payment according to level of engagement.<br>Anticipate an amount in the range £10-£18 appropriate for complete screening, full assessment and advice, and referral.<br>Capping numbers can be done per pharmacy or as a total for all pharmacies. |
| Staff training | Expected to train all pharmacists and a suggested minimum of two non-pharmacist staff.<br>Training where possible should be self-completed and/or in a virtual capacity as difficult for staff to attend face-to-face training. |
| Service support | Expected that the local pharmaceutical committee would be the first port of call for support with subsequent direct access to clinical support . |
| Feedback of staff | Recognition that this is poorly done but advised feedback to pharmacies of aggregated service outcomes beneficial and feasible. |
| Promotional and education materials | Expectation that these would be provided to pharmacies, or given access to ordering them. Would not be appropriate to expect pharmacies to print these themselves. |
| Electronic referrals | Agreed use of NHSmail appropriate and immediately implementable. Ideal of integration with pharmacy software (Pharmoutcomes®) but the latter would take time due to workload relating to current national advanced services |
| Delivering a pulsed vs continuous service | Intermittent services cannot be contracted easily therefore advise a continuous service but with episodes where service delivery can be pulsed/pushed for increased use |

# Appendix N Example service specification using the developed complex intervention structure and components

## 1 Service background and rationale

1.1.1 In the UK, alcohol misuse represents one of the biggest risk factors for death, ill-health and disability. Alcohol is a leading cause of premature mortality with more years of working life lost as a result of alcohol-related conditions than for the 10 most common cancers combined. The majority of working years of life lost due to alcohol are a result of alcohol related liver disease (ArLD).

1.1.2 Over 200 diseases and conditions that can be caused (at least in part) by alcohol use. ArLD represents a condition entirely caused by alcohol and is the cause of death in over 80% of all deaths that are entirely a result of alcohol misuse. The number of premature deaths due to ArLD have increased by 61% in England since 2003.

1.1.3 A person with ArLD may have no symptoms until developing complications of the advanced stage of ArLD called cirrhosis at which point it the condition is much harder to treat and the person will be at much greater risk of dying from ArLD.

1.1.4 Earlier identification of ArLD by testing people who are at increased risk of it (i.e. people with alcohol misuse) can result in earlier care for both their ArLD and alcohol misuse in order to prevent development of complications of cirrhosis. Evidence also suggests that testing people with alcohol misuse for ArLD may also help to reduce their drinking.

1.1.5 Testing for ArLD involves having a liver fibrosis test. This can either be a blood test or a special type of ultrasound scan called transient elastography (Fibroscan®).

1.1.6 The practice of testing for liver fibrosis ArLD in people with alcohol misuse is recommended in NICE guidance and by national and international consensuses on ArLD.

1.1.7 Providing brief advice to people with alcohol misuse (who are at increased risk of ArLD) is known to be effective in reducing drinking, which consequently reduces risk of alcohol-related harms, including ArLD and its potential complications.

## 2 Aims and intended outcomes

- Identify people with alcohol misuse who are at increased risk of alcohol-related liver disease and refer them directly for liver fibrosis testing and ongoing care
- Provide brief advice for people who are identified as having alcohol misuse and refer them for further alcohol support as appropriate
- Increase access to assessment for alcohol-related liver disease
- Increase earlier diagnosis and care of alcohol-related liver disease
- Increase awareness of alcohol-related liver disease
- Support reduction of alcohol-related harm

## 3 Service description

### 3.1 User eligibility and access

3.1.1 Any person aged 18-75 who accesses the pharmacy is eligible for this service

3.1.2 Offer of the service should be made routinely to any eligible pharmacy user and not specifically targeting pharmacy users who may be suspected of having alcohol problems.

3.1.3 An eligible pharmacy user engaging with any advanced or other locally commissioned service offered by the pharmacy represents a key opportunity for staff to offer this service alongside.

3.1.4 Other key opportunities to offer this service include prescription collection or minor ailment advice for conditions or medications where alcohol is of clear relevance.

3.1.5 The pharmacy should also promote the service using materials that will be provided as part of the service set up. Electronic versions will be available for use on display screens if present in the pharmacy and for use on the pharmacy website and/or social media as able.

3.1.6 The pharmacy is encouraged to offer the service directly to eligible existing pharmacy users through any existing established text messaging or email distribution lists.

## 3.2 Service pathway

There are three steps of the service:

1. Screening of any eligible pharmacy user
2. ArLD risk identification and brief advice
3. Referral of at-risk pharmacy users for liver fibrosis testing and onward care

**Step 1: Screening of any eligible pharmacy user**

3.2.1 Eligible pharmacy users will be screened using the AUDIT-C screening tool.

3.2.2 This can be done by any trained member of pharmacy staff with the pharmacy user in a consultation room or private area. It is permissible to complete this at the counter with a pharmacy user if they agree to this. It takes approximately 1 minute to complete the questions.

3.2.3 Alternatively the pharmacy user can self-complete the questions by provision of a self-screening tool. This will be either be: 1) a card, either offered by a member of pharmacy staff or made available in the pharmacy for customers to pick up themselves; 2) a QR code displayed providing access to an online self-screening tool

3.2.4 The AUDIT-C score is interpreted and actioned as follows:

- Less than 5: Low risk of health harm due to alcohol
    - Liver testing and brief advice not indicated
    - Pharmacy user should be congratulated and advised to keep this level of low-risk drinking. Can be given educational information about ArLD and about safe use of alcohol
- 5-10: Increasing risk of health harm
    - Referral for liver testing may be indicated subject to further assessment
    - Brief advice should be given, and details of alcohol support services provided
- 11-12: High risk of health harm and possible alcohol dependence
    - Referral for liver testing likely indicated subject to further assessment
    - Brief advice not indicated but should be offered referral to alcohol services

3.2.5 All pharmacy users scoring 5 or more should be offered to proceed to step 2. The self-screening tool will advise the pharmacy user they should see a member of pharmacy staff if they score 5 or more in order that they can be offered to proceed to step 2.

3.2.6 If a pharmacy user declines to proceed to step 2 they should be offered educational information about ArLD, safe drinking and details of local alcohol support services.

**Step 2: ArLD risk identification and brief advice**

3.2.7 All these pharmacy users will have an AUDIT-C score of 5 or more. This step will be conducted in a private area or consultation room by a pharmacist or pharmacy technician with verbal consent obtained from the pharmacy user.

3.2.8 The process of risk identification and brief advice is expected to take 10-15minutes

3.2.9 If a private area or consultation room or not available at the time of screening, or the pharmacy user is unable to undertake step 2 at the time offer should be made for the pharmacy user to return at an agreed time.

3.2.10 The pharmacist or pharmacy technician will:

a) Establish the number of units of alcohol the pharmacy users drinks in a typical week
b) Establish their BMI (height and weight can be estimated if measurement is not possible)
c) Check if they are known to have type 2 diabetes, high blood pressure or high cholesterol (or on treatment for any of these)
d) Check if the individual is known to have liver disease (self-report of pharmacy user or use of summary care record if available)
e) Provide brief advice to pharmacy users with AUDIT-C score 5-10
f) Advise referral to local alcohol support service if AUDIT-C score 11-12
    a. If pharmacy user agrees staff member should complete referral with user using the relevant service's online referral form. If the patient declines this they should be offered details of how to self-refer.
g) Offer referral for liver testing if indicated (see step 3)
h) Offer educational information about ArLD, safe drinking and details of local alcohol support services.
i) Offer to inform pharmacy users GP (via NHSmail) of the result and actions of the assessment

**Step 3: Referral of at-risk pharmacy user for liver testing**

3.2.11 A pharmacy user will be eligible for referral for liver testing if they drink more than 30 units per week (see addendum) and do not already have a liver disease diagnosis.

3.2.12 With the patients consent a referral will be sent using a dedicated electronic referral form to the community liver testing hub. The form will be sent via NHSmail.

3.2.13 On receipt of a valid referral form the community liver testing hub (see addendum) will contact the pharmacy user to arrange testing and subsequent management

3.2.14 Any incomplete referrals or referrals of ineligible pharmacy users will be rejected by reply to the referral email. In this case it is the responsibility of the provider to either inform the pharmacy user they are not eligible for referral or send a correctly completed referral form.

3.2.15 As part of the referral the patient will be asked to provide optional consent for the pharmacy to be informed that the patient has attended the community liver testing hub.

3.2.16 If a pharmacy user declines referral for liver testing they should be offered educational information about ArLD, safe drinking and details of local alcohol support services

3.2.17 It is possible and permissible that a pharmacy user may be eligible for both liver testing referral and referral to the local alcohol support service but only agree to one of the referrals.

# 4 Requirements for service provision

## 4.1 Premises

4.1.1 The provider must already be delivering at least one of the following advanced services: Pharmacy First, Hypertension Case-Finding service, Smoking Cessation service, New Medicine Service

4.1.2 The pharmacy must have a consultation room in order to deliver step 2 and 3 of the service

4.1.3 Promotional and education materials should be displayed in the pharmacy to promote service uptake. These will be provided as part of service set-up.

4.1.4 Access to self-screening tool should be available to provide pharmacy users at all times

4.1.5 It is desirable but not essential for providers to be working within more deprived communities

### 4.2 Staff training

4.2.1 Dedicated training service will be provided in an online format. Duration TBC. This must be attended by:

- All pharmacists regularly working at the pharmacy, one of whom should be designated lead for the service
- Any pharmacy technicians who will deliver step 2
- Two customer-facing pharmacy assistants

The training will incorporate:

- Overview of guidance on recommended alcohol limits and levels of risk
- An overview of alcohol-related liver disease including who is at increased risk, how it can be diagnosed and the potential consequences of it
- Use of the AUDIT-C and AUDIT
- Calculating units of alcohol
- How to undertake brief advice, including relevant communication skills
- Explanation of the referral pathway and outcomes of it

4.2.2 In addition, any pharmacy staff who will undertake screening of customers (step 1) are required to complete the e-learning for healthcare alcohol identification and brief advice community pharmacy programme https://www.e-lfh.org.uk/programmes/alcohol/.

## 5 Delivery

5.1.1 Staff involved in delivery of the service must maintain a non-judgemental, non-confrontational approach with the pharmacy user

5.1.2 Pharmacy user privacy and confidentiality must be maintained in the delivery of the service

5.1.3 Staff involved in the delivery of the service should have the relevant knowledge and appropriate training for their involvement

5.1.4 The service should be available to pharmacy users throughout normal working hours.

5.1.5 Pharmacy users should be provided the option of returning at an agreed time if there is no consultation room or trained staff availability to deliver step 2 at the time of user engagement.

5.1.6 Providers are encouraged to utilise alcohol awareness campaigns to further promote uptake of the service

5.1.7 Providers must ensure staff operate within locally agreed protocols and SOP

5.1.8 Staff delivering the service should be aware of local safeguarding procedures

### 5.2 Delivery support

5.2.1 CPSC will support service delivery and be able to facilitate communication of clinical queries to relevant liver clinicians.

5.2.2 Meetings will be held with the provider service lead, a commissioning representative and a representative of the community liver testing hub prior to delivering the service and during service delivery at intervals established during service set up.

## 6 Payment (amounts and details are provisional)

6.1.1 A pharmacy delivering the service will be eligible for the following payment amounts:

- Set-up fee £TBC
- Screening of pharmacy user (step 1) £2
- ArLD risk-identification and brief advice (step 2) £5
- Referral for liver fibrosis testing (step 3) £5

6.1.2 The maximum payment possible for one pharmacy user is £12

6.1.3 Payment for pharmacy users that complete screening only (step 1) will be provided up to a maximum of £60 per month. If a pharmacy user screens positive and further steps are

delivered then payment for the screening step will still be provided regardless of whether this maximum has been reached i.e. the payment for step 2 will always be £7.

6.1.4 Payment will not be provided for pharmacy users that self-complete screening and do not subsequently inform staff of their result

6.1.5 Payments will be made on a monthly basis

6.1.6 The service may be suspended if activity levels exceed the available budget

# 7 Data collection and audit

7.1.1 The provider will maintain appropriate records to ensure ongoing service delivery, payment and audit

7.1.2 Recording of relevant service information for audit and payment will be done using PharmOutcomes

7.1.3 The provider will be requested to participate in a service review 3 months after starting delivery of the service

# 8 Addendum

## 8.1 Eligibility for referral for liver testing

8.1.1 The eligibility for referral for liver testing may be different depending on local area liver pathways. Potential alternative eligibility criteria include:

- Drinking more than 14 units a week
- Drinking more than 35 units per week if female or 50 units per week if male
- Different unit per week criteria depending on the presence or absence of certain co-morbidities such as diabetes, hypertension or obesity

## 8.2 Community liver testing hub

8.2.1 This infrastructure is in development and may take the form of a community clinic or a mobile testing van as has been used within Hepatitis C services.

# Appendix O Publications from work in this PhD

## 1 Letter to editor in response to systematic review and meta-analysis

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Letter to Editor


Letter to Editor

### Comment on 'Does Advice Based on Biomarkers of Liver Injury or Non-Invasive Tests of Liver Fibrosis Impact High-Risk Drinking Behaviour: A Systematic Review and Meta-Analysis'

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#### DEAR EDITOR

In the article 'Does advice based on biomarkers of liver injury or non-invasive tests of liver fibrosis impact high-risk drinking behaviour: A systematic review and meta-analysis' (Subhani et al., 2021) the authors aimed to quantify how biofeedback of a marker of liver injury affects alcohol consumption. To address this aim Subhani et al. (2021) search for literature that reports the change in alcohol consumption in patients with alcohol misuse following 'intervention-based' alcohol advice—defined by the authors as advice based on any liver blood test or measure of liver fibrosis (also termed 'biofeedback'). The authors include single arm prospective interventional studies and randomized control trials (RCTs) and using the data from nine RCTs conduct a meta-analysis. Based on the results of the meta-analysis the authors conclude that there is a significant association between alcohol interventions that include biofeedback on markers of liver injury and reduction in harmful alcohol consumption.

This is an exciting conclusion but we wish to highlight features of the study that in our view temper its validity and impact. Firstly, for an RCT to deliver reliable findings it is essential that the groups are treated identically aside from the intervention being tested. Seven of the nine original studies included in the meta-analysis compared biofeedback and a brief intervention to reduce alcohol consumption against no intervention at all. This leaves the reader uncertain about whether it was the biofeedback or the brief intervention that exerted a positive effect. This is pertinent because brief interventions alone are known to be effective (Beyer *et al.*, 2019).

Secondly, we note that the authors comment on their findings being suitable for application to day-to-day primary medical practice. We agree that non-invasive liver tests (NILTs) and biofeedback of the results could be performed in primary care settings but note that two of the studies included in the meta-analysis were done in a hospital inpatient setting. These studies had the two greatest mean reductions in alcohol intake and together comprised 47% of the total population. As such we have reservations about the generalizability of the meta-analysis to a primary care population.

Finally, in our view the authors should have discussed the potential unintended negative consequences of adding biofeedback on a marker of liver injury/NILT to a consultation aiming to reduce alcohol consumption. What if the test is normal? Could it lead to a continuation or even escalation of risky drinking behaviour? (National Institute for Health and Care Excellence, 2007). We feel this is particularly relevant to the primary care setting where the pre-test probability of liver injury may be lower (i.e. there are more 'normal' tests).

We fully support the intention of the authors and wholly agree that understanding the impact of biofeedback of NILTs on alcohol consumption is important. However for the reasons we describe we believe this article does not answer this question and further primary research is required. Good quality evidence would support the inclusion or exclusion of such tests in community care services for individuals with harmful alcohol consumption.

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Subhani M, Knight H I, Ryder S, *et al.* (2021) Does advice based on biomarkers of liver injury or non-invasive tests of liver fibrosis impact high-risk drinking behaviour: A systematic review with meta-analysis. *Alcohol Alcohol* 56:185–200.

## 2 Narrative review article of alcohol services in community pharmacy and a potential role in alcohol-related liver disease

the PHARMACEUTICAL JOURNAL

# Building on hepatitis C testing: the potential to identify alcohol-related liver disease through community pharmacy

Community pharmacy can identify people who may have alcohol-related liver disease, but research is needed to ascertain the best approach.

**Liver disease**

23 September 2021By **Alex Smith**, **Julie Parkes**, **Deborah Crockford**& **Ryan Buchanan**

PEER REVIEWED

**Abstract**

**Liver disease is the third biggest cause of premature mortality in the UK. Community pharmacy can effectively identify people with hepatitis C but is not routinely used to identify people with alcohol-related liver disease.**

**Some community pharmacists offer alcohol screening and a brief intervention to reduce alcohol misuse, and evidence has shown that pharmacists can identify a high proportion of people who drink above recommended limits when compared to the general population. A unique attribute of community pharmacies is their accessibility to those from areas of higher deprivation. It is well recognised that alcohol-related mortality is highest in these areas.**

**The ability to identify people who drink alcohol above recommended limits, combined with its accessibility to the populations most at risk of alcohol harm, shows community pharmacy has clear potential to identify people who may have undiagnosed alcohol-related liver disease. However, research is required to optimise and establish how community pharmacists can effectively work in partnership with medical services to ensure these patients receive appropriate ongoing care.**

**Key words: community pharmacy; alcohol; liver disease; cirrhosis; risk; testing; diagnosis.**

**Key points**

- Deaths resulting from alcohol-related liver disease (ArLD) continue to rise;
- Identifying early-stage ArLD can reduce morbidity and mortality by motivating reduction in alcohol intake and preventing complications;
- Community pharmacists can identify people at risk of ArLD;
- Linking people identified by community pharmacists as at risk of ArLD with a test for liver fibrosis could increase the detection of undiagnosed ArLD.

## Introduction

The role of community pharmacy in improving public health has continued to expand, as envisaged in the 2008 white paper 'Pharmacy in England — Building on strengths, delivering the future[1]. The Healthy Living Pharmacy (HLP) Framework, created to increase community pharmacy delivery of a broad range of public health services, demonstrates this potential[2].

Community pharmacy is a vital part of the 'NHS long-term plan' [3]. In keeping with this, the 'Community pharmacy contractual framework' (CPCF) for 2019/2020 to 2023/2024 requires all community pharmacies to meet HLP level 1 requirements from 1 January 2021 and comments on a "fundamental shift towards clinical service delivery focused initially on minor illness and the prevention and detection of ill health'[4,5].

The capability of community pharmacy to prevent and detect ill-health is enhanced by the fact that community pharmacists are one of the most accessible healthcare professionals[6]. Their position in the community also means they can address inequalities in access to healthcare. For example, the number of GPs per 100,000 of the population is lower in areas of higher deprivation but, conversely, access to community pharmacies is greatest in areas of highest deprivation — the so-called 'Positive Pharmacy Care Law'[7,8].

This accessibility, combined with the fact that around 90% of the UK population visit a community pharmacy at least once per year, makes community pharmacies a strategic place to undertake population screening for disease[9]. This potential has been studied in many disease areas, including diabetes, cardiovascular disease, respiratory disease, colorectal cancer, and osteoporosis, and there appears to be high participant satisfaction and acceptability for these services[6,9–12]. Researchers have highlighted that higher quality research is needed to establish effectiveness of these services, but some recent studies have already demonstrated their ef icacy and cost-effectiveness[6,9,10].

Support for case inding in community pharmacy is shown by the allocation of funding for hepatitis C (HCV) testing in the new CPCF[5]. The service offers a HCV antibody test to individuals who inject drugs who are not currently accessing treatment services. HCV antibody testing in community pharmacy, based on any risk factor (including injectable drug use), has been shown to be cost effective and demonstrates that community pharmacists are capable of reaching individuals who are not engaged with other services[13–15]. Other research has also shown the ability of community pharmacists to not only test for HCV but provide HCV treatment, resulting in better treatment outcomes compared to conventional care[16,17].

## Alcohol and liver disease

The expansion of HCV testing into community pharmacy comes amid greater attention to the mortality from liver disease, which increased 400% in the UK between 1970 and 2015[18]. Liver disease represents the third largest cause of premature death in the UK, accounting for around 12,000 deaths per year, with only ischaemic heart disease and suicideranking higher [18]. In 2013, the Department of Health listed liver disease as one of the ' ive big killer diseases' in the Living Well for Longer Campaign, alongside cancer and stroke[19]. In the same year, the Lancet Commission into liver disease was created with the aim of providing the strongest evidence-based recommendations to reduce the premature mortality and disease burden from avoidable causes of liver disease. Its irst recommendation was "improving expertise and facilities in primary care to strengthen detection of early disease and its treatment, and screening of high-risk patients in the community'[18,20,21]. Additionally, improving community-based care for patients with alcohol-related liver disease (ArLD) was a research priority set by the James Lind Alliance, a non-pro it initiative established in 2014 and funded by the National Institute for Health Research, which identi ies areas of evidence uncertainty by bringing together patients, carers, and health and social care professionals[22].

HCV testing in community pharmacy is one response to these recommendations; however, the majority of premature mortality from liver disease is associated with ArLD[18]. A 2016 report from the Office for National Statistics highlighted that almost 90% of alcohol-related deaths in England and Wales are caused by ArLD[23]. The consequences of alcohol misuse go beyond liver disease; in England, alcohol misuse is the biggest risk factor for early mortality, ill health and disability in people aged 15–49 years[24]. And, in 2018, data show that 180,000 working years were lost to alcohol misuse[25]. Alcohol is also a factor in health inequality — the most deprived areas have the greatest rates of alcohol-related harm, including ArLD [18]. Alcohol misuse and ArLD have been of particular relevance during the ongoing COVID-19 pandemic, during which there has been a reported increase in alcohol use and an associated rise in alcohol-related hospital admissions in the UK [26,27].

There are many locally-commissioned community pharmacy alcohol screening and brief intervention services[28]. Alcohol brief interventions are short, empathetic and structured conversations that aim to motivate and support individuals to think about and/or plan a change in their drinking behaviour[29]. These community pharmacy services aim to address the problem of alcohol misuse but the role of community pharmacy in going further to identify ArLD has not been considered.

This article describes current practice for identifying ArLD in the community and aspects that have been conducted in community pharmacy. It then considers how a care pathway to identify ArLD could be deployed in a community pharmacy setting.

# Identifying alcohol misuse

To identify ArLD, alcohol misuse must be identified. Current UK guidance advises a limit of 14 units of alcohol per week for men and women to keep health risks from alcohol to a low level[30]. In the UK, the alcohol content of a drink is shown as 'alcohol by volume' (ABV). Table 1shows the definitions of a unit of alcohol and ABV and shows how these are used to calculate the alcohol content of a drink[31].

| Measures of alcohol content and how they are calculated | |
|---|---|
| **Measurement** | **Definition[31]** |
| 1 unit of alcohol | 10ml or 8g of pure alcohol |
| % alcohol by volume (ABV) | Percentage of a drink's total volume that is pure alcohol |
| Examples of calculating units<br>1 pint (568mL) of 3.5% ABV beer = 20mL of pure alcohol (3.5% of 568ml) = 2 units of alcohol<br>1 glass (175mL) of 11.5% wine = 20mL of pure alcohol (11.5% of 175mL) = 2 units of alcohol | |

Table 1

Consuming alcohol above recommended limits constitutes alcohol misuse and can be termed hazardous or harmful[32]. The World Health Organization (WHO) defines hazardous alcohol use as that which increases the risk of harmful health consequences. Harmful alcohol use is defined as that which has caused damage to health[33]. In the UK, the National Institute for Health and Care Excellence (NICE) also provides weekly consumption-based definitions (see Table 2).

Alongside these definitions is the concept of alcohol use disorder (AUD), which puts greater focus on aspects of dependence. AUD is defined in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V) as "a problematic pattern of alcohol use leading to clinically significant impairment or distress'[34]. The WHO-approved Alcohol Use Disorder Identification Test (AUDIT) is regarded as the 'gold standard' alcohol use screening test and is the most widely used tool in primary care [27,35,36]. It contains ten multiple choice questions that enquire about a person's alcohol intake, potential dependence on alcohol and experience of alcohol-related harm [35]. Each question is scored individually and the sum of the ten answers gives the total AUDIT score, ranging from 0 to 40. The AUDIT questions and how they are scored are shown in Figure 1. The AUDIT-Consumption (AUDIT-C) score is an abbreviated version of the AUDIT that uses the first three questions of the AUDIT score, which ask about alcohol intake. The Fast Alcohol Screening Test (FAST) is another alcohol use screening test that asks four questions taken from the AUDIT (see Figure 1). A FAST score of ≥3 is deemed 'positive' and should then prompt completion of the remaining AUDIT questions [37].

| The alcohol use disorder identification test (AUDIT) | |
|---|---|
| **Question** | **Score** |
| 1. How often do you have a drink containing alcohol?* | |
| • Never<br>• Monthly or less<br>• 2–4 times a month<br>• 2–3 times a week<br>• 4 or more times a week | 0<br>1<br>2<br>3<br>4 |
| 2. How many units of alcohol do you drink on a typical day when you are drinking?* | |
| • 1 or 2<br>• 3 or 4<br>• 5 or 6<br>• 7 to 9<br>• 10 or more | 0<br>1<br>2<br>3<br>4 |
| 3. How often have you had six or more units if female, or eight or more if male, on a single occasion in the past year?*^ | |
| • Never<br>• Less than monthly<br>• Monthly<br>• Weekly<br>• Daily or almost daily | 0<br>1<br>2<br>3<br>4 |
| 4. How often during the past year have you found that you were not able to stop drinking once you had started? | |
| • Never<br>• Less than monthly<br>• Monthly<br>• Weekly<br>• Daily or almost daily | 0<br>1<br>2<br>3<br>4 |
| 5. How often during the past year have you failed to do what was normally expected from you because of your drinking?^ | |
| • Never<br>• Less than monthly<br>• Monthly<br>• Weekly<br>• Daily or almost daily | 0<br>1<br>2<br>3<br>4 |

| | |
|---|---|
| • Daily or almost daily | 4 |
| 6. How often during the past year have you needed an alcoholic drink in the morning to get yourself going after a heavy drinking session? | |
| • Never<br>• Less than monthly<br>• Monthly<br>• Weekly<br>• Daily or almost daily | 0<br>1<br>2<br>3<br>4 |
| 7. How often during the past year have you had a feeling of guilt or remorse after drinking? | |
| • Never<br>• Less than monthly<br>• Monthly<br>• Weekly<br>• Daily or almost daily | 0<br>1<br>2<br>3<br>4 |
| 8. How often during the past year have you been unable to remember what happened the night before because you had been drinking?^ | |
| • Never<br>• Less than monthly<br>• Monthly<br>• Weekly<br>• Daily or almost daily | 0<br>1<br>2<br>3<br>4 |
| 9. Have you or someone else been injured as a result of your drinking? | |
| • No<br>• Yes, but not in the past year<br>• Yes, during the past year | 0<br>2<br>4 |
| 10. Has a relative or friend, doctor or other health worker been concerned about your drinking or suggested that you cut down?^ | |
| • No<br>• Yes, but not in the past year<br>• Yes, during the past year | 0<br>2<br>4 |
| *Questions contained in the AUDIT-C; ^Questions contained in the FAST alcohol screening test | |

Figure 1

Both the AUDIT and AUDIT-C scores can be used to identify hazardous or harmful alcohol use and alcohol dependence as shown in Table 2[38].

| Different criteria for categories of alcohol misuse | | | | | |
|---|---|---|---|---|---|
| **Measure** | **Criteria for hazardous alcohol use** | | **Criteria for harmful alcohol use** | | **Alcohol dependence** |
| UK units per week[32] | Female 14-35 | Male 14-50 | Female >35 | Male >50 | No criterion |
| AUDIT-C score[38] | ≥5 | | | | ≥11 |
| AUDIT score[35] | >8 | | | | >15 |
| AUDIT = alcohol use disorder identification test; C = consumption | | | | | |

# What is alcohol-related liver disease?

The term 'alcohol-related liver disease' encompasses a spectrum of liver disease caused by alcohol misuse. According to European guidelines, criteria for a diagnosis of ArLD include patients with clinical and/or biological abnormalities suggestive of liver injury — such as fatty liver on imaging, abnormal liver blood tests, evidence of liver ibrosis — who have a regular alcohol intake of >20g/day in women (1 7.5 UK units per week) and >30g/day in men (26 UK units per week)[36].The spectrum of ArLD begins with liver steatosis (i.e. fatty liver), which is present in almost all heavy drinkers[39]. In a subset of patients who continue to drink excess alcohol, there is progression to liver in lammation and injury, which is termed 'steatohepatitis'.

Steatohepatitis will continue with ongoing heavy alcohol intake and may result in further progression to liver ibrosis and, ultimately, cirrhosis, which is the inal and irreversible stage of ibrosis[40].The development of liver ibrosis in ArLD indicates those with progressive disease that may require specialist input, but it is generally asymptomatic until advanced and irreversible[40,41]. This means that diagnosis of ArLD at this late stage is common: nearly half of all patients with liver cirrhosis are irst diagnosed during an emergency hospital admission and alcohol is the most common cause of cirrhosis in these patients (other causes of cirrhosis include hepatitis, non-alcoholic fatty liver disease and bile duct disorders)[42]. The asymptomatic development of liver ibrosis means routine testing is an important component in the diagnosis of suspected ArLD[40].

Identification of ArLD at an earlier stage can drive behaviour change to reduce alcohol consumption, which in turn can prevent progression to cirrhosis [43,44]. Earlier diagnosis of cirrhosis improves prognosis by allowing for the motivation for alcohol abstinence and facilitating engagement with interventions to prevent and/or treat complications of cirrhosis (e.g. liver cancer) [45,46]. Strategies for reduced intake and abstinence from alcohol are beyond the scope of this article but national guidance and advice on application in community pharmacy has been produced [27,47]. Importantly, it is recognised that brief alcohol interventions in primary health care (including community pharmacy) are effective in reducing alcohol-related problems [48].

# Testing for liver fibrosis

Historically, a liver biopsy has been the only way to identify liver ibrosis [49]. Liver biopsy remains the gold standard for both diagnosis and staging of ArLD but is an invasive test with associated morbidity and so is not routinely recommended [36]. The risk of liver biopsy has led to the development of non-invasive liver ibrosis tests (NILTs), which are now part of routine practice in the UK [41].

There are several types of NILTs, including blood or imaging tests [50]. Current UK guidance advises the use of the enhanced liver ibrosis (ELF) blood test or transient elastography (TE [a form of ultrasound scan]) in patients at risk of ArLD [41,51]. An ELF test requires a standard blood sample, similar to other blood tests routinely performed in the community. TE requires a specialist device but is an easy to learn procedure, requiring only minimal training and providing a result at the point of care [50]. It has widespread use in secondary care but is increasingly being performed in the community (usually by a trained nurse) via primary care outreach services and in a few locally funded primary care

centres[52]. Both tests give a numerical result that is compared against recognised cut-off values to determine whether there is suspected significant liver fibrosis.

## Existing services that identify alcohol-related liver disease in the community

NICE and the British Society of Gastroenterology advises testing for liver fibrosis in individuals at risk of ArLD, and the NHS Health Check 'Best practice guidance', published in October 2019, advises referring anyone with an AUDIT score of ≥16 for a liver fibrosis test [41,51,53].

In addition to national guidance, many NHS trusts have developed primary care pathways to assist GPs in appropriate investigation and referral of liver disease[54–57]. Entry into such pathways may be from blood test and imaging abnormalities, or based on risk factors alone (e.g. the presence of alcohol misuse). In advanced liver disease, liver blood tests may be within normal range, demonstrating the importance of identifying risk factors[41].

Primary care pathways incorporate one or more NILTs that are performed in the community. NILT cut-off values are provided to inform primary care clinicians which patients may have significant fibrosis, and should therefore be referred onto secondary care, as well as patients that can be monitored in the community[54–56]. This approach has been shown to be cost effective [58]. An example pathway is shown in Figure 2.

Existing primary care pathways are not without limitations. Identi ication of alcohol misuse is the universal component of these services, but has been shown to be suboptimal in general practice. A cross-sectional study published in 2019 by Mans ield et al. demonstrated that only 48.8% of 1.5 million registered patients had a record of their alcohol consumption in the past ive years [59]. In addition, a study that used GP electronic records to identify risk factors for liver disease found the prevalence of hazardous alcohol use was 6.3%, much less than the estimated general population prevalence of 22% [60,61]. This may be explained by suboptimal recording of alcohol consumption but could also indicate that individuals with hazardous alcohol use do not consult their GP or are not truthful when queried. Additionally, 15% of patients with liver cirrhosis are aged younger than 45 years at diagnosis, with ArLD the leading aetiology [62]. NHS Health Checks are only offered every ive years to those aged 40–74 years, therefore opportunities for earlier diagnosis can be missed in those aged under 45 years [53].

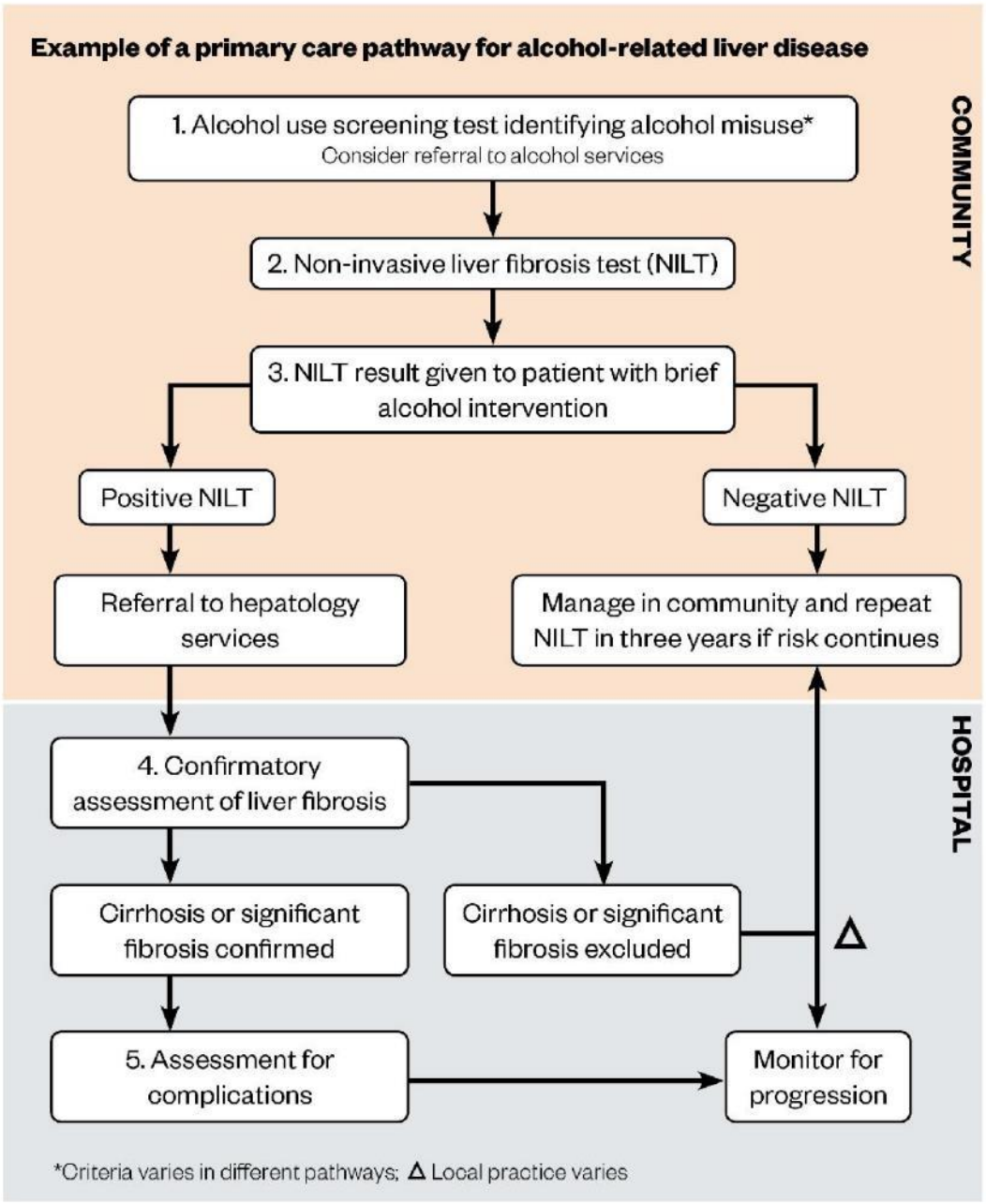
Example of a primary care pathway for alcohol-related liver disease
COMMUNITY
1. Alcohol use screening test identifying alcohol misuse*
Consider referral to alcohol services
2. Non-invasive liver fibrosis test (NILT)
3. NILT result given to patient with brief alcohol intervention
Positive NILT
Negative NILT
Referral to hepatology services
Manage in community and repeat NILT in three years if risk continues
HOSPITAL
4. Confirmatory assessment of liver fibrosis
Cirrhosis or significant fibrosis confirmed
Cirrhosis or significant fibrosis excluded
Δ
5. Assessment for complications
Monitor for progression
*Criteria varies in different pathways; Δ Local practice varies

Figure 2

# Evidence for community pharmacists identifying those at risk of alcohol-related liver disease

Individual studies have demonstrated community pharmacists' ability to perform alcohol use screening tests to identify people who are misusing alcohol. Health Survey for England data show that 22% of adults in England drink hazardous amounts of alcohol and 4% drink harmful amounts[61]. Published community pharmacy studies involving alcohol use screening tests show a higher proportion of hazardous alcohol use, ranging from 27% to as high as 79%, as shown in Table 3 [63–73]. The ability to identify a higher prevalence of hazardous alcohol use would make community pharmacy a strategic place to identify ArLD.

**Studies performing an alcohol use screening test in people attending community pharmacies and the percentages of hazardous alcohol use identified in those completing the test**

| Study | Alcohol use screening test used | Number of tests completed | Percentage hazardous [study criteria] | Country |
|---|---|---|---|---|
| Dhital (2005)[73] | AUDIT | 73 | 36% [AUDIT ≥8] | UK |
| Goodall *et al.* (2006)[65] | FAST | 352 | 30% [FAST ≥3] | UK |
| Fitzgerald *et al.* (2008)[66] | FAST | 70 | 53% [FAST >3] | UK |
| Dhital *et al.* (2010)[67] | | 102 | 52% [AUDIT-C ≥3♀,≥4♂] | UK |
| Watson *et al.* (2011)[63] | FAST | 844 | 27% [FAST >3] | UK |
| Sheridan *et al.* (2012)[68] | AUDIT-C | 2268 | 30% [AUDIT-C ≥5] | NZ |
| Khan *et al.* (2013)[69] | AUDIT-C | 125 | 72% [AUDIT-C >3♀,≥4♂] | UK |
| Brown *et al.* (2014)[70] | AUDIT | 261 | 67% [AUDIT ≥8] | UK |
| Krska & Mackridge (2014)[71] | AUDIT | 164 | 32% [AUDIT ≥8] | UK |
| Dhital *et al.* (2015)[64] | AUDIT | 561 | 79% [AUDIT ≥8] | UK |
| Hattingh *et al.* (2016)[72] | AUDIT | 50 | 70% [AUDIT ≥8] | NZ |

AUDIT – alcohol use disorder identification test; C – consumption; FAST – fast alcohol screening test; NZ – New Zealand.

Most of the studies in Table 3 offered an alcohol use screening test to any adult attending the community pharmacy, while ive of the studies used a case- inding strategy by offering the test to targeted groups[63,64,69,70,72]. Four of these ive studies identi ied the highest percentages of hazardous alcohol use [64,69,70,72]. Brown *et al.* only offered the test to women who were accessing the community pharmacy for emergency hormonal contraception(70). The other three studies offered tests to people requesting treatment for prede ined symptoms that may be related to alcohol use (e.g. re lux, poor sleep). Additionally, the presence of behaviours including use of certain medication prescriptions, use of smoking cessation services and asking for alcohol advice were used to prompt the offer of a test[64,69,72].

The acceptability of routine alcohol use screening by community pharmacists as part of medication reviews has been recently demonstrated in the results of a randomised control trial (RCT) published in 2020 by Stewart *et al.*[74].

The studies outlined in Table 3demonstrate the ability of community pharmacists to identify people who are drinking alcohol at potentially harmful levels and who may benefit from an assessment for ArLD.

## Evidence for a pharmacy-based brief intervention to reduce risk of alcohol-related liver disease

In 2015, Dhital *et al.* assessed whether a brief alcohol intervention delivered by community pharmacists in comparison with a lea let control was effective in reducing hazardous and harmful alcohol use at three months, determined by change in AUDIT score[64]. All participants required an AUDIT score of between 8 and 19 to be eligible for the study. Out of 561 customers who were tested, 407 were eligible and participated. The study did not ind any signi icant difference in AUDIT score between the intervention and control groups, and AUDIT score did not signi icantly change from baseline to follow up in either group. However, a secondary outcome examining AUDIT-C scores showed statistically signi icant reductions in mean AUDIT-C score of 0.75 (95% CI 0.41–1.08) in the intervention group and 0.69 (95% CI 0.35–1.03) in the control group, indicating a decrease in alcohol consumption[64].

A reduction in alcohol consumption has been seen in other pharmacy-based studies. In 2013, Khan *et al.* followed up 41 hazardous drinkers three months after a pharmacy-delivered alcohol brief intervention and found a statistically signi icant decrease in the median number of drinking days per week from three to one and an 84% reduction in the number of alcohol units consumed[69].

Then, in 2016, Hattingh *et al.* followed up ten participants after a pharmacy-delivered alcohol screening and brief intervention and observed three of the ive participants with hazardous or harmful alcohol use had reduced their level of drinking at one month follow up[73].

This trend of reduction in alcohol consumption is in keeping with the known effectiveness of alcohol screening and brief intervention in primary care populations[48]. Importantly, it may signal an ability for community pharmacists to reduce risk of ArLD and thereby demonstrate the further utility of community pharmacy in ArLD pathways.

## What could a community pharmacy pathway for identifying alcohol-related liver disease look like?

Current national guidance advises the offer of a NILT to people at risk of ArLD, highlighting the potential for an ArLD identi ication pathway in community pharmacy; however, there are currently no existing ArLD pathways in community pharmacy. Community pharmacy HCV antibody testing is now a CPCF-commissioned service[75]; the testing pathway in this service could inform the structure of a community pharmacy ArLD identi ication pathway. In the HCV antibody testing service, those offered testing are consented pre-test for onward referral (if their test is positive) to the local operational delivery network (a central hub that coordinates patient pathways between healthcare providers) for further testing and treatment [75].By combining this model with the structure of existing community ArLD pathways (see Figure 2), we present a conceptual model of what a community pharmacy ArLD pathway could look like (see Figure 3).

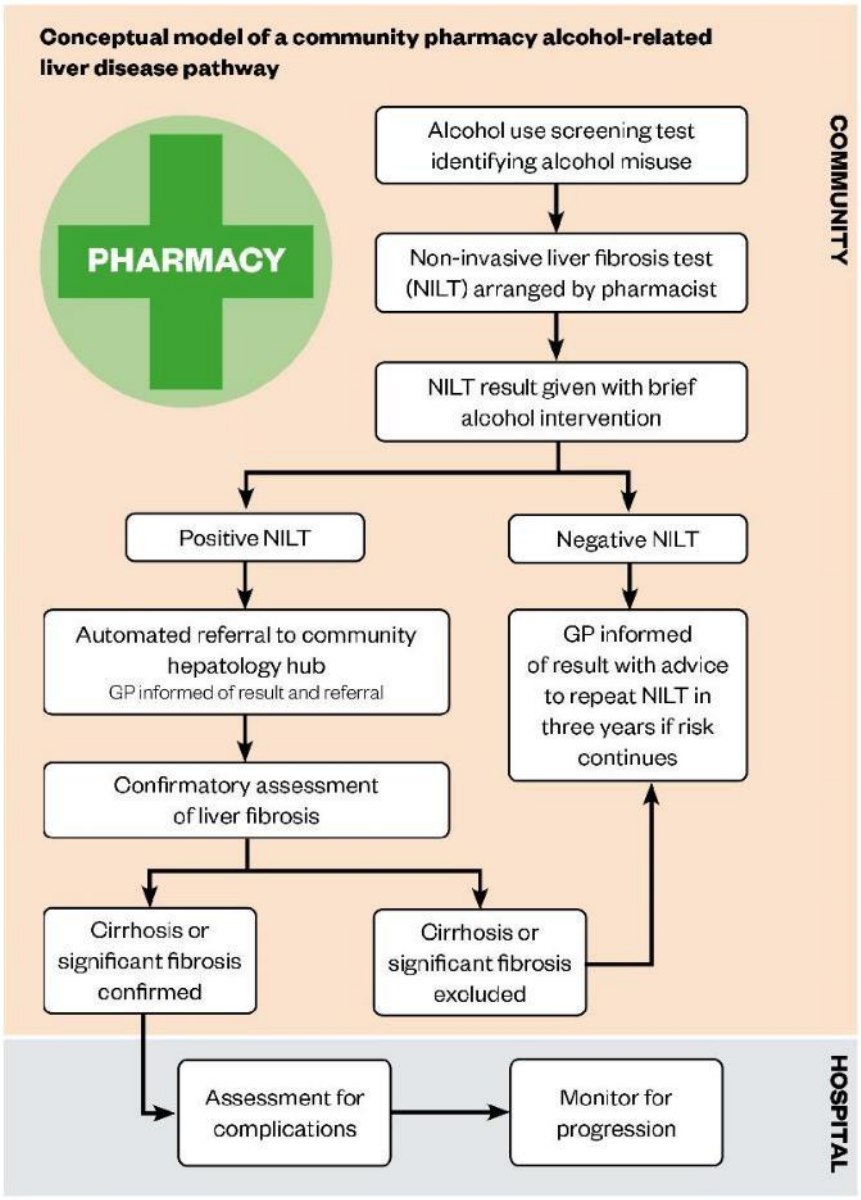
Conceptual model of a community pharmacy alcohol-related liver disease pathway
PHARMACY
Alcohol use screening test identifying alcohol misuse
Non-invasive liver fibrosis test (NILT) arranged by pharmacist
NILT result given with brief alcohol intervention
Positive NILT
Negative NILT
Automated referral to community hepatology hub
GP informed of result and referral
GP informed of result with advice to repeat NILT in three years if risk continues
Confirmatory assessment of liver fibrosis
Cirrhosis or significant fibrosis confirmed
Cirrhosis or significant fibrosis excluded
Assessment for complications
Monitor for progression
COMMUNITY
HOSPITAL

Figure 3

For such a pathway to be developed and implemented, research is needed to establish its design, acceptability and feasibility. This initial exploratory work would have to consider existing literature that describes barriers to pharmacy disease screening and case inding services[6,9]. Known barriers include patient uptake of onward referral for con irmatory testing/ongoing care, pharmacist knowledge and con idence, public and other healthcare providers' perception of pharmacist competency, a perceived lack of privacy and con identiality in the pharmacy environment, and time pressures of pharmacy staff; the latter related to inadequate funding preventing the employment of suf icient staff[6,9].

A challenge when considering an ArLD pathway in community pharmacy is the NILT. A key component of the HCV antibody testing service is the use of a point-of-care test, performed by the pharmacist[75]. TE is the only recommended point-of-care NILT in ArLD but, to our knowledge, has never been used in the community pharmacy setting. The alternative to TE is a blood sample NILT, such as the nationally recommended ELF test, but there are no point-of-care blood-based NILTs[41]. Encouragingly the ability of community pharmacists to arrange a blood sample for NILTs and interpret the results has been recently demonstrated by Radley *et al.* in their study of a pharmacy-based HCV treatment service, where a nurse or phlebotomist attended pharmacies to take the required blood sample[16]. Whether this could be emulated in a community pharmacy ArLD care pathway or whether TE could/should be the NILT are some of the questions that research into a community pharmacy ArLD pathway would need to address. The Box belowdetails some research questions that must be addressed for the implementation of the aforementioned pathway.

### Box: A sample of research questions that need to be addressed in order to design an effective community pharmacy-based care pathway for alcohol related liver disease

- Which non-invasive liver test (NILT) for liver fibrosis should be done?
- Can the NILT be performed in community pharmacy and if so who should do it?
- How best is the NILT result given and who should deliver this?
- What training and support for community pharmacists would be needed?
- Should onward referral be direct to hepatology services or via general practice?
- What could be the impact of the potential increased workload on general practice and/or hepatology services?
- How can alcohol addiction services be incorporated to maximise public health benefits of the service?

## Summary

This article outlines evidence showing that community pharmacy could play an important role in the community care pathway for people at risk of ArLD. Alcohol misuse causes three-quarters of deaths from liver disease in the UK[18]. Deprived areas have the highest burden of ArLD and alcohol-related harm, but also have the greatest access to community pharmacy services[8,18]. Expanding community pharmacy services therefore presents an opportunity to address the health inequality of alcohol-related death. Earlier diagnosis of ArLD saves lives through motivating reduced alcohol consumption and facilitating engagement with interventions to prevent complications[45,46,76]. Existing care pathways for ArLD in community settings aid earlier diagnosis but they are not without limitations[77].

There is substantial evidence that individuals with alcohol misuse can be identi ied through simple alcohol use screening tests performed in community pharmacy. There is also evidence that alcohol use screening tests performed in community pharmacy identify a greater proportion of people with alcohol misuse than is present in the general population. While it is uncertain whether a pharmacy delivered alcohol brief intervention leads to a reduction in alcohol consumption, community pharmacy could play an important role in linking at-risk patients directly to tests for ArLD. Additional research is needed to examine the structure, feasibility and effectiveness of a community pharmacy-based care pathway for ArLD.

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# 3 Natural experiment review article

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REVIEW

OPEN

# The role of natural experiments in hepatology research: filling the gap between clinical trials and service evaluations

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**Abstract**

Research developing and testing interventions that address the social determinants of liver disease are urgently needed; however, this cannot be achieved using conventional clinical research designs. A different approach is needed to conduct widely applicable, inclusive, and community-based research that addresses upstream factors driving liver morbidity. Natural experimental studies encompass a well-established field of research methodology that is less familiar to clinical hepatologists than conventional research methods such as the randomized control trial. The key strength of natural experiments is that, when robustly designed, they can be used to imply causality from routinely collected data. As such, they are well placed to test the impact of community interventions that aim to address social determinants of liver disease that cannot feasibly be assessed in a randomized control trial. In this review, we define natural experiments and their potential utility. We then work through examples of where they have already been used in clinical hepatology to highlight a range of research designs, analytical approaches, and best practices regarding their conduct and reporting. In doing so, we hope to equip clinical hepatologists with another tool to ensure the hepatology community can meet the global liver disease epidemic with evidence-based interventions.

## INTRODUCTION

The European Association for the Study of the Liver–Lancet commission stresses the inconsistency in models of care for liver disease in Europe and the scarcity of programs delivering testing and treatment for early-stage disease. The commission highlights the enormous number of lives that could be saved if measures that address disease prevention and detection are properly validated and implemented.[1]

Both the European Association for the Study of the Liver–Lancet commission and field leaders in the US[2] emphasize the need to study the "social determinants of liver disease" (eg, stigma, discrimination, and

Abbreviations: GP, General Practice; ITS, interrupted time series; IV, instrumental variable; MRC, Medical Research Council; NES, natural experimental studies.

asymmetrical resources allocation[3]) if meaningful progress is to be made. Presently, the quantity and quality of interventional studies addressing upstream social determinants of health in gastroenterology and hepatology are described as "grim."[4] There are many barriers to conducting research in this area: (1) the causal relationship between social determinants of health and liver disease is convoluted and complex, (2) in the short term, intervention leads to "soft" nonclinical outcomes (eg, reduced alcohol intake), (3) interventions are often multimorbidity focused, and (4) potential research participants are predominantly in the community rather than hospital settings—limiting the accessibility of the research population to predominantly hospital-based hepatologists.[3] An important additional contributory factor to this lack of evidence is our collective professional insistence on using clinical research methods to solve what are essentially public health problems. This leads to a lack of diversity in research[5] and a particular lack of evidence for interventions targeting social determinants of liver health in marginalized and deprived populations—a lack of evidence that leads to a lack of spending and policy change.[3,6]

The gold standard clinical experiment is the randomized controlled trial (RCT). An RCT has 4 defining features: (1) it includes 2 or more groups, (2) 1 or more group is assigned to a treatment or series of treatments, (3) subjects are randomly assigned to 1 group, and (4) the treatment can be manipulated by the researcher.[7] The random assignment of the individuals to groups means that "on average," they should have the same characteristics. Thus, statistically similar groups are exposed at the same time to 2 or more different conditions, which reduces or eliminates confounding and supports causal inferences. There are, however, many circumstances when an RCT is impossible and many cases when, even though an RCT is possible, such a trial has not been funded, has not been done and will not be done in a timescale that helps the policy maker or clinician.

The challenges in using RCTs to evaluate complex interventions to overcome social determinants of health are well described,[8,9] and most strategic decisions—particularly in Public Health—are made without the benefit of evidence from an RCT. So, what else constitutes acceptable evidence? Figure 1 (adapted from Ogilvie et al[10]) describes 2 pathways that lead to health policy change. The first (pathway A) includes RCTs and is more typical of the hospital-based system that is familiar to clinical hepatologists. Expert opinion and observational data are collected, collated, and presented. This leads to the development of an intervention, which is tested in an RCT and leads (usually with support from further trials, meta-analysis, and cost-effectiveness evaluation) to policy action. A recent example from clinical hepatology is the changing indications for carvedilol in patients with liver cirrhosis. Observational data indicated that beta-blockers should be effective at preventing decompensation in patients with clinically significant portal hypertension.[11,12] These studies led to an RCT that showed positive results,[13] and this has started to alter international policy.[14]

The second pathway (pathway B) is more typical of public health and will be less familiar to clinical hepatologists. Expert opinion and observational data lead to policy change, policy action, and the implementation of an intervention. A good example of a widespread practice in clinical hepatology that lacks evidence from RCTs (with the exception of a study in China[15]) is HCC surveillance with liver ultrasound. Observational data about the relative incidence of HCC in patients with liver cirrhosis and expert opinion have led to the practice being recommended in international guidelines.[16,17] The impact of HCC surveillance has been evaluated in observational cohort studies that have compared outcomes for patients with HCC "exposed" to surveillance or presenting outside of surveillance.[18] These studies are at risk of lead time bias and selection biases (including length-time bias) for which they have been partially adjusted.[18] The results have been used to parameterize cost-effectiveness models and support the widespread implementation of surveillance.[19] Despite the widespread implementation, some authors have advocated that there is still a need for an RCT, but others have highlighted the lack of acceptability, large sample sizes needed to demonstrate significant effects, and high study costs.[20–22]

In 2014, the Centre for Disease Control in the US recommended cohort screening for HCV of the baby-boomer generation.[23] This was a massive program that received high-level criticism calling for an RCT.[24] However, the call was met with a response from the clinical community that indicated such a trial was unacceptable. Through online responses, other experts

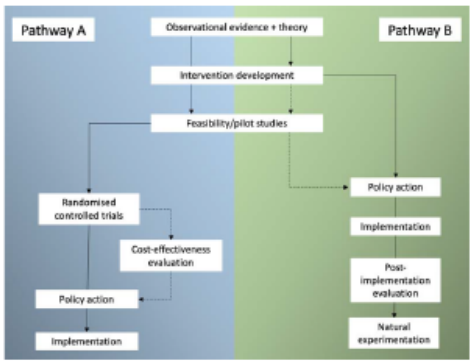


**FIGURE 1** Two pathways to policy action (A) classic clinical pathway and (B) pragmatic public health pathway (adapted from Ogilvie et al[10]).

cited the high costs involved, the timescale required, and that modeling had already explored some of the uncertainties that would be addressed by a trial. In a similar example, NHS England has recently funded a widespread scale-up of community testing for early-stage liver disease. The program follows the recent publication of the NHS long-term plan[25] and a political focus on early identification of disease—specifically cancer. In keeping with pathway B in Figure 1, the policy has led to rapid implementation without utilizing the evidence-generation steps in pathway A.

What can help clinicians decide whether interventions implemented into practice without passing through the traditional hierarchy of medical evidence is the right thing for their patients and the communities they look after? As we have highlighted, observational data can help but are subject to biases that limit causal inferences. In the remainder of this article, we will discuss how natural experimental studies (henceforth abbreviated to NES)—sitting somewhere between experimental and observational research methods—can help. We describe this method in detail for the clinical audience of this journal because we believe NES are key to better evaluations of large-scale health interventions for patients at risk of, or with liver disease outside of the hospital walls. Unlike other research methods, they are undertaught and underutilized.

## What are NES?

To illustrate what we mean by NES, we will work through historical, famous, widely cited, but infrequently fully explained examples of Public Health research. It is well known that in 1854 John Snow identified the source of cholera outbreaks in London, UK, and undertook a simple Public Health intervention—he is famously credited with removing the handle from the Broad Street water pump—thereby cutting off a key source of contaminated water. However, the study design John Snow used to draw his conclusions is less well known.[26]

Sometime before his study, 1 of the 2 water companies serving London situated their intake pipe in the River Thames upstream of the city in (what turned out to be) less contaminated water. The other company continued to take water from the Thames as it ran through the city. To test his hypothesis that cholera was waterborne, John Snow looked at cholera cases in households served by each water company. He noted that the incidence of cholera in households served by the downstream water company was 10 times that of households served by the company with the upstream source. John Snow recognized the risk of bias and worked hard to prove that the supply of water to each household was not associated with other factors that could be associated with cholera (ie, confounders). In fact, he was able to show that the supply of water was almost random: many households were unaware of which water company they used, and neighboring houses were often served by different companies.

In his study, John Snow highlighted the "rules" that now define NES[10,27] (Box 1) The "intervention" (in this case a change in water pipe location) should be outside of the researchers' control, the allocation of the intervention should be "as if" random or at the very least variation in exposure should be unrelated to factors that may influence the outcome[7,28,29] and the experiment should be relevant to current health policy/service decisions. Crucially, it should be possible for causal inferences to be drawn from the study.[30] We will return to these rules again when we evaluate examples of NES in hepatology research.

Some authors have contended this relatively straightforward definition of NES, summarized by the Medical Research Council[30] and Box 1, does not capture their full complexity. Dawson et al[31] classify NES into type 1 and type 2 (Figure 2). Type 1 fits most closely with the MRC definition and the examples we have already discussed—researchers have no control over the implementation and exposure to the intervention. In type 2, researchers may have some control. For example, they could influence how and where a health intervention is being deployed to influence the semi-natural formation of groups. Type 2 NES get close in structure to quasi-experimental designs, which are, in turn, closer to the RCT design (Figure 2). The term "quasi-experiment" is often used interchangeably with natural experiment, and there remains debate in the literature over their exact definitions.[29] Generally, quasi-experiments are recognized to include designs where the researcher has full control of the intervention, but there is still an absence of control over randomization[31] and hence would not meet the rules of the definition of NES (Box 1). A good example of a quasi-experimental study was when uptake of a researcher-led intervention relies on volunteers (forming the intervention "arm") with people who do not volunteer to become a control group. In this example, very careful consideration needs to be given to controlling for potential confounders that are associated with the act of volunteering and the outcome of interest.[31,34]

NES have strengths over other study designs: they can evaluate the effect of events or interventions that are impossible to manipulate experimentally, interventions are generally less distorted than in strict experimental conditions, and control groups are less likely to alter their normal behaviors.[35] In addition, NES can be used with retrospective data and are less susceptible to confounding than conventional observational designs.[29] Accordingly, NES can provide strong causal information with large effect sizes[29] that are comparable in some circumstances to randomized designs[36]

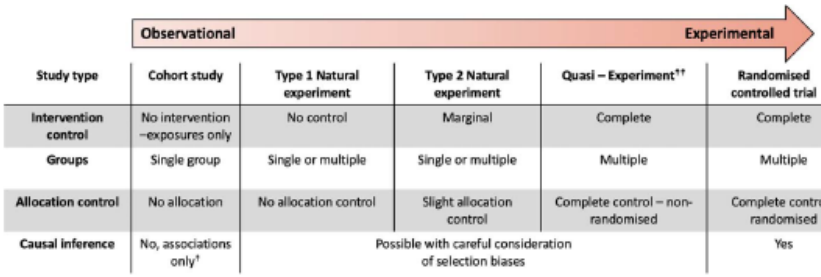


**FIGURE 2** Observation to experimental design spectrum (adapted from Ogilvie et al.[10]).
†This is not universally true, for example, the causal association between smoking and lung cancer is primarily based on observational data. For a different perspective on causality in observational research designs, see Vandenbroucke et al.[32]. Specific criteria that "upgrades" the strength of observational data such that causal inferences may be considered are available in the GRADE statement.[33] ††The definition of quasi-experiment does vary—for an alternative, see de Vocht et al[29].

(Figure 2). However, to do this, NES need to be carefully planned, well conducted, and accurately reported.

## Examples of NES in hepatology

NES have been widely used in global health care–related research with a broad range of examples, including interventions aimed at reducing gun fatalities in the US,[37] improving road safety,[38,39] improving maternal health,[40] reducing suicide with pesticides,[41] and reducing cycling accidents.[42] We will now consider a few examples of where NES have been used in studies relating to liver disease or the direct risks of liver disease (Table 1). In keeping with the recommendations in the recent European Association for the Study of the Liver–Lancet Commission[1] and its previous editions,[47] these studies have an appropriate focus on early identification or prevention of liver disease in community settings.

Concerns about overburdening stretched hepatology services have led to novel pathway designs that stratify patients as "high risk" for significant liver disease before a referral is made (for an overview of novel pathways, see Abeysekera et al[48]). A good example is Srivastava et al [43] published in 2019. This article has had impact with over 200 citations in 3 years. In the study, the authors compared the proportion of significant liver disease in patients referred to the hospital through a novel pathway with others that were referred without the novel pathway and showed that the pathway significantly reduced unnecessary referrals. The study broadly meets the "rules" for a NES (Box 1) (Table 1). The study met an important clinical/public health concern; the researchers lacked control over the implementation of the intervention, circumstance dictated which population was exposed, and there was a reasonable argument that the exposed and unexposed groups were broadly similar.

Ground rules that define a natural experiment
1. Researchers lack control over the implementation of the intervention
2. Variation in exposure to the intervention should be unrelated to the outcome such that causal inference can be drawn
3. The intervention should be relevant to public health/health service decisions

Our second and third examples describe interventions to enhance HCV treatment engagement in people who inject drugs (PWIDs). In both, the populations who are exposed to the intervention live in areas where there has been the early implementation of enhanced services for HCV treatment, and the "control" or unexposed populations live in areas with slow adoption of the interventions. Hickman and colleagues describe the study protocol for the Epitope study (results unpublished at the time of writing). They compare the prevalence of HCV in the Tayside area of Scotland to other parts of Scotland where HCV services for PWID were in their relative infancy.[44] Jugnarain et al[45] describe the impact of peer-supported engagement with HCV treatment in PWID living in areas of England where peer support has been implemented and compare the number starting and completing treatment with areas that have not started a peer-supported program. They observed a significant increase in the rates of treatment initiation and contended that this was unlikely to be due to hidden confounders:

"given the magnitude of the change and the large number of networks involved it is difficult to envisage a common confounding factor that could have led to the changes we observed."

Our final example tested the impact of the implementation of the minimum unit alcohol pricing policy in Scotland. In many respects, this is a "classic" NES. Observational data[49] describing the association between cost and consumption led directly to a policy change.

**TABLE 1** Examples of natural experiments in hepatology

| References | Aim of intervention | Intervention | Implementation of intervention | Group allocation process | Measured primary outcome | Method of analysis |
|---|---|---|---|---|---|---|
| Srivastava et al[43] | Reduce inappropriate referrals to hospital hepatology services | Referral pathway, including noninvasive fibrosis assessment before referral | Commissioned novel pathway in 2/25 CCGs referring patients to 3 hospital trusts | Iterative service development and funding in 2 CCGs (2—intervention) but not others (23—control) | Change in the proportion of patients referred to hospital care with significant fibrosis or cirrhosis | Compared OR of having primary outcome before and after pathway in intervention patients and between control and intervention patients after implementation |
| Hickman et al[44] | Reduce the prevalence of HCV in PWID | Multifaceted community HCV service innovation | Expanded HCV care pathways in 1 geographical area | Asymmetrical iterative service development with early adopter and late adopters | Chronic HCV prevalence in PWID | Adapted Bayesian synthetic control methods |
| Jugnarain et al[45] | Increase the proportion of PWID starting and completing treatment for HCV | Peers to support engagement with HCV treatment | Peer-supported engagement with HCV treatment | Asymmetrical iterative service development with early adopter and late adopters. Timing dependent on funding application and operational readiness | Total numbers starting treatment (presented as a relative ratio) | Mixed effects model |
| O'Donnell et al[46] | Reduce alcohol consumption | Minimum unit price for UK unit—50p (0.61$) | Implemented in Scotland | Policy implemented in Scotland, not implemented in England | No. grams of alcohol purchased per household | Interrupted controlled time series analysis |

Abbreviations: CCGs, clinical commissioning groups; PWID, people who inject drugs.

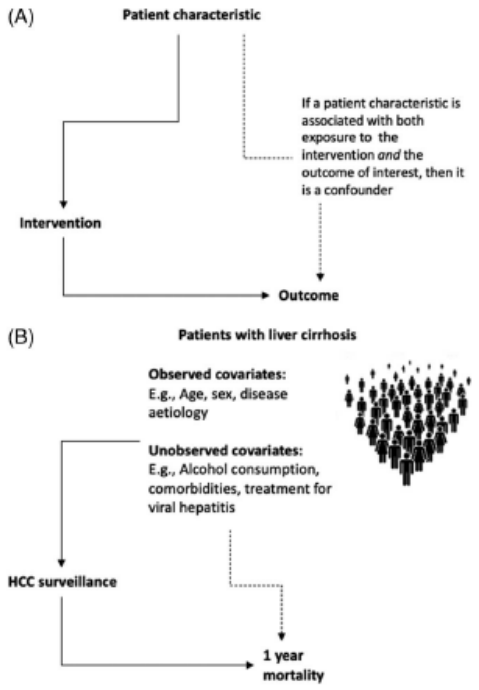


**FIGURE 3** Confounding is visualized as a directed acyclic graph. In (A), as indicated by the arrows, a patient characteristic is associated with exposure to the intervention, and the outcome is therefore confounding. (B) Patient characteristics are associated with engagement with HCC surveillance, for example, abstinence from alcohol may plausibly be associated with increased attendance at ultrasound appointments and is plausibly independently associated with reduced 1-year mortality. When designing an observational study, it is important to measure the covariates that could introduce confounding and use design and analytical approaches that mitigate their impact. By design, natural experimental studies are devised *a priori* to deal with confounding and therefore strengthen causal inferences that can be drawn from the results.

Evaluation of the impact then relied on observational data and NES. O'Donnell et al[46] compared the amount spent per household on alcohol in Scotland and England (where the policy was not implemented) and separately in northern areas of England—to control for "cross-border contamination." The authors showed an immediate drop in alcohol purchasing in Scotland and no comparable decrease in England. The authors summarized the rationale and strength of their natural experiment:

"although the randomised controlled trial remains the ideal research standard, interrupted time series analysis provides a strong alternative where an experimental study design is infeasible or unethical, such as the evaluation of policy initiatives in healthcare."

## Design and analysis in NES

By definition, in NES, the researcher has little or no influence over exposure to the intervention.[27] In all NES, exposure to the intervention is therefore at risk of selection bias as the implementation is very rarely completely random—an exception may be a study that compares lottery winners to members of the general population. Selection bias becomes a problem when it leads to confounding. A confounder is a covariate associated with the intervention and the outcome of interest. Figure 3A illustrates this as a directed acyclic graph, and as an example, Figure 3B illustrates how observed and unobserved differences (covariates) between patients with cirrhosis exposed and unexposed to HCC surveillance could lead to confounding in observational studies evaluating its effectiveness.

The study design and analytical approach taken should be the best available to mitigate the effect of selection bias and confounding on the outcome. There are many approaches to maximize causal inferences in NES, which in many instances equally apply to observational and randomized designs. Broadly speaking, these approaches fall into 2 groups—those designed to deal with recorded covariates and those designed to deal with things the researcher does not know about the study population (see Figure 3B for an example). We summarize the approaches in Table 2 and highlight how our examples of NES in hepatology research have maximized causal inferences in the following text. A more comprehensive overview of different approaches to maximize causal inferences is available elsewhere.[30,50]

Srivastava and colleagues compared patients referred through a novel service pathway to patients referred from other areas in London (UK), where the pathway had not been implemented. The results are presented as an "Odds" that patients seen in the clinic will have significant fibrosis/cirrhosis—that is, are they appropriate referrals? The results were positive with patients referred from General Practice (GP) with the novel pathway being more likely to have a significant disease; however, it is unlikely the patients coming from the 2 areas are exactly the same, that is, there will be some selection bias in exposure to the novel pathway. Had this same study been an RCT, the unit of randomization would have been GP practices. A confounder would therefore arise from a variable associated with GP services in one area that is associated with the outcome of interest (Figure 3). For example, an education program aimed at GPs in the intervention area could have improved the appropriateness of referral independently of the new pathway. To support their assertion that the new pathway (rather than hidden confounders) caused the improved selection of patients referred to secondary care, the authors conducted a supplementary analysis.

**TABLE 2** Examples of study design and analytical tools to enhance causal inferences in natural experiments

| | Positive effect | Limitation in NES |
|---|---|---|
| | Tools to manage measured covariates as potential confounders | |
| Control population | Gives a counterfactual to support a more robust analysis | May not be available in natural experimental conditions. Likely to be unknown underlying differences between groups |
| Multiple control populations | Reduces confounding associated with just a single control group. Groups need to differ in a meaningful way such that potential confounders in 1 control group but not another can be dismissed | Challenging to identify more than 1 control group that closely matches the intervention group yet differ from each other |
| Matching, eg, through propensity scores | Creates a subpopulation with similar characteristics to those exposed to the intervention | Matching can only be ascribed using measured covariates |
| Regression analysis | Adjusts for observed differences between control and intervention groups | Cannot account for confounding caused by unobserved covariates |
| | Tools to manage unmeasured covariates as potential confounders | |
| Repetition of experiment in multiple settings | Increases sample size, reduces unmeasured biases if factors associated with exposure to intervention differed between settings | May not be available, potentially costly |
| Mixed method design | Supports triangulation of qualitative and quantitative data | More costly and time consuming, nested qualitative study likely to need ethical approval |
| Difference in differences analysis | Follows the same unit through time and therefore is invulnerable to unobserved differences | Only applicable to data measured at 2 (or more) time intervals in the same unit or individual. Relies on underlying assumptions, eg, parallel trends assumption. |
| Time series analysis | Accounts for underlying trends in data before and after the implementation of the intervention | Needs data from multiple time points before and after the intervention is implemented. Time intervals need to be equal. |
| Instrumental variable (IV) analysis | Uses covariate associated with exposure to the intervention but not the outcome to control for unmeasured confounders | Difficult to identify IVs in NES that do not violate fundamental assumptions for their use |

Abbreviation: NES, natural experimental studies.



Further analysis showed a significantly increased proportion of appropriate referrals within the intervention area if the novel pathway was followed compared with those where it was not.

However, in their analysis, Srivastava and colleagues do not account for background trends in the primary outcome. When outcomes are analyzed discreetly, underlying trends are unaccounted for, this can lead to misleading results. For example, the development of the intervention with community partners could have led to a change of behavior in referring primary care physicians before the novel pathway was introduced. The observed effect could have been a continuation of this behavior change after the pathway was introduced rather than an effect of the pathway itself. Figure 4A and B show 2 hypothetical time series data of time (*x*-axis) and a percentage (*y*-axis). In Figure 4A, the mean monthly percentage is 51% before the intervention versus 70% after. In Figure 4B, the means are 51% versus 74%, respectively. If just considering mean proportions before and after the intervention, we may determine that it was effective in both scenarios. However, the benefit of examining the trends in Figure 4 is clear—we can see the evidence of an intervention effect in Figure 4A and no effect in Figure 4B.

Interrupted time series (ITS) is a common analytical approach in NES (Table 2). A review in 2019 identified over 200 articles that reported using ITS in a health care setting (although only 116 met the full inclusion criteria for the review).[51] As per our example, (Figure 4) in an ITS, equally spaced data points are compared before and after the intervention (the interruption) is implemented.[52] To conduct ITS analysis, a large number (typically at least 8) of data points are needed before and after the interruption.[52] Regression modeling is used to estimate the underlying trend in the preinterruption data and consequently the expected trend if the interruption had not occurred, what is termed the "counterfactual."[53] The counterfactual is a comparator for the observed postinterruption data to examine whether the interruption had an effect significantly different from the expected trend. In doing so, the ITS design controls for any pre-existing trends in the data.

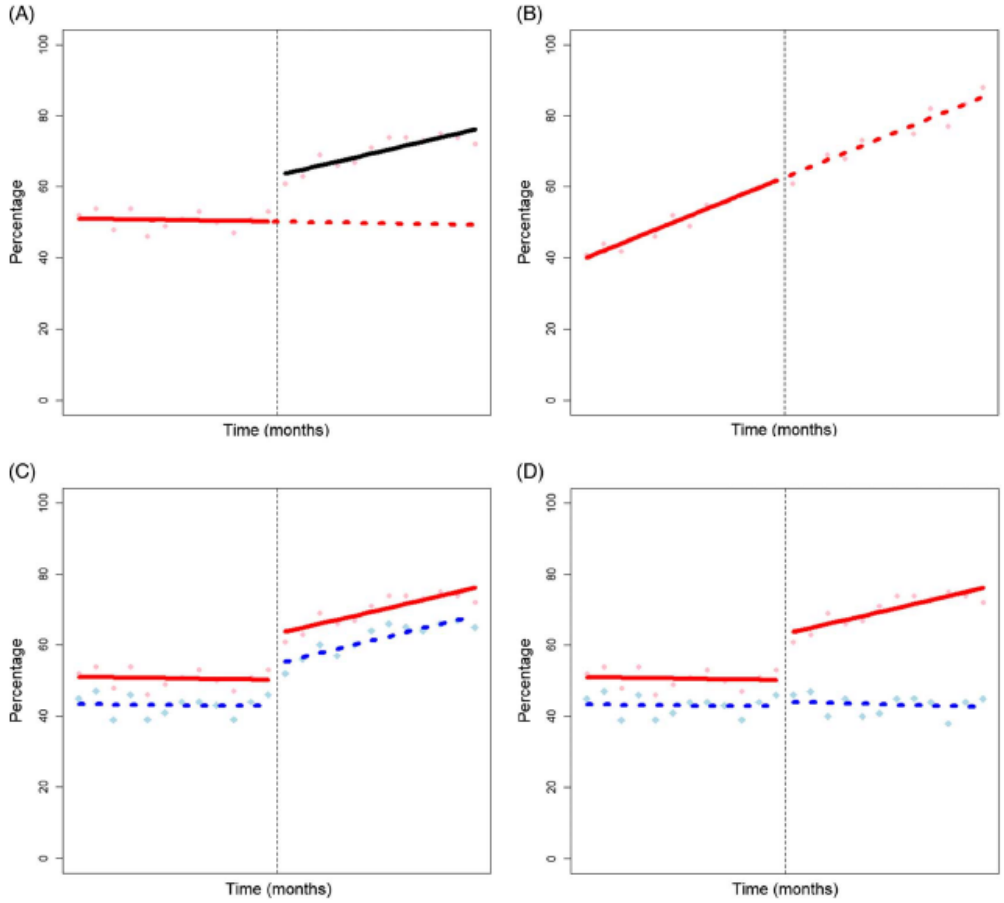




**FIGURE 4** Graphical representation of interrupted time-series analysis (A&B) and a controlled interrupted time series analysis (C&D). Vertical black dotted lines represent the interruption - i.e. the implementation of the intervention. In A&B the solid red line represents the pre-intervention trend, black solid line the post intervention trend and the red dotted line represents the counterfactual (predicted trend). In C&D the red solid line shows the pre and post intervention trend in the group exposed to the intervention and the blue dotted line represents the pre and post intervention trends in the group exposed to control conditions.

However, ITS can still give misleading results: the before and after populations may not have the same characteristics, time may have affected the primary outcome independently of the tested intervention, and hidden environmental confounders that cannot be adjusted for may have altered the observed trends.

The addition of a group that is unexposed to the intervention adds validity by controlling for hidden confounding.[54] O'Donnell et al[46] (Table 1) conducted a controlled ITS. Two control groups were used, the whole of England and a sub-group that just included those in Northern England. Figure 4C and D illustrate the benefit of a control group using hypothetical data. Figure 4C illustrates similar effects in the control and intervention time series, indicating that a confounder—common to both groups—rather than the intervention is increasing the percentages. In Figure 4D, we see an absence of change in the control time series, supporting the assertion that the observed effect is a result of the intervention.

The control group needs to be carefully chosen. One needs to be confident that the control group is exposed to the same environmental influences as the intervention group—except for the intervention itself—and be confident that the control group cannot be affected by the intervention through contamination.

In their study protocol, Hickman and colleagues describe their intention to use an adapted causal impact

synthetic control model[55] to assess the impact of changing service design on HCV. The synthetic control population is based on preintervention population characteristics and provides a counterfactual trend against which the impact of the intervention can be compared. The use of a synthetic control population has the advantage of being less subjective and should ensure it is more representative of the wider population.[30]

## Conducting and reporting NES

One of our selected studies (Table 1) presents a protocol.[44] The Medical Research Council (MRC) and others recommend the publication of a study protocol in advance of conducting NES. Otherwise, there is a risk of a blurring of intended target populations, outcomes, and analytical approaches.[9,56] Alongside the robust approaches to assess causal inference we have described, a published *a priori* protocol adds validity to the findings and has the potential to broaden the acceptability of NES as admissible evidence for causation. For reference, a detailed framework of what to include in the protocol has been recently published.[29]

In their study, O'Donnell and colleagues used a recognized reporting guideline.[46,57] The reporting guideline they used is specific to studies using an ITS design and describes 8 quality criteria. The first 4 criteria relate to the general quality of NES, and the remainder is specific to ITS. Alternatively, other authors recommend using the TREND guideline.[27] These were developed by the Centre for Disease Control in the US to improve the quality of studies testing interventions designed to tackle the HIV epidemic and were modeled on the EQUATOR guidelines for RCTs.[58] The TREND guidelines are now widely used, frequently requested by journal editors, and are specific for studies that evaluate interventions using nonrandomized designs.[59] The TREND checklist includes 5 sections; many subsections are more applicable to quasi-experiments as they assume the researcher has control over the intervention and (nonrandomized) allocation of participants.[60] The MRC gives an adapted, brief, and more specific summary of what should be reported in NES to convey validity (Table 3).

## Ethical considerations in NES

We argue that the use of NES in hepatology will help physicians adhere to the World Medical Association Declaration of Helsinki, specifically natural experiments will serve to enhance equity of access for disadvantaged and marginalized populations to health research and provide a means to test unproven interventions that have been implemented into practice.[61] Other aspects of the declaration are also important when planning and conducting a natural experiment. Although the intervention is largely or totally outside of the researcher's control, the physician-researcher still has obligations to prevent harm occurring to participants. This is more complex than in an RCT or quasi-experiment. Consider Jugnarain et al[45] in Table 1. What if the peer-support program had been unexpectedly associated with reduced engagement with HCV treatment or the researchers observed unanticipated negative effects—so-called adventitious harms? The research team would have been ethically obliged to meet with commissioners, publish and publicize their findings and encourage consideration about the suspension of the service. However, the ability of a researcher to act to prevent harm in NES is usually limited. The analysis of a NES is typically conducted well after the intervention has been implemented (as in all of the examples we cite above)—therefore, the findings of the study cannot alter exposures that have already taken place.[31]

**TABLE 3** Key information to report in natural experimental studies (NES)

| Study component | Key information |
|---|---|
| Design | Describe the study design *a priori* in published protocol and in full study abstract and methods<br>Describe how the design meets the definition for NES<br>Report study using recognized reporting guidelines |
| Eligible and included population | Include a precise and detailed definition of the eligible population or service areas *a priori* in the published protocol and as part of the main manuscript<br>Report the characteristics of included population and compare to control population (if using)<br>Describe any selection biases in exposure to intervention<br>Justify choice of control population<br>Describe and justify the choice of measured covariates |
| Intervention | Define the intervention being tested<br>Describe the level of researcher control over the intervention<br>Describe the implementation landscape of the intervention<br>Consider spillover effects between the intervention and control groups |
| Outcome and analysis | Define primary outcome and analysis plan *a priori* in published protocol and report clearly in study methods<br>Describe and justify the use of design and analytic tools to maximize causal inferences<br>Describe how residual confounding may bias the outcome |

Research participants should always give informed consent[61] for data collection and, in the case of RCTs and quasi-experiments, allocation/randomization to an intervention or control group. In NES, the intervention is outside of the researchers control so there is not a need to collect informed consent for this; however, ethical approval is still required for the collection and use of data about the participants unless it is aggregated, anonymized, and in public domain.[31]

## The future of NES in hepatology

In this review, we have described 2 pathways that lead to health policy action. One relies on the conventional hierarchy of evidence before the implementation of an intervention. The second relies on *post hoc* analysis. We have highlighted 3 examples of hepatology clinical practice that have followed this second pathway, including HCC surveillance program, baby-boomer screening for HCV, and a community program to identify compensated liver cirrhosis and advanced fibrosis. Importantly, these programs are being implemented alongside electronic health records and accessible "big data."[62] A reliance on conventional observational research designs to use this data and evaluate these programs has limitations. NES go some way to addressing these limitations, and we hope this article will provoke thought and debate about how they could be applied. Consider baby-boomer screening for HCV, which was recommended in 2012. Can NES address some of the concerns raised by Koretz et al[24] about the effectiveness of the program? If the implementation of screening was asymmetrical (eg, between the US states), did naturally occurring exposed and unexposed populations take shape that is sufficiently similar and large enough to observe relative liver transplantation rates or death in the years that followed?

To address the upstream determinants of liver-related morbidity and mortality, the field of hepatology is moving toward a focus on large-scale public health interventions. Relatively cheap and safe interventions are being deployed in community settings. We argue NES are needed to test the effectiveness of these interventions, and the hepatology community needs to familiarize itself with their design, strengths, and limitations.

## CONFLICTS OF INTEREST

The authors have no conflicts to report.

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# 4 British Association for the Study of the Liver conference abstract



## Abstracts

### 05 A PRIMARY CARE LIVER PATHWAY REDUCES REFERRALS TO HEPATOLOGY OUTPATIENT CLINICS – A CONTROLLED INTERRUPTED TIME SERIES ANALYSIS

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**Introduction** Primary care liver pathways are internationally recommended to enhance earlier detection and management of liver disease and also reduce unnecessary referrals to secondary care.[1 2] Liver pathways represent complex interventions and natural experiment studies (NES) such as interrupted time series (ITS) studies can offer a robust methodology for their evaluation.[3]

Our primary care liver pathway was introduced in January 2018. The pathway provides primary care practitioners (PCP) guidance on investigation of abnormal liver function tests and fatty liver on imaging, as well as two stage community fibrosis testing for suspected alcohol-related and non-alcoholic fatty liver disease using ELF testing followed by transient elastography.

We aimed to evaluate the effect of the pathway on new PCP referrals to hepatology outpatients at our hospital using a controlled interrupted time series (CITS) study design, one of the strongest natural experiment designs.[4]

**Methods** We used routinely collected data of referrals to hepatology outpatients from 1st April 2016 to 31st October 2019. We utilised a quasi-Poisson segmented regression model5 to estimate the change in trend and level of monthly PCP refer-rals to hepatology from the local clinical commissioning group (CCG) where the pathway was implemented ('P-CCG') using a neighbouring local CCG where the pathway was not implemented as a control ('C-CCG').

**Results** Over the 43-month period 1,722 new referrals were made from P-CCG PCPs to hepatology outpatients and 1,205 from C-CCG PCPs. Controlling for any trend and level change in C-CCG, there was a statistically significant decrease in trend of P-CCG referrals post-pathway with incidence rate ratio 0.96 (95% CI 0.93–0.98, p=0.001). This corresponds to P-CCG referrals decreasing by 1.3% per month post-pathway compared to increasing 2% per month pre-pathway (see figure 1). There was no significant level change in P-CCG and no significant level or trend change in C-CCG. Using our model, we estimate that in the absence of the pathway there would have been 581 more referrals from P-CCG PCPs.

**Discussion** We have shown that implementation of a liver pathway incorporating community fibrosis testing was associated with a decrease in monthly referrals from PCPs to hepatology outpatients. Our use of a CITS accounts for pre-existing trends and any unknown confounders affecting both referral CCGS, strengthening the causal inference of our findings that the effect was due to the pathway. ITS designs are a novel way to evaluate hepatology service interventions and should be considered for future evaluations.

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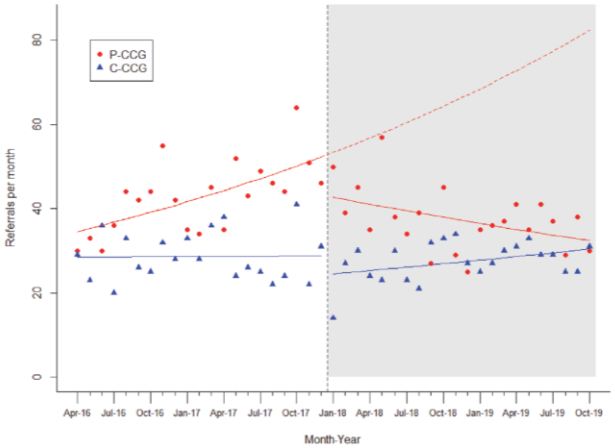


**Abstract 05 Figure 1** Controlled interrupted time series of new referrals per month from primary care practitioners from two clinical commissioning groups to hepatology outpatients. Red circles and blue triangles show observed values for P-CCG and C-CCG respectively. Vertical dashed line indicates introduction of pathway. Grey area indicates post-pathway period. Red solid line is the modelled trend in P-CCG. Blue solid line is modelled trend in C-CCG. Red dashed line is the counterfactual trend in P-CCG in absence of pathway. P-CCG, Pathway Clinical Commissioning Group; C-CCG, Control Clinical Commissioning Group

# 5 Published qualitative evidence synthesis

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**Review Article**

IJPP International Journal of Pharmacy Practice

OXFORD



## Barriers and facilitators experienced in delivering alcohol screening and brief interventions in community pharmacy: a qualitative evidence synthesis

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### Abstract

**Background:** Following increases in deaths due to alcohol during the COVID-19 pandemic, there have been renewed calls to increase resources in alcohol screening and brief intervention (SBI). Research has shown that community pharmacy could be a promising setting for SBI. This review aimed to investigate the barriers and facilitators to SBI delivery in community pharmacy to inform its further development.

**Methods:** A systematic search of four databases (MEDLINE, EMBASE, CINAHL, and PsycINFO) was conducted in October 2021 to identify relevant published qualitative or mixed-method studies. Relevant qualitative data were extracted from the included studies and a framework synthesis was performed using the Capability–Opportunity–Motivation–Behaviour (COM-B) model.

**Results:** Two thousand two hundred and ten articles were screened and nine studies were included in the review (seven in the United Kingdom and two in Australia). Identified barriers and facilitators to delivering SBI corresponded to all components of the COM-B model. Facilitators included non-confrontational communication skills, aligning SBI with existing pharmacy services and pharmacist role legitimacy. Barriers included multiple demands on staff time, a lack of staff experience with screening tools, and staff concerns of causing offence. Using the Behaviour Change Wheel (BCW), we propose five elements of a pharmacy SBI to address identified barriers.

**Conclusions:** Research into SBI in community pharmacy is limited in comparison to other healthcare settings and this review provides an understanding of the barriers and facilitators to the delivery of SBI in community pharmacy from a behavioural perspective. Through the use of COM-B and BCW, our findings could inform the development of future pharmacy-based SBI.

*Keywords:* clinical practice; community pharmacy; health promotion; alcohol; brief intervention

### Introduction

Worldwide, alcohol use represents the seventh leading risk factor for disease and is the leading risk factor in people aged 15–49 years [1]. The World Health Organization (WHO) estimates that 5.3% of all deaths globally are a result of harmful alcohol use, contrasting with other causes such as diabetes (2.8%), road injuries (2.5%), and hypertension (1.6%) [2]. The socioeconomic impacts can be highlighted by data from England showing more working years of life are lost due to alcohol than from the 10 most common cancers combined [3].

The number of people drinking alcohol is increasing globally and this trend is projected to continue [4]. The COVID-19 pandemic has had a further impact with increases in deaths due to alcohol seen in both the United States of America and England [5, 6]. In England, a sustained increase in high-risk drinking post-pandemic has been shown and the Institute for Alcohol Research has highlighted the need to increase resources for primary and secondary prevention such as alcohol screening and brief interventions (SBI) [7].

SBI are an internationally recognized and advocated method of reducing alcohol consumption [8]. A unifying definition provided by the WHO is 'those practices that aim to identify a real or potential alcohol problem and motivate an individual to do something about it' [9]. The widely cited evidence supporting the effectiveness of SBI in primary care populations is a systematic review and meta-analysis [10]. The analysis found that when compared to minimal or no intervention, SBIs can reduce alcohol consumption in hazardous and harmful drinkers. None of the included studies were

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set in community pharmacy and hence there is uncertainty around the applicability to community pharmacy settings.

Community pharmacy continues to expand its roles into improving the health of the public [11, 12], but there is limited evidence regarding the effectiveness of SBI in this setting. A landmark randomized- control trial (RCT) testing SBI in community pharmacy did not show an effect on alcohol use disorder identification test (AUDIT) score. However, there was a reduction in AUDIT-C score in both the intervention and control groups, indicating a decrease in alcohol consumption [13]. This mirrors the results of a large primary care SBI RCT in the UK and may be explained by the process of just undergoing an alcohol assessment having an impact on a person's drinking behaviour [14].

Pharmacy-delivered SBI has shown a sustained impact on alcohol intake. Khan *et al.* [15] followed up on hazardous drinkers 3 months after a pharmacy-delivered SBI and found a statistically significant decrease in the number of drinking days reported and a reduction in the number of alcohol units consumed. Hattingh *et al.* [16] followed up a small number of participants after a pharmacy-delivered alcohol SBI and observed three of the five participants with hazardous or harmful alcohol use had reduced their level of drinking at follow-up.

It is recognized that implementation of SBI into routine healthcare practice has been limited [17]. Systematic reviews have been conducted to understand the barriers and facilitators to implementing SBI in primary healthcare settings, which can subsequently inform design, delivery, and commissioning [18–21]. However, SBI in the pharmacy setting was not examined.

Pharmacy-based SBIs show potential to impact alcohol consumption and recommendations from Public Health England support their practice [22] with commissioned SBI services currently being delivered in around 5% of pharmacies in England [23]. With a global trend in increasing alcohol use, potentially worsened by the pandemic, increasing SBI delivery in pharmacies could help combat the negative consequences of this.

Given the uncertainties around the practice, the aim of this study is to understand barriers and facilitators experienced in delivering alcohol SBI in community pharmacy to inform future development and delivery as well as policy.

## Methods

In order to achieve our aim, we performed a qualitative evidence synthesis informed by behaviour change theory. Qualitative evidence synthesis is a recognized method to gain a greater understanding of individuals' experiences of interventions and factors influencing intervention delivery [24]. This review is reported according to the enhancing transparency in reporting the synthesis of qualitative research (ENTREQ) guidance [25]. The protocol was pre-registered on PROSPERO (CRD42021284130).

### Data sources, search strategy, and selection criteria

The electronic databases MEDLINE (via Ovid), EMBASE (via Ovid), CINAHL (via EBSCOhost), and PsycINFO (via EBSCOhost) were searched using a search strategy developed with the input of an experienced research librarian to identify all relevant studies (see Supplementary material S1). These databases were selected as per recommendation in the Centre for Reviews and Dissemination guidance for undertaking reviews in healthcare [26]. Reference lists of included studies were manually searched for relevant studies. Searches were conducted in October 2021 and were limited to publication from January 2003 onwards. This date was chosen to obtain contemporary findings as 2003 marks the publication of 'A Vision for Pharmacy in the New NHS' by the Department of Health in England [27]. There were no language exclusions imposed.

The articles eligible for this review were qualitative or mixed-method primary research studies published in peer-reviewed journals. Grey literature including conference abstracts, commentaries, book chapters, PhD theses, and reports was excluded. The selection criteria summarized using the setting, perspectives, intervention, comparison, evaluation (SPICE) framework [28] are presented in Table 1.

**Table 1.** Study inclusion and exclusion criteria according to SPICE framework.

| | Inclusion | Exclusion |
|---|---|---|
| Setting | Alcohol SBI conducted in community pharmacy in any country | Alcohol SBI not conducted in community pharmacy |
| Perspectives | Any of:<br>Community pharmacy staff<br>Community pharmacy customers<br>Pharmacy policymakers<br>Pharmacy commissioners | |
| Intervention | Any alcohol SBI delivered by community pharmacy staff to community pharmacy customers.<br>We define alcohol screening as an assessment of an individual's alcohol consumption (with or without using a screening tool) that identifies their level of risk of alcohol-related problems. We define a brief intervention as per the WHO definition of 'practices that aim to identify a real or potential alcohol problem and motivate an individual to do something about it' [9]. At minimum this is feedback of risk from screening. | Studies where an intervention has not been delivered |
| Comparison | N/A | |
| Evaluation | Phenomena of interest are perspectives, attitudes and experiences of participants regarding the feasibility, acceptability and barriers and facilitators to alcohol SBI delivered in community pharmacy | Studies where data were only analysed quantitively |

SBI, screening and brief intervention; SPICE, setting; perspectives, intervention, comparison, evaluation.

### Data screening and extraction

Results of searches were transferred first into Endnote (version 20.2), de-duplicated, and then imported into Rayyan [29]. Initial title screening was performed by one reviewer (A.S.). Two reviewers (A.S., H.S.) independently screened abstracts, and disagreement at the abstract level resulted in the study being included at the full-text review stage. The two reviewers (A.S., H.S.) then independently screened the full-text articles. Any disagreements were resolved through discussion and where disagreement was not met, a final decision was made by a third reviewer (K.I.).

Study characteristics were extracted by one reviewer (A.S.) into a Microsoft Word (Microsoft 365 version 2301) data extraction template that was created for the review. Information extracted included: study title, authors, year of publication, country, study design, study aim, qualitative data collection and analysis method(s), number of participants in qualitative work, type of participant(s), details of alcohol screening, and brief intervention.

Two reviewers (A.S., Q.T.) independently extracted relevant data from the results and discussion sections of the included studies. Data related to experiences of SBI delivery were extracted regardless of whether the terms barrier or facilitator were used. This included first-order constructs (quotations from participants) and second-order constructs (interpretation of authors). The extracted data were compared between the two reviewers and any differences in extraction were discussed and agreed. The data were then imported into NVivo (release 1.6.1) for analysis.

### Quality appraisal

The quality of each study was appraised independently by two reviewers (A.S., K.I.) using the critical appraisal skills program (CASP) checklist for qualitative research [30]. Each question in the checklist was assigned one point if answered 'yes' so that each study had a score out of 10. Disagreements were resolved by discussion and the quality of each study was recorded. The methodological quality assessment did not influence the inclusion of the studies.

### Data analysis

We utilized a framework synthesis for our review, which involves familiarization with the literature, identification of a thematic framework, selecting articles and extracting the data from the articles ('indexing') using the framework to categorize, code and synthesize the data into charts ('charting') and finally mapping and interpretation of the identified themes in reference to the research question [31]. This approach was selected as it generates outputs that are more relevant to policy makers, practitioners, and designers of interventions [32], as is the target audience of our review.

Two reviewers (A.S., K.I.) initially independently inductively open-coded extracted data from two studies. Initial open coding was chosen to allow analysis to be grounded in the data and to avoid forcing data into pre-defined themes/codes at this stage. Coding was discussed and agreed to form a coding manual. The coding manual was then applied to the other studies by AS with regular meetings with KI to discuss any generated codes. If analysis of a study produced a new code then the coding manual was updated and previously analysed studies were re-analysed and re-coded if indicated.

Descriptive sub-themes were inductively derived from the open codes, led by A.S. with regular discussion with K.I. During this process concepts mirroring the COM-B model were evident in the data. The COM-B model describes three interacting factors required for a behaviour to occur, namely 'Capability', 'Opportunity', and 'Motivation' [33]. The included studies described influences on individuals' behaviour of delivering (or engaging with) alcohol SBI and, therefore, the COM-B components were considered by A.S. and K.I. to be a naturally good fit for the data.

A simple framework consisting of each of the COM-B components (see supplementary material S2) was then used to map sub-themes and form three themes. All sub-themes could be mapped to one of the COM-B components with no sub-themes being mapped to more than one. Themes were then charted to create summaries of the evidence and examined to describe barriers and facilitators identified within themes. Links within and between themes were examined through the lens of the COM-B model. This synthesis process was led by the primary researcher AS with regular discussion on theme development with senior qualitative researcher KI.

We subsequently utilized the Behaviour Change Wheel (BCW) to identify potential intervention functions that could address the barriers to delivery. The BCW maps intervention functions that address one or more target components of the COM-B model (see supplementary material S2) and further links these intervention functions to policy categories that may enable them [33]. We identified BCW intervention functions of facilitators to incorporate into proposed elements of community pharmacy SBI that would appropriately target the identified barriers [33]. A.S. performed BCW intervention function mapping which was regularly discussed and revised with K.I. to gain agreement on the proposed elements.

## RESULTS

### Included articles

A total of nine articles were included in this review. The PRISMA flow diagram of the study screening process is shown in Figure 1.

Details of the included studies are shown in Table 2. Studies were conducted in either the UK ($n$ = 7) or Australia ($n$ = 2). Five of the studies were qualitative and four of the studies were mixed methods with qualitative components. The qualitative methods were interviews ($n$ = 7) or focus groups [2] with two studies also conducting observation. SBI was delivered as a research activity (i.e. requiring participant consent) in three of the studies, as a formal pharmacy service in four studies either as part of a pilot ($n$ = 3) or already commissioned service ($n$ = 1), or as part of routine care in two studies. The total number of participants in all of the studies was 133: 78 pharmacy customers, 51 pharmacists, and 4 pharmacy support staff. Observation was conducted in 10 pharmacies across 2 studies for a combined total of 181 h. The results of the quality assessment using the CASP qualitative appraisal tool are available in supplementary material S2. The scores ranged from 3 to 9 with the majority of the studies scoring 6 or more.

### Synthesis findings

We report our synthesis findings using the identified sub-themes within each of our three themes that correspond to a component of the COM-B model. This structure and supporting quotes are shown in Table 3.

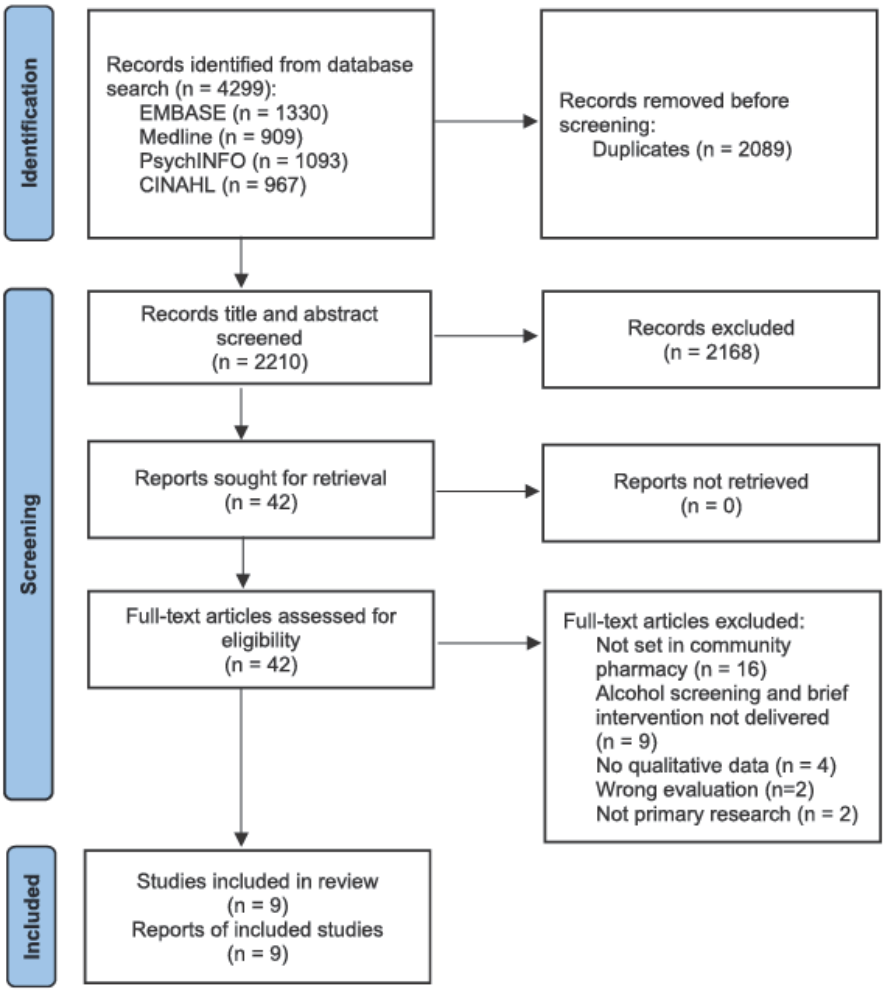


**Figure 1.** PRISMA flow diagram illustrating the study selection process.

### Awareness, training, and communication skills

This theme covers attributes held by staff and customers that could influence delivery of SBI, reflecting the 'Capability' component of COM-B and in which four sub-themes were identified.

#### *Non-confrontational, empathetic communication skills*

Pharmacy staff demonstrated the importance of non-confrontational, empathetic communication skills with customers when engaging them with SBI. This staff skill was seen as important by staff and customers when raising the topic of alcohol [16, 34–40] with some customers' further engagement with SBI and perceptions of acceptability being contingent on it [34–37, 40, 41]. Staff empathy and non-judgmental approach were also reported to potentially promote customer honesty in an alcohol assessment [35].

Not all staff demonstrated these communication skills, finding engaging customers difficult as a result [34, 36] but the benefit of training in communication skills was recognized by pharmacists in one study [34].

#### *Alcohol-related knowledge*

In addition to being empathetic, pharmacy staff alcohol-related knowledge also influenced how alcohol SBI was delivered. Pharmacists' knowledge of medications [16, 34, 36] and conditions affected by alcohol use such as blood pressure [16] enabled some to personalize the intervention given to customers who were drinking at risk.

However, pharmacists in one study examining provision of 'alcohol-related health information and advice' to older customers reported a lack of knowledge and skill beyond giving advice about medications in the context of their alcohol

**Table 2.** Details of included studies.

| Study, year and country | Study design | Study aim(s) | Qualitative data collection and analysis method(s) | Number and type of participant(s) in qualitative component | Details of SBI | Staff involved in SBI delivery | Details of customer eligibility for SBI | Did staff have training? |
|---|---|---|---|---|---|---|---|---|
| Brown et al. 2014, UK | Mixed methods | Evaluate the acceptability of alcohol screening and brief interventions to women accessing emergency hormonal oral contraception in community pharmacies | Interviews; thematic analysis using a framework approach | Pharmacists ($n$ = 14) | Service pilot of AUDIT and brief advice (not described further) to women presenting for emergency contraception.<br>If AUDIT score >19 then no brief advice but referred on to appropriate services. | Pharmacists only | Women presenting for emergency contraception | Yes[a] |
| Dare et al. 2017, Australia | Qualitative | Explore the barriers and enablers influencing Western Australian community pharmacists' knowledge, confidence, willingness and practice in engaging older clients in alcohol-related health discussions | Focus groups; thematic analysis | Pharmacists ($n$ = 14) | 'Alcohol related health information and advice' as part of existing care. No further detail. | Pharmacists only | Customers aged >60 years | Not specified |
| Fitzgerald et al. 2008, UK | Mixed methods | Evaluate the feasibility and acceptability of the provision of brief interventions on alcohol in community pharmacies | Interviews; framework analysis approach | Pharmacists ($n$ = 6); Pharmacy customers ($n$ = 19) | Following consent for study customers completed FAST questionnaire with pharmacist and given a brief intervention[b] if score >2. | Pharmacists only (medicine counter assistants could offer study involvement) | Customers enquiring about the study or asking for certain products or services[c] | Yes[d] |
| Hall et al. 2019, UK | Qualitative | Identify the key contextual influences on perceived appropriateness and feasibility of delivering IBA in alternative community settings by non-specialist staff | Interviews; thematic analysis | Pharmacists ($n$ = 6); Pharmacy technician ($n$ = 1); counter staff ($n$ = 2); health champion/smoking cessation advisor ($n$ = 1; supervisor($n$ = 1) | Service pilot of AUDIT-C self-completion scratch-card and information leaflet tailored to each risk category identified from AUDIT-C (category thresholds not reported). Staff engaged increasing risk customers in a targeted brief conversation about alcohol consumption[e].<br>Participants in the "high risk" category advised to contact their GP or local alcohol support services. | Pharmacists and non-pharmacist staff | All adult customers | Yes[f] |

**Table 2.** Continued

| Study, year and country | Study design | Study aim(s) | Qualitative data collection and analysis method(s) | Number and type of participant(s) in qualitative component | Details of SBI | Staff involved in SBI delivery | Details of customer eligibility for SBI | Did staff have training? |
|---|---|---|---|---|---|---|---|---|
| Hattingh et al. 2016, Australia | Mixed methods | To evaluate an SBI intervention in community pharmacies through assessing (i) the feasibility of recruiting and training pharmacists in SBI techniques, (ii) the acceptability of SBI for alcohol use among consumers in pharmacies, (iii) process outcomes for pharmacists delivering SBI and (iv) retention' of consumers at three months | Interviews; analysis using general inductive approach | Pharmacists ($n$ = 10) | Customers provided study information then consented to AUDIT questionnaire with pharmacist followed by brief intervention[a] if AUDIT score ≥8 and provided alcohol booklet.<br>If AUDIT >20 also advised to see doctor or specialist. | Pharmacists only | Customers requesting certain prescription or non-prescription medications[b] | Yes[a] |
| Jamie et al. 2019, UK | Qualitative | 1. Explore patients' experiences of alcohol-related discussions within MURs<br>2. Understand the particular experiences of patients from socio-economically deprived areas vis-à-vis pharmacy-based alcohol-related discussions. | Focus groups; thematic analysis | Pharmacy customers ($n$ = 9) | 'Alcohol-related discussions' within a medication use review as part of existing care. No further detail. | Pharmacists only | Customers undergoing MUR | Not specified |
| Krska and Mackridge 2014, UK | Mixed methods | 1. Explore the views of community pharmacy staff, the general public and other stakeholders towards pharmacy- based alcohol screening and advisory services<br>2. Involve all relevant stakeholders in designing acceptable and feasible pharmacy-based alcohol screening and advisory services<br>3. Evaluate a pilot pharmacy-based alcohol screening and advisory service from multiple perspectives | Interviews and direct observation of pharmacy environment; thematic analysis | Pharmacy customers ($n$ = 10) & pharmacies ($n$ = 5) | Service pilot of AUDIT-C pre-screen followed 'as appropriate' by referral to pharmacist for completion of AUDIT and discussion in private area.<br>Direct referral to local alcohol treatment service could be offered | Pharmacy support staff did AUDIT-C<br>Pharmacists did full AUDIT and discussion | All customers | Yes[a] |
| Mackridge et al. 2015, UK | Mixed methods | To develop and apply a model for in-depth scrutiny of community pharmacy-based screening and intervention services with feedback to service providers to support development of best practice | Ethnographic observation, interviews, and interactive feedback with pharmacy staff; constant comparison technique | Pharmacies ($n$ = 5) & SBI consultations ($n$ = 9); pharmacy customers ($n$ = 16) | Commissioned service. Customers pre-screened using AUDIT-C and if scored >5 then offered an in-depth consultation framed around a full AUDIT assessment. | Any member of staff could do AUDIT-C<br>Pharmacist or other trained member of staff did AUDIT and consultation | Not specified | Yes[a] |

**Table 2.** *Continued*

| Study, year and country | Study design | Study aim(s) | Qualitative data collection and analysis method(s) | Number and type of participant(s) in qualitative component | Details of SBI | Staff involved in SBI delivery | Details of customer eligibility for SBI | Did staff have training? |
|---|---|---|---|---|---|---|---|---|
| Quirk et al. 2016, UK | Qualitative | Use qualitative data from a process study nested within a community pharmacist brief intervention trial to study research participation effects | Interviews; framework analysis | Pharmacy customers ($n = 24$) | Customers given study information and asked 'how often do you have three or more drinks on a single occasion?'—if monthly or more then offered AUDIT by pharmacist in consultation room.<br>If AUDIT score 8–19 then consented to study and randomized to leaflet or brief intervention.[i]<br>If AUDIT score >19 then given written materials and letter with AUDIT result and advise to see GP. Pharmacist also offered to fax letter and book appointment with GP. | Pharmacists and pharmacy support staff asked single question.<br>Pharmacists did AUDIT and brief intervention. | Customers exhibiting one or more specified behaviours[k] | Yes[l] |

SBI, screening and brief intervention; AUDIT(-C), alcohol use disorder identification test(-consumption); FAST, fast alcohol use screening test; GP, general practitioner.

[a]Details of training given not provided.

[b]Included: feedback on screening and risks to health; explanation of sensible drinking and units in clients' preferred drink(s), discussion of pros and cons of current drinking pattern and link with presenting issue, discussion of options for cutting down, recommendation to seek further advice, written information.

[c]Emergency hormonal contraception; advice or products to address sleep difficulties or fatigue/lethargy/a feeling of being 'run-down', smoking cessation/reduction.

[d]Pharmacists received 2-day training course covering problem alcohol use in Scotland, attitudes to alcohol use, drinking guidelines, screening tools, motivational interviewing and brief intervention, how and where to refer clients and the study protocol. Medicine counter assistants had a day of training to enable them to correctly identify possible clients for study participation.

[e]This involved three questions: how does your score make you feel?; what other benefits might you get from drinking a little less?; how do you think you could drink a little less?

[f]Staff involved received a self-explanatory IBA kit developed specifically to be self-explanatory and require minimal training or explanation for non-expert staff.

[g]Conversation using motivational interviewing technique to facilitate behaviour change.

[h]Non-prescription medications relevant to alcohol use such as 'hang-over cures', reflux/heartburn medications and sleep aids; prescriptions for certain chronic conditions that require diet modification (e.g. peptic ulcer disease, diabetes); prescriptions for medications contra-indicated with alcohol; prescriptions for medications with increased falls risk due to increased drowsiness (e.g. certain anti-psychotics, hypnotics and opioid analgesics).

[i]Pharmacy staff received 2-h training event facilitated by local alcohol treatment service covering alcohol-related illness, units, local alcohol services and referral mechanisms, and the use of standard screening tools to categorize drinking and appropriate action to take. How to identify and approach potential service users was discussed, but this training did not cover delivery of behavioural interventions. Also provided with details of free electronic training.

[j]A 10-min discussion based on structured intervention protocol plus written information.

[k]Viewing study posters and flyers; making a general health query or seeking advice linked to alcohol use; purchasing over the counter products for smoking cessation aids, gastrointestinal remedies, sleep aids and central nervous system depressants; receiving any of the following pharmacy services: smoking cessation, medication use review, health check or emergency hormonal contraception; presenting medication prescriptions for cardiovascular disease, depression or anxiety, diabetes or gastric problems (taken from *Dhital et al.*).

[l]Pharmacists received 7 h training on trial procedures and intervention delivery, involving communication skills training influenced by the perspective of motivational interviewing. Pharmacy support staff attended a brief training session on how to identify potentially suitable participants for the trial.

**Table 3.** Themes according to COM-B component and supporting quotes organized by sub-theme.

| Theme (COM-B component) | Sub-theme | Supporting quotes |
|---|---|---|
| Awareness, training and communication skills (Capability) | Non-confrontational, empathetic communication skills | '"It's not 'do you drink alcohol?' It's 'I'm just letting you know', and then 'well, oh yes I have a drink every night', and then we'll be like 'oh well I'll choose a different product for you', or 'don't take this at the same time', or something, so that you can keep the conversation going a bit. .. .But that does need some training, because that's hardly a question, it's more giving information so it doesn't seem like a confronting interrogation."' (pharmacist, first order, Dare *et al.* [34])<br>'"it's more, amenable to talk here, about it because I - I can be honest and don't feel, that people are going to be judgmental"'(customer, first order, Jaime et al. [35]) |
| | Alcohol-related knowledge | '"... some people that were on high risk obviously and moderate risk we spoke to them if they had any blood pressure problems or, you know you usually have the medication next to you because you have dispensed something and have a little bit of a discussion how reducing alcohol intake can reduce blood pressure"'. (pharmacist, first order, Hattingh et al. [16])<br>'"information's out there on interventions and that sort of thing but there's not really a... [guide] on how to do it"' (pharmacist, first order, Dare et al. [34]). |
| | Using alcohol screening tools | 'All pharmacists agreed that working through the AUDIT scores with the consumers provided an opportunity to talk about alcohol use' (second order, Hattingh *et al.* [16])<br>'"The more you don't do it, the more and more you kind of, the knowledge kind of just slips away a little bit."' (pharmacist, first order, Brown *et al.* [36]) |
| | Customers' awareness of their own risk | 'many of them [customers] were not aware of the amount they were drinking and how that translated into units' (second order, Brown *et al.* [36])<br>'"I would say it would be worthwhile to other people but I didn't really find it worthwhile. I don't feel I've got a problem with alcohol."' (customer, first order, Fitzgerald *et al.* [37]) |
| Physical and social opportunities for SBI (Opportunity) | Time and competing demands | 'Researcher field notes identified inconsistent availability of trained staff owing to other work activities or shift patterns' (second order, Mackridge *et al.* [38])<br>'"The potential issue with that [lack of time] is people might be ready to have that conversation right now and they might [not have that]... desire to have that in... a weeks' time or they may not feel comfortable having that discussion with someone else, so that's a potential issue."' (pharmacist, first order, Dare *et al.* [34]) |
| | Existing pharmacy services | '"When alcohol use comes up it is invariably associated with prescription medication – "it is 'will it be ok to drink while I'm taking this?' There is never any other time where I would feel comfortable bringing it up."' (pharmacist, first order, Dare *et al.* [34])<br>'"I just always bring it up anyway in when we are doing the smoking [cessation] and I think they're a bit more honest ... but when you're outside in the shop we just sort of, I think they get a bit more embarrassed about it."' (counter assistant/smoking cessation advisor, first order, Hall *et al.* [39]) |
| | Privacy and private spaces | '"... maintaining that level of privacy while you're discussing very personal questions, that was probably a big challenge"' (pharmacist, first order, Hattingh *et al.* [16])<br>'"There were no customers in so it wasn't too bad but if it had have been busy I wouldn't have done it. Just like err may be a private screened area just like you know like a photo booth style curtain or something just at the end of the counter – nothing more than that – I'm not talking about a private room or anything"' (customer, first order, Krska and Mackridge [40]) |
| | Existing relationships | '"I think probably most of them [the clients who took part] know myself and the staff so I think they were comfortable with us discussing it."' (pharmacist, first order, Fitzgerald *et al.* [37])<br>'in some cases the pharmacists made a judgement about whether or not to approach the topic with them, based on their knowledge about whether they had a regular partner and whether they were a potential candidate for an alcohol IBA' (second order, Brown *et al.* [36]) |
| | Promotional and written materials | '"if the adverts and the promotional material are there sort of for people to see that can sort of lead for them to come in to speak to us rather than having to approach people about it"' (pharmacist, first order, Hall *et al.* [39])<br>'"The leaflet made me think about things.....and in this case thinking about my drinking meant I drank slightly less"' (customer, first order, Quirk *et al.* [41]) |
| | Corporate restrictions | 'Key barriers to service provision raised by staff were [...] constraints on commissioned service (e.g. maximum numbers of service episodes or restrictive targeting)' (second order, Mackridge *et al.* [38])<br>'The pharmacists who participated in the alcohol SBI provided positive feedback and highlighted that flexibility in approaching and working with consumers worked well' (second order, Hattingh *et al.* [16]) |

**Table 3.** Continued

| Theme (COM-B component) | Sub-theme | Supporting quotes |
|---|---|---|
| Balancing beliefs of worth with concerns of taboo (Motivation) | Belief in ability to help | '"I think doing the alcohol study and the screening process it sort of, it makes the invisible visible. It brings that out … It allows the person to evaluate their own condition more objectively. … It will definitely allow them to think about what they're doing and their whole lifestyle so it may have an implication on their health, eating habits as well because often alcohol is associated with going out"' (pharmacist, first order, Hattingh *et al.* [16])<br>'"Not everyone was really wanting to cut down even though they knew they were drinking more than was recommended. But I mean everyone I think learned something from it."' (pharmacist, first order, Fitzgerald *et al.* [37]) |
| | Alcohol as taboo | '"There are certain patients where you can smell the alcohol on them and they are regulars and you know they do have an issue, and bringing it up is sometimes a little bit difficult and uncomfortable, so generally we don't like to"' (pharmacist, first order, Dare *et al.* [34])<br>'service users did not report concerns regarding discussing alcohol in the pharmacy' (second order, Mackridge et al. [38]) |
| | Staff role legitimacy | '"We do enjoy doing all the service and different promotional activity that we do here"' (pharmacist, first order, Brown *et al.* [36])<br>'"I definitely found everybody quite honest and open and I think people especially with all this publicity about pharmacies people do sort of see you as a health professional."' (pharmacist, first order, Fitzgerald *et al.* [37]) |
| | Impact on staff | '"… it made the pharmacists to be more aware and to be more proactive as well when they approach customers"' (pharmacist, first order, Hattingh *et al.* [16]) |
| | Remuneration | 'Without clear financial incentives, screening and brief intervention cannot be expected to be undertaken during busy times' (second order, Hattingh *et al.* [16])<br>'"It wouldn't make any difference to me how much we got paid. I would do the service if I felt it was the right thing to do)"' (pharmacist, first order, Brown *et al.* [36]) |

use. In this study by Dare *et al.* [34] staff did not receive formal training in SBI and this may partly explain this perceived lack of capability. Staff were reported to have had prior training relating to SBI in seven of the nine included studies (see Table 2). However, there was limited detail of what the training involved and its impacts on staff and customer behaviour.

*Using alcohol screening tools*

Three studies elicited staff experiences of using alcohol screening tools, all of which involved the AUDIT [16, 36, 38]. Pharmacists in one study found the AUDIT easy to use and that the tool facilitated discussion about alcohol use [16]. Conversely in another study [36] some pharmacists reported feeling unfamiliar with the AUDIT, consequently reducing motivation to undertake SBI. A reason for the different views of the AUDIT between the two studies may be a consequence of differences in opportunities to gain experience in its use. In Hattingh *et al.* [16] the AUDIT could be completed with any adult customer whereas in Brown *et al.* [36] it was only done within an emergency hormonal contraception (EHC) service. Authors in the latter noted pharmacists with a low demand for the service did not gain experience with AUDIT use thus ability to use the tool was not acquired or even lost.

In a third study, researchers observed staff using the AUDIT and noted some were uncomfortable asking the AUDIT questions and changed question wording as a result, reflecting a significant influence of motivation on staff ability to use the AUDIT [38]. The limited detail about the training provided to staff in these three studies meant it was not possible to examine if the varying staff perceptions of the AUDIT were related to differences in training.

*Customer awareness of their own risk*

When considering the capability aspects of customers, it was evident that many customers engaging with SBI were unaware if they are drinking at risk or not [16, 35–38]. This was a result of a lack of knowledge of recommended low-risk drinking levels [37, 38], an unawareness of amount consumed [16, 36, 37], or a lack of knowledge of how to calculate the amount consumed to compare to recommended levels [36, 38]. This lack of customers' awareness of their own risk may be less relevant to those drinking at the highest risk, with some pharmacists [16] and customers [41] reporting that those at the highest risk were mostly aware of their problem but were less motivated to engage in SBI.

When considering those customers who engage with SBI, there is an evident group of 'deniers'—those who undergo alcohol assessment and are identified as drinking at risk but do not perceive themselves to have a problem. Consequently 'deniers' may not see a brief intervention as relevant or of benefit to them [34, 37, 38]. Why some customers saw benefit from SBI and others did not in part reflected their underlying knowledge and understanding of risk from alcohol with some 'deniers' seeing a 'problem' only equating to alcohol dependence, a view that could also be acquired through comparison with others [37, 41].

### Physical and social opportunities for SBI

Our second theme concerns the 'Opportunity' component of the COM-B model and covers aspects of the community pharmacy setting and features of the SBI that can influence delivery. Six sub-themes were identified within this theme.

*Time and competing demands*

Undertaking SBI in the context of time and competing demands in pharmacy was a challenge experienced by pharmacists and non-pharmacist staff across the majority of the studies [16, 34, 36–40]. This was exacerbated when a pharmacy was busy [16, 36, 39], no dedicated staff time for SBI [39], and when only certain staff could undertake SBI as engaging customers were reported to be dependent on availability of these staff [36, 38–40].

Competing demands on staff time were reported to potentially lead to fewer customers being engaged by staff [34, 37, 39]. Timing of SBI can be crucial and staff should be able to engage customers at the right time. Competing demands and lack of time were reported by some to reduce staff ability to grasp opportunities when customers may be ready and willing to engage [34]. Additionally, for some pharmacists who experienced significant time pressures from their existing work demands, undertaking SBI was perceived to add to this pressure, consequently reducing motivation for it [36].

With regard to customers' time, observation in one study noted how customers declined alcohol assessment for the reason 'don't have the time', although did not elicit whether this was a genuine reason for not engaging or merely an excuse [38].

*Existing pharmacy services*

Although existing pharmacy services are a demand on both staff and customer time, these services presented an opportunity for SBI. For example, dispensing medication was reported as a good opportunity to ask about alcohol use whilst customers were waiting [16, 39]. It also created opportunity through targeting customers whose medication requests may suggest alcohol misuse, for example, heartburn [16], and through discussions about potential interactions between medication (or condition being treated) and alcohol [34–36]. Discussions of alcohol interactions may be initiated by staff or customers with the latter circumventing staff motivational barriers to asking customers about their alcohol use [34].

Formal medication reviews (medication use reviews in UK practice and home medicine reviews in Australian practice) [34–36, 39], smoking cessation [37–39] and health assessments [34] were also successfully used by some staff to engage customers with SBI. Staff were more confident asking about alcohol within these services, perceiving it as a more routine part of such services and less likely to make clients feel targeted [34, 36, 39].

Despite staff perceptions of opportunity for SBI being provided by these services, two studies conducting in-pharmacy observation highlighted such opportunities were not always taken [38, 40]. No reasons for this were reported in the studies.

A possible exception to the opportunity from existing pharmacy services was indicated in Brown *et al*. where SBI was exclusively offered within an EHCservice [36]. Restricting SBI to customers using a single service meant SBI was dependent on uptake of that service, with low uptake a reality for some pharmacists and consequently fewer opportunities for SBI [36]. Some of the pharmacists also saw alcohol as a particularly sensitive topic for this customer group.

When considering services outside of pharmacy, SBI can involve offer of onward referral of those drinking at risk to other services. Two studies made a brief reference to this, indicating the presence of clear pathways to refer to other services seems to be a facilitator [39] and their absence a barrier to SBI delivery [16].

*Privacy and private spaces*

Privacy and private spaces in pharmacies were also important factors for consideration. Having sufficient privacy when undergoing SBI was important to customers [37, 38, 40], and some staff and customers regarded its absence to prevent customers engaging with and being honest in SBI [39, 40]. Some staff found attaining privacy in the pharmacy setting difficult, especially when the pharmacy was busy [16, 34, 39] but the use of consultation rooms or private areas was perceived by both staff [16, 39] and customers [38, 40] to facilitate the required level of privacy.

However, it was noted in one study that staff use of private areas for SBI was mostly only when it was performed in conjunction with an existing service that used such areas [39]. As discussed earlier, using existing services to ask customers about alcohol was perceived to prevent customers from feeling 'targeted' about their alcohol use. This same concern may in part explain this limited use of consultation rooms solely for SBI as some pharmacists in one study felt use of consultation rooms could also make customers feel 'singled out' [34]. However, customers in the included studies did not express this view and were supportive of using consultation rooms or private areas to attain privacy [37, 38, 40].

*Existing relationships*

For some staff, knowing their customers was as an opportunity for SBI through approaching customers they suspected may be drinking [16, 39]. The presence of an existing relationship could also encourage customer engagement and honesty with SBI. This was perceived by some pharmacists to be a consequence of these customers feeling more comfortable with staff and was reflected in customer views [34, 37, 38].

Existing relationships between staff and regular customers receiving SBI also provided an opportunity for staff to ascertain changes in drinking behaviour when these customers re-attended the pharmacy [16, 39]. However, the opportunities for SBI provided through existing relationships could become saturated once most regular customers had been engaged. This was of most significance in pharmacies with a high proportion of regular customers [38, 39].

Additionally, existing relationships could limit opportunity if pharmacists perceive an 'over-familiarity' with customers through knowing them very well or knowing them outside of the work environment [34, 36, 39]. This could increase staff perceptions of difficulty and feelings of embarrassment in engaging these customers [36, 39] and through staff believing some customers do not 'need' an alcohol assessment [36].

*Promotional and written materials*

Promotional materials such as displays, posters and leaflets prompted some customers to 'make the first approach' about alcohol use [36, 37, 39, 40]. Staff also used promotional materials to broach SBI with customers, including the use of local or national alcohol awareness campaigns [34, 39]. However, for many staff the opportunity that promotional

materials provided for customers to bring up their alcohol use was particularly valued [36, 37, 39].

In addition to promotional materials, staff were provided with written materials to give customers in four of the studies [16, 36, 39, 41]. Staff reported that these materials should be easily accessible and printed format seems to be favoured [34, 41]. Providing written materials to customers as part of SBI was perceived by some pharmacists to enhance delivery through increasing customer knowledge relating to their alcohol use and risk and consequently motivation to reduce their drinking [16, 36, 41]. Written information may also serve as a reference for customers after SBI and could benefit customers such as the 'deniers' who do not perceive a verbal intervention as relevant to them [41].

*Corporate restrictions*

Limitations on displaying promotional materials were an instance of corporate restrictions potentially reducing the opportunity for SBI, as seen in two studies [36, 40]. Restrictions on who could be engaged with SBI were similarly seen to reduce opportunities as did restricting the number of interventions staff could undertake per week/month [36, 38].

This contrasts with pharmacists from other studies where such restrictions were not imposed and as such pharmacists used a variety of existing services and approaches, perceiving this flexibility to be beneficial for engaging customers [16, 39].

### Balancing beliefs of worth with concerns of taboo

The 'Motivation' component of the COM-B model is reflected in this third theme. Five sub-themes within this theme cover the influences of staff and customers' thought processes on the delivery of SBI.

*Belief in ability to help*

Motivation for many pharmacists to deliver SBI surrounded their belief in ability to help customers [16, 34, 36, 37]. Many pharmacists perceived they could help through providing customers knowledge and enabling them to understand their risk from alcohol [16, 36, 37].

The desired effect of SBI for people who are drinking at risk is a reduction in their alcohol consumption. Some staff saw positive impacts of SBI on drinking behaviour through being able to follow-up with existing customers [16, 39], increasing their motivation to undertake SBI with other customers. For other pharmacists there was uncertainty about changing customers' drinking behaviour, perceiving that some customers will and others won't [37, 39]. However, staff still delivered SBI despite this view as they perceived customers gain knowledge from it and the process could enhance staff-customer relationships [16, 36–38].

Customer experiences were in keeping with perceptions of pharmacists, showing an acquisition of knowledge and risk awareness for many [38, 40, 41] but also mixed motivation to reduce alcohol consumption.

*Alcohol as taboo*

A barrier to staff motivation to deliver SBI was individual perceptions of the alcohol topic. Some staff perceived alcohol as a taboo topic and had a lack of confidence in asking customers about their alcohol use, driven by feeling uncomfortable or embarrassed [34, 36, 38]. Such feelings could be exacerbated if staff perceived customers to have an alcohol problem and could lead to reduced motivation to engage customers [34, 37].

For staff who engaged customers, feelings of discomfort could also impact their use of alcohol screening tools, as shown by observation of some pharmacists changing the wording of AUDIT questions in one study [38]. For other staff who saw alcohol as a sensitive topic, motivation to engage was impacted by concerns of offending customers and the possible negative consequences of this including loss of custom [36], damaging existing relationships [16], and aggressive reactions [34, 37].

Conversely, to these staff concerns, customer participants did not describe feeling offended nor embarrassed when being asked about alcohol [35, 36, 38].

*Staff role legitimacy*

Despite the concerns about the alcohol topic expressed by some, pharmacists across five of the studies regarded SBI to be an appropriate activity to undertake as a community pharmacist [16, 34, 36, 38, 39]. Further perceptions of role legitimacy for pharmacists were through the view that SBI was in keeping with the expanding roles of pharmacists into health promotion services, providing motivation through meeting contractual requirements as well as enjoyment of such roles [16, 36, 39].

Customer views largely reflected those of pharmacists, perceiving SBI by pharmacists to be appropriate [16, 35, 36, 38, 40] apart from one study describing a minority of customers seeing general practice to be more appropriate but provided no further detail to gain a deeper understanding of this finding [38].

Four of the studies described non-pharmacist staff being involved in SBI delivery (see Table 2) but the role legitimacy for non-pharmacist staff was not clear from these studies. An apparent exception to this were UK staff in healthy living champion roles, which were seen to be appropriate for delivering SBI and perceived to enhance delivery [38, 39].

When considering customer motivations to engage with SBI relating to staff role legitimacy, pharmacists believed many customers view them as health professionals and see pharmacy as part of healthcare [16, 37, 39]. This was perceived to encourage customers to engage with SBI through creating an atmosphere of trust [34, 37, 39]. Conversely, it was perceived by a pharmacist in one study that being seen as a health professional could reduce customer honesty about alcohol use [39] but none of the studies gave customer's views or experiences regarding honesty to understand the truth of this perception.

*Impact on staff*

Negative SBI experiences with customers were acknowledged by some pharmacists in one study to impact motivation to undertake it in the future [34]. However, it was evident across the studies that staff gaining experience in SBI delivery increased their confidence to ask customers about alcohol. These gains in confidence consequently increased staff motivation to proactively engage customers both in SBI [16, 39] as well as pharmacy services in general [38]. Pharmacists in two studies also saw that delivering SBI could positively impact staff-customer relationships through showing an interest in their customers' health [16, 36].

*Remuneration*

The final aspect of motivation relates to remuneration for delivery of SBI, for which perceptions from three studies were mixed [16, 34, 36]. None of the studies reported an amount of remuneration. For some pharmacists, remuneration could have a motivating role to overcome challenges relating to time and competing demands [16, 34]. However, remuneration does not appear to be a driving factor for some pharmacists who reported that the ability to help customers was far more important [36].

## Application of behaviour change wheel

A summary of the barriers and facilitators that were described above under the different themes mapped against the COM-B model is provided in Table 4.

The application of the BCW resulted in five potential elements of community pharmacy SBI that address the identified barriers. First, a formal training program for all customer-facing staff. This should focus on communication skills, use of screening tools and educating about customers' willingness for SBI in addition to conducting brief interventions. The second element is aligning SBI with multiple other pharmacy services including dispensing medication, medication reviews, smoking cessation and health assessments. As is common practice with many of these services, our third element is delivering SBI in private areas of the pharmacy or consultation rooms. The fourth element is the use of displays, adverts, posters and leaflets within the pharmacy promoting pharmacy SBI and highlighting alcohol health risks. Additionally, easily accessible written information about alcohol use and its effects on health should be available to give to customers. The final element is offering to follow-up customers, including the option of referral to other services using accessible, clearly defined pathways. Further detail of these elements, the purpose of the intervention functions operationalized, and the barriers being addressed is provided in Table 5.

## Discussion

To our knowledge, this is the first qualitative evidence synthesis examining barriers and facilitators to SBI in community pharmacy. We used the COM-B model to describe influences on SBI delivery and understand how these influences facilitate or impede this delivery from a behavioural perspective. Facilitators include: (i) non-confrontational, empathetic communication by staff; (ii) aligning SBI with multiple other pharmacy services; (iii) role legitimacy of pharmacists along with staff belief in their ability to help. Notable barriers include: (i) lack of staff knowledge and experience of screening tools; (ii) multiple other demands on staff time; (iii) staff concerns of causing offense or feeling uncomfortable. The greatest proportion of both barriers and facilitators identified were within the 'Opportunity' component of the COM-B model but we regard each component as equally important, reflecting the

**Table 4.** Summary of barriers and facilitators to SBI delivery organized by theme reflecting each COM-B component.

| Theme (COM-B component) | Facilitators | Barriers |
|---|---|---|
| Awareness, training and communication skills (Capability) | + Staff non-confrontational, empathetic communication skills<br>+ Training in communication skills<br>+ Staff knowledge of conditions and medications affected by alcohol use<br>+ Having and gaining experience in using screening tools<br>+ Many customers unaware of own risk | - Staff with limited non-confrontational communication skills<br>- Lack of training and knowledge in delivering SBI<br>- Staff lack of experience with alcohol screening tools<br>- 'Deniers' - customers drinking at risk but don't see this as a problem |
| Physical and social opportunities for SBI (Opportunity) | + Aligning SBI with medication dispensing<br>+ Aligning SBI with medication reviews, smoking cessation and health assessments<br>+ Clear pathways to refer to other services<br>+ Private areas and/or consultation rooms<br>+ Staff knowing existing customers that SBI could benefit<br>+ Existing customers' familiarity with staff<br>+ Regular returning customers<br>+ Posters and displays promoting SBI<br>+ Local/national alcohol awareness promotions<br>+ Easily accessible written materials to provide customers | - Multiple other demands on staff time<br>- Pharmacy busy with customers<br>- No dedicated staff time for SBI<br>- Insufficient staff able and available to undertake SBI<br>- Delivering SBI only within a single pharmacy service<br>- Lack of referral pathways to other services<br>- Lack of privacy due to presence of other customers<br>- A high proportion of customers being regulars<br>- Over-familiar staff-customer relationships<br>- Restrictions on number of permitted SBI per week/month<br>- Restrictions on which customers can be targeted<br>- Restrictions on using promotional materials |
| Balancing beliefs of benefits and appropriateness with concerns of taboo (Motivation) | + Staff believing they can help customers<br>+ Staff seeing positive changes in customers drinking behaviour<br>+ Most customers not embarrassed or offended to be asked about alcohol use<br>+ Pharmacist and healthy living champion role legitimacy to deliver SBI<br>+ SBI in keeping with expanding roles in community pharmacy<br>+ Pharmacists seen as trusted health professionals<br>+ Staff confidence in engaging customers<br>+ Remuneration for delivery of SBI | - Staff seeing alcohol as a taboo subject to raise<br>- Staff feeling uncomfortable or embarrassed talking about alcohol<br>- Staff concerns or experience of offending customers<br>- Uncertainty on intervention effect on customer drinking<br>- Some customers see GP surgeries as more appropriate for SBI |

COM-B, Capability Opportunity Motivation—Behaviour; SBI, alcohol screening and brief intervention; GP, general practitioner.

**Table 5.** Proposed elements of community pharmacy SBI, the BCW intervention functions used and the barriers being targeted.

| Proposed element of community pharmacy SBI | BCW intervention function(s) used and purpose | Barriers targeted (component of COM-B model) |
|---|---|---|
| Training programme for all customer-facing staff. Training provided should include communication skills, use of alcohol screening tools and brief intervention delivery. | *Training*<br>Provide staff beneficial communication skills and ability in using alcohol screening tools and performing brief intervention with customers. Training all staff who can be involved in SBI delivery in a given pharmacy to maximize staff availability. | Staff with limited non-confrontational communication skills (C)<br>Lack of training and knowledge in delivering SBI (C)<br>Staff lack of experience with screening tools (C)<br>Insufficient staff able and available to undertake SBI (O)<br>Staff feeling uncomfortable or embarrassed talking about alcohol (M) |
| | *Education*<br>Educate staff that most customers are not embarrassed or offended to be asked about alcohol. Educate about screening tools, the effectiveness of brief interventions and that the majority customer lack of awareness of their risk and hence engaging a broad range of customers | Lack of training and knowledge in delivering SBI (C)<br>Staff seeing alcohol as a taboo subject to raise (M)<br>Staff concerns or experience of offending customers (M) |
| Aligning SBI with multiple other pharmacy services such as dispensing medication, medication reviews, smoking cessation and health assessments | *Environmental restructuring*<br>Undertaking SBI when delivering other services to reduce the additional time demand for SBI and facilitate staff using private areas/consultation rooms. The use of multiple services provides multiple different cues for staff to undertake SBI and multiple contexts acceptable to staff to engage customers in SBI. | Multiple demands on staff time (O)<br>No dedicated staff time for SBI (O)<br>Lack of privacy due to other customers (O)<br>Staff feeling uncomfortable or embarrassed talking about alcohol (M) |
| | *Enablement*<br>Align with multiple services, as opposed to a single service, to enable staff to conduct SBI more frequently and thereby increase experience. Align with medication services and health services to enable staff to apply their existing alcohol-related knowledge used within these services to SBI. | Aligning SBI with a single pharmacy service (O)<br>Staff lack of experience with alcohol screening tools (C)<br>Restrictions on which customers can be targeted (O) |
| Delivering SBI in private areas or consultation room | *Environmental restructuring*<br>To enable the attainment of the level of privacy desired by both customers and staff | Pharmacy busy with customers (O)<br>Lack of privacy due to other customers (O) |
| Using displays, adverts, posters and leaflets promoting pharmacy-delivered SBI and having easily accessible written information about alcohol and effects on health to provide customers | *Environmental restructuring*<br>Materials displayed serve as a cue for staff to engage customers with SBI. Having easily accessible materials to provide customers minimizes staff time spent sourcing such materials. | Multiple other demands on staff time (O)<br>Staff feeling uncomfortable or embarrassed talking about alcohol (M)<br>Restrictions on using promotional materials (O) |
| | *Education*<br>Promotional materials used to educate customers aware that SBI is being provided as part of community pharmacy care.<br>Providing written information to increase customers knowledge and understanding of their risk(s) from alcohol. | Some customers see GP surgeries as more appropriate for SBI (M)<br>'Deniers'—customers drinking at risk but don't see this as a problem (C) |
| | *Persuasion*<br>Promotional materials used to stimulate customers to raise their alcohol use with pharmacy staff | Staff seeing alcohol as a taboo subject to raise (M) |
| Offering to follow-up customers after SBI and/or referral to other services using accessible, defined pathways | *Enablement*<br>Follow up enables staff to see positive effects of SBI delivery, enhancing confidence and motivation for conducting with other customers. Accessible, defined referral pathways can enable staff to offer customers further help that may be beyond their capabilities. | Lack of referral pathways to other services (O)<br>Uncertainty on intervention effect on customer drinking (M) |

SBI, alcohol screening and brief intervention; BCW, Behaviour Change Wheel, GP, general practitioner, (C), Capability, (O), Opportunity, (M), Motivation.

model's described interaction of components to produce behaviour [33]. For example, the use of dispensing services in pharmacy (Opportunity) can facilitate delivery of SBI as it provides time (Opportunity) but also utilizes staff knowledge of medications related to alcohol use (Capability) and reduces staff feelings of discomfort (Motivation). Through application of the BCW, we describe five proposed elements of community pharmacy SBI that address the barriers identified in our synthesis.

Our findings are given in acknowledgement of the limitations of the studies included in our review. A strength of our study was the use of a comprehensive search strategy to include all contemporary published evidence; however, identified studies were conducted in the UK and Australia only, and as such application of our findings to other countries may not be appropriate. We highlight that only one of the studies sought the perspectives of non-pharmacist staff [39]. As such there may be unidentified barriers and facilitators specific to non-pharmacist staff and we suggest that future research should include examining the experiences of customer-facing non-pharmacist staff in SBI delivery.

We used a broad definition of SBI in our inclusion criteria. This meant there was heterogeneity in SBI delivered across the small number of studies included. Additionally, there was limited or no detail on intervention content and as a result, our findings are not specific to one SBI approach. However, we see this primarily as a strength as we believe this enables our findings to be applied more broadly.

It is well known that socioeconomic factors impact alcohol behaviours [2] but these factors may not be captured by the COM-B model as it focuses on the behaviour of individuals [33]. However, the included studies did not report findings

concerning these factors so we believe COM-B was appropriate to our data but recommend further research should also examine the influence of socioeconomic factors on pharmacy SBI. The use of COM-B and BCW enabled identifying intervention functions that could address some of the barriers to delivering SBI in community pharmacy. However, more research is needed to discuss and refine these strategies through a co-design approach and the involvement of relevant stakeholders before testing the intervention elements in community pharmacies.

We are aware of four systematic reviews exploring barriers and facilitators to implementing SBI in healthcare settings for primary care populations but none of these included studies of SBI in community pharmacy [18–21]. A number of barriers reported in these reviews were also identified in our study, suggesting they are not setting-specific. These included a lack of training, time and existing workload, and staff concerns relating to causing offence or embarrassment. Barriers relating to staff time for SBI amidst existing workloads are well recognized in the delivery of other pharmacy services [42, 43]. Barriers in delivering public health services in community pharmacy relating to a lack of staff knowledge, skills and training are also well recognized [12, 42, 43].

Similarly, the facilitators of training, belief in benefit of SBI and staff role legitimacy have also been reported in other settings [18–21]. The key facilitator of aligning SBI with other services was only described in one review of SBI in primary care populations. In this example aligning SBI with well-being clinics or registration sessions was a reported facilitator [21]. However, the role of privacy and private spaces and the importance of non-confrontational, empathetic communication skills have not been reported in the primary care setting [18–21]. Non-confrontational, empathetic communication is recommended by the WHO to effectively deliver alcohol brief interventions [9] and non-judgemental attitudes and communication skills enhance customer use of pharmacy services [44]. With regard to privacy and private areas, the lack of this finding in the primary care setting likely reflects most professional practice here being conducted in private rooms as a norm. However, public and pharmacy customers' perception of a lack of privacy is a well-recognized barrier to use of extended pharmacy services and public health roles [44, 45]. Importantly, our review found sufficient privacy for customers was attainable through the use of private areas and consultation rooms in keeping with research into privacy in the pharmacy setting [46].

Our proposed elements identified through the application of the BCW are considered in relation to SBI implementation research in the primary care setting given the absence of such research in the pharmacy setting.

We describe multiple different elements to be used, in keeping with evidence indicating utilizing multiple strategies is beneficial in increasing SBI implementation in primary care [47]. We first propose a formal training program for all customer-facing staff. Training for staff increases SBI delivery in primary care [48] as does increasing the number of staff trained [49]. Additionally, the need for pharmacy staff training in SBI delivery is in keeping with a number of studies [50–52].

Our proposed element of aligning SBI with other pharmacy services is supported by a UK expert consensus concerning SBI implementation in primary care [53]. We also specify the use of multiple existing services to avoid dependency on a single service. A risk of aligning with a single service was shown in a UK study that integrated an alcohol intervention with existing community pharmacy medication review services [54]. The decommissioning of medication use reviews in the UK meant there was no longer a service for the intervention to integrate with [54].

We are not aware of any evidence to show that the use of private areas or consultation rooms increases SBI delivery (in pharmacy or other settings) but believe it could overcome barriers to privacy in the main pharmacy that prevent customer engagement with SBI. This could help SBI fit into the pharmacy context, an important process in primary care SBI implementation [55].

We suggest using promotional materials to increase customer awareness and promote discussions. Promotional materials in primary care waiting rooms are supported by expert consensus [53] and may increase the occurrence of alcohol discussions between patients and general practitioners [56]. Expert consensus also supports clear referral routes as a way to increase delivery, something recommended in WHO guidance [9, 53] and included in our proposed elements. We also highlight follow-up of customers after SBI to allow staff to see positive effects. Staff being able to see and share the positive effects of SBI is believed to improve SBI implementation in primary care [57].

## Conclusion

Our review provides an understanding of the barriers and facilitators to the delivery of SBI in community pharmacy from a behavioural perspective. Using the behavioural change wheel we propose five elements of community pharmacy-based SBI that could facilitate its delivery including training, aligning SBI with other pharmacy services, ensuring privacy, using promotional materials and customer follow-up and referral. Research into SBI in community pharmacy is limited in comparison to other healthcare settings and this review adds to this limited body of research. We propose future research into community pharmacy SBI should use the evidence generated from this review to design interventions that facilitate SBI delivery in community pharmacies and encourage developers to consider using the BCW to identify intervention functions suitable to their context.

## Supplementary Material

Supplementary data are available at *International Journal of Pharmacy Practice* online.

## Conflict of interest statement

The authors declare that there are no conflicts of interest.

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## Author contributions

Alexander Smith was the main author and researcher of the synthesis. Kinda Ibrahim was a senior qualitative methodologist

co-conducting the synthesis and contributing author. Helen Stone was co-researcher for the screening and article selection. Qian Y Tan was a co-researcher for data extraction. Alexander Smith, Kinda Ibrahim, Ryan Buchanan and Julie Parkes co-designed the study and prepared the manuscript for submission.

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## Data availability

No new data were generated or analysed in support of this research.

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# 6 Published qualitative interview study

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# Exploring a role for community pharmacists in the identification of alcohol-related liver disease: a qualitative interview study with professionals, patients, and the public

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## Abstract

**Aims: To explore the views and attitudes of professionals, patients and the public to a role for community pharmacists in the identification of alcohol-related liver disease (ArLD).**
**Methods: Semi-structured interviews were conducted with a purposive sample of patients with ArLD, members of the public, pharmacy staff, and clinicians managing patients with ArLD across the Wessex region of south England. The interviews explored experiences of alcohol, ArLD and health advice in pharmacies and elicited views of what a pharmacist role in identifying ArLD could entail and factors influencing this. Transcripts were analysed using reflexive thematic analysis.**
**Results: Twenty-six participants were interviewed and three themes were generated: (i) acknowledging, seeking help and engaging with a hidden problem; (ii) professional roles, boundaries and attributes; (iii) communication, relationships, collaboration and support. Participants reported key challenges to identifying people at-risk of ArLD. Offering testing for ArLD was perceived to motivate engagement but there were concerns about pharmacists performing this. A role was mostly seen to be finding people at-risk and engaging them with further care such as referral to liver services. This was perceived to require developing interprofessional collaborations, remuneration and training for pharmacy staff, and community-based liver testing.**
**Conclusions: Professionals, patient and public participants recognized a role for pharmacists in the identification of ArLD. This was envisaged to incorporate educating pharmacy users about ArLD risk, and identifying and directly engaging those at-risk with liver and support services through development of interprofessional collaborations. The findings of this study support and can inform future work to develop this role.**

*Keywords:* alcohol-related liver disease; identification; case-finding; community pharmacy; pharmacists; qualitative

## Introduction

Alcohol is one of the leading risk factors for population health across the world (World Health Organization 2018). An estimated 3 million deaths per year worldwide are caused by harmful alcohol use, corresponding to 5.3% of all global deaths (World Health Organization 2018). In England, over 80% of alcohol-related deaths are due to liver disease (Office for National Statistics 2022). Alcohol-related liver disease (ArLD) affects those of middle age, with over 90% of deaths occurring in those under 75 years of age (Office for National Statistics 2022). In this group the number of deaths from ArLD has risen by 61.3% since 2003 (Office for Health Improvement and Disparities 2024).

To help address this problem there have been international calls for the earlier identification of ArLD using case-finding approaches (Karlsen et al. 2022; Allison et al. 2023). A case-finding approach for ArLD relies on identifying people who are at risk of ArLD from how much they drink and engaging them with testing to assess their liver for scarring (known as liver cirrhosis) (Karlsen et al. 2022). Risk of ArLD can be assessed through establishing number of standard drinks of alcohol consumed per week and/or through use of alcohol screening tools such as the alcohol use disorder identification tool for which thresholds for testing for ArLD have been described in international guidance (Newsome et al. 2017; Thursz et al. 2018).

There is a body of research indicating community pharmacists can undertake alcohol screening and provide brief interventions (Hattingh and Tait 2018) with pharmacists' accessibility, particularly in areas of higher deprivation where alcohol-related harm is greatest, a well-recognized advantage (Todd et al. 2015). There may also be a higher prevalence of ArLD risk in people attending community pharmacy compared to the general population (Smith et al. 2021).

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Furthermore, pharmacists are able to take an active role in the identification of common chronic diseases by assessing risk and linking patients to appropriate healthcare providers (Ayorinde et al. 2013). However, there is a lack of research exploring the potential for community pharmacists to have a role in identifying ArLD in people with alcohol misuse (Smith et al. 2021).

To explore a potential role for community pharmacists in the identification of ArLD, we present a qualitative study that examines the views and attitudes of professionals, patients, and the public. Using an ethnographic approach, we aimed to gain an understanding of perceptions of such a role, what it could look like and potential barriers and facilitators to it by drawing on existing, contextualized experiences of participants.

## Method

Our study used semi-structured interviews given the potentially sensitive subject area and to provide flexibility around participants' availability and avoid hierarchical influences that may be present if using focus groups (Ritchie and Lewis 2003). Topic guides were developed by A.S., refined with R.B. and K.I. and piloted with two patient and public involvement contributors (neither were participants in the study). The guides were iteratively revised as new concepts emerged during data collection and covered a number of areas including: experiences of community pharmacies providing health services and advice; experiences of existing alcohol and liver disease care in community pharmacy and healthcare in general; views on a role for pharmacy staff identifying ArLD including what this could entail and how this could link with existing care.

Purposive sampling was used to get a range of participants anticipated to provide the most useful and relevant data to achieve the study aims (Campbell et al. 2020). Heterogeneity of participants was desired to increase transferability of findings (Robinson 2014). Participants were recruited from the Wessex region of south England.

Professional participants incorporated community pharmacy staff (pharmacists and pharmacy assistants) and clinicians involved in the identification and care of patients with ArLD. A range of years of experience was sampled given the changing landscape of both community pharmacy and liver disease management in the last 20 years. Recruitment of pharmacy staff was through a Local Pharmaceutical Committee (LPC)—the local organizations for community pharmacies in England, each representing pharmacy owners in a defined locality. A study advert was placed on the LPC website and the LPC sent participant information sheets and an invitation for participation to pharmacies in their locality. For clinician participants we recruited key informants, using gatekeepers (hepatology consultants known to the research team) to identify and offer participation to other clinicians perceived to be information rich (Palinkas et al. 2015).

Patient and public (PP) participants included patients with lived experience of ArLD as well as pharmacy-using members of the public. For PP participants a range of age, sex and level of socioeconomic deprivation were desired given these are factors influencing outcomes of ArLD (Roerecke et al. 2019; Probst et al. 2020). Patients were recruited from liver outpatient clinics of a tertiary referral hospital through invitations from their clinicians. Members of the public were recruited through posters advertising study participation displayed in five pharmacies in the LPC locality, shared on social media (Twitter), and shared with an existing liver research-interested public group. Snowball sampling was also used whereby recruited participants were provided participant information sheets to pass onto any eligible contacts they may have (Palinkas et al. 2015).

Written consent was given by participants prior to being interviewed. Ethical approval was granted by University of Southampton Faculty of Medicine Ethics Committee (reference 64,726) and South Central—Oxford B Research Ethics Committee (reference 22/SC/0222). Interviews were conducted between September 2022 and August 2023 by A.S., a male doctoral researcher and hepatology specialty registrar with training in qualitative methods. A.S. was described as a liver research fellow to participants. Interviews were conducted either by telephone, video call on Microsoft Teams (version 1.5.00), or face-to-face in a private room of a community pharmacy or clinical research facility. Field notes were written following each interview. All interviews were audio recorded and transcribed before being checked for accuracy and anonymized by A.S.

Analysis was performed using thematic analysis based on the reflexive approach described by Braun and Clarke (Braun and Clarke 2022). We aimed to achieve data saturation, defined here as the point where no new themes are developed in the analysis, recognizing that the precise number of participants required to achieve saturation prior to analysis cannot be known (Braun and Clarke 2019). Thematic analysis can produce unanticipated insights, matching the exploratory aims of this work. Additionally the results are accessible to both the general public and healthcare professionals, important as our study will inform ongoing complex intervention development work involving these groups (Braun and Clarke 2006).

A.S. performed the analysis supported by K.I., an experienced qualitative researcher. The analysis was undertaken iteratively, moving back and forth between phases. Transcripts were imported into NVivo (release 1.6.1) and coded inductively. After coding four transcripts, a list of all codes generated was reviewed and refined to create a codebook. Two of these transcripts were separately coded by K.I. with coding subsequently discussed to share perspectives and interpretations of the data. The codebook was used to code further transcripts whilst allowing for new codes to be generated and existing codes to be refined. If new codes were generated, previously coded transcripts were re-examined for these codes. Notes were made of potential clusters of codes and themes during this process and regular meetings were held between A.S. and K.I. throughout to discuss coding and development of themes.

Following theme development, coded data extracts within themes and sub-themes were examined and revised until each theme was coherent and did not appear to overlap with another. The themes presented common patterns and important information reported by participants.

## Results

A total of 26 participants were recruited and interviewed; 15 professional participants and 11 PP participants. Table 1

**Table 1.** Characteristics of interviewed participants

| Characteristic | Group | |
|---|---|---|
| | Professionals (n = 15) | Patients and public (n = 11) |
| Age years; median (range) | 48 (24–61) | 56 (43–80) |
| Sex | | |
| Female | 11 (73) | 4 (36) |
| Male | 4 (27) | 7 (64) |
| IMD Quintile | | |
| 1 | - | 2 (18) |
| 2 | - | 4 (36) |
| 3 | - | 0 (0) |
| 4 | - | 1 (9) |
| 5 | - | 4 (36) |
| Profession | | - |
| Community pharmacy staff | 8 (53) | |
| Pharmacist | 4 (27) | |
| Pharmacy assistant | 4 (27) | |
| Clinician managing ArLD | 7 (46) | |
| Consultant in gastroenterology and hepatology | 2 (13) | |
| Hepatology nurse specialist | 2 (13) | |
| Fibroscan technician | 1 (7) | |
| GP | 2 (13) | |
| Years of experience in current role; median (range) | 12 (.5–28) | - |
| Lived experience of ArLD | - | 6 (54) |
| Ethnicity | | |
| White British | - | 10 (91) |
| White Irish | - | 1 (9) |

Numbers are counts (percentage) or where stated median with range IMD index of multiple deprivation, GP general practitioner, ArLD alcohol-related liver disease

shows a summary of participant characteristics. Most interviews were done remotely using Microsoft Teams (n = 12) or telephone (n = 8). Interviews lasted between 18 and 72 min with a median length of 39 min.

Three overarching themes emerged from the analysis with each theme containing a number of sub-themes as summarized in Table 2. The analysis is described according to these themes and sub-themes with illustrative quotes from participants (labelled as participant number/participant type/age and sex) to enhance this description.

## Acknowledging, seeking help, and engaging with a hidden problem

### Stereotyping and self-awareness of drinking

Most pharmacy staff reflected on regular experience of people with overt alcohol misuse in their day-to-day work and—along with other professional and PP participants—recognized a 'park-bencher alcoholic' stereotype of a person with alcohol misuse. However most participants believed many people with alcohol misuse do not fit this stereotype. Professional and PP participants described people who are unaware of how much they drink and/or what amount constitutes misuse as well as 'self-aware drinkers' i.e. people who recognize they drink 'too much' alcohol. Despite this insight, 'self-aware drinkers' were perceived to commonly be in denial about their drinking being a problem. Participants with lived experience of ArLD and some professionals saw this driven in part by social comparisons.

*'you associated an alcoholic with being somebody on a park bench, drinking a bottle every single day. [. . . ] You think, I'm not because I'm not doing that.' (C015/Patient/59F).*

### Seeking advice and revealing hidden conditions

Many PP and clinician participants believed the asymptomatic development of ArLD perpetuated denial of alcohol as a problem. All participants regarded it universally known that drinking 'too much' can cause liver disease. Consequently 'self-aware drinkers' were believed to have some underlying concern about their liver. However, all participants with lived experience of ArLD recalled how the absence of symptoms—and a lack of awareness that ArLD may have developed despite this—allayed concerns.

Most participants perceived that people with alcohol misuse do not tend to seek advice for their drinking but some professional and PP participants believed the underlying concern about liver disease could motivate some 'self-aware drinkers' to take up an opportunity for a liver assessment, as described by a clinician who had worked at a liver charity event offering Fibroscans to the public.

> 'They'll say, "I'd like to have a scan", and when you get in the room [. . . ] "I'm aware that I drink quite a lot more than I should, [. . . ] but I haven't really done anything about it."' (C008/Clinician/52F)

### Stigma, honesty and routinely contextualizing

Professional and PP participants recognized a need for healthcare professionals (HCPs) to routinely ask about alcohol with an 'ask everyone' approach perceived by some to avoid stigmatization through implied pre-judgement of an alcohol problem. This view was complicated by the perception of some professional and PP participants that many people with alcohol misuse do not want to speak about their drinking or

**Table 2.** Summary table of themes and subthemes

| Theme and theme description | Sub-themes |
|---|---|
| *Acknowledging, seeking help and engaging with a hidden problem*<br>• This theme incorporates participants views and experiences around how alcohol-related health problems are realized and the challenges relating to this. Perceptions around engaging patients with possible alcohol-related health problems with a process of assessment, identification and ongoing care area are also examined. | *Stereotyping and self-awareness of drinking*<br>*Seeking advice and revealing hidden conditions*<br>*Stigma, honesty and routinely contextualizing*<br>*Enabling and facilitating motivated engagement* |
| *Professional roles, boundaries and attributes*<br>• This theme examines the experiences of health advice in community pharmacy in relation to alcohol-related health problems. It further explores views and perceptions of what role community pharmacy staff could play in identification of ArLD alongside other healthcare professionals and perspectives of the attributes of both pharmacy staff and the community pharmacy environment that may impact such a role. | *General health, alcohol and liver disease advice in community pharmacy*<br>*Perceived abilities of community pharmacists for a role in ArLD identification*<br>*Bypassing GPs*<br>*Benefits and challenges of the community pharmacy setting*<br>*Optimizing a service model of delivery in pharmacy* |
| *Communication, relationships, collaboration and support*<br>• This theme explores views regarding the links and communication between community pharmacy and other healthcare professionals. Further perceptions of needs in relation to this and also in relation to the wider interdisciplinary, collaborative care of patients with possible ArLD are also considered. | *Making referrals and pathways simple, clear and efficient*<br>*Two-way interprofessional communication*<br>*Establishing relationships and collaborating*<br>*Unmet support needs* |

*ArLD; alcohol-related liver disease; GP; general practitioner*

will lie about it if asked. Postulated reasons for this included the aforementioned denial, potential personal consequences of revealing alcohol misuse (including stigmatization), and the communication style of the HCP asking. Most participants held the view that honest reporting of alcohol use was most achievable if asking routinely within a perceived relevant health context.

> 'If I was in the chemist tomorrow, and they said, "Oh, we're doing this thing about alcohol, to see if you've got a liver problem. Would you be interested in answering a few questions," or whatever, then I'd say, "Yes, that's fine." [. . .] but if the chemist just asked me out of the blue, "Hello, Mr X. How are you? Oh, how many pints. . .?" I'd think, well. . .' (C020/Public/71M)

Concerns of offending and the potential taboo of alcohol conversations were recognised by many professional participants and seen as barriers to asking and advising about alcohol use for clinicians and pharmacy staff alike, with some clinicians perceiving this contributing to late diagnoses.

### Enabling and facilitating motivated engagement

Regardless of how a person may be asked, the widely held view was that people need to be motivated to engage with any alcohol-related health advice or assessment. A goal for many professional participants was to generate motivation for patients to engage with care. In a pharmacy setting, offering and advertising an ArLD role as well as providing educational information about the risk of ArLD was believed essential for this. PP and professional participants also thought conveying the asymptomatic nature of ArLD to be important to enhance engagement.

Some participants conceptualized a pharmacy based 'liver health check' service, expecting this would incorporate a physical test. It was perceived by some PP and clinician participants that engagement of 'self-aware drinkers' would be motivated by, and possibly contingent on, getting such a test.

> 'If it's just questions, there's probably little value in doing it [. . .] to have something on a piece of paper that goes, actually we've done this blood test, and it's come back, and you need to be a bit careful, or you need to go now and see a GP, or a specialist, then that's valuable.' (C019/Patient/44M)

It was also believed a 'positive' test for ArLD can motivate patients to engage with further care and reduce their alcohol consumption. However, a negative test was perceived by some clinicians and participants with lived experience of ArLD to potentially perpetuate current drinking habits, emphasizing the importance of educating about future risk.

## Professional roles, boundaries, and attributes

### General health, alcohol and liver disease advice in community pharmacy

Both PP and professional participants regarded community pharmacists as qualified HCPs able to assess and advise on minor illnesses.

> '[pharmacists] they're trained professionals. They've got qualifications and knowledge. So it's like you would listen to your GP and you would listen to an NHS nurse. I would listen to them' (C026/Public/56M)

Many pharmacy staff participants were motivated to provide health advice through being able to help pharmacy users and enjoying a role different to routine prescription-based work. Pharmacy staff experience of assessing and advising on alcohol use was mostly within advanced pharmacy services (e.g. hypertension case-finding service) or when delivering an alcohol identification and brief advice service, the latter only reported by three experienced staff (two pharmacists and one pharmacy assistant), each having worked for over 20 years' in their roles.

Assessing and advising on alcohol use was seen by most participants to be within the capabilities of pharmacists.

Views about pharmacy assistants were different; some PP participants perceived them insufficiently qualified whereas pharmacy staff participants believed that with appropriate communication skills training pharmacy assistants could engage pharmacy users in conversations about alcohol use. Despite these differing views, professional and PP participants acknowledged pharmacy assistants are typically the first (and often only) point of contact for pharmacy users and so would have to play a role.

> 'Nine times out of ten, the pharmacist is actually behind a little counter. He can't see you. He's busy doing his drugs bit and it's the girls that come and see you. They're not medically qualified. Most of them aren't, anyway.' (C015/Patient/59F)

Pharmacists (as well as many professional and PP participants) perceived that their existing work had already equipped them with the communication skills needed for potentially difficult conversations around alcohol use and ArLD. However, with the exception of one experienced pharmacist, pharmacy staff participants did not feel they currently had sufficient knowledge to appropriately assess and advise on alcohol use or ArLD but perceived this achievable with appropriate training. No participants were aware of ArLD being discussed in pharmacy. Moreover, pharmacy staff had little or no experience in discussing any liver disease.

### Perceived abilities of community pharmacists for a role in ArLD identification

There was uncertainty whether pharmacists were sufficiently qualified to assess for and discuss ArLD. For some participants with lived experience of ArLD the presumption that ArLD has significant symptoms such as jaundice meant a doctor is needed and there is no role for a pharmacist. Additionally, ideas of assessment were often tied to expectations of a physical examination, blood test or scan and that these—as also acknowledged by pharmacy staff—are not routinely done by community pharmacists. Clinician participants also recognized this and whilst some perceived pharmacists able to be trained to conduct a liver test (Fibroscan or blood test), a lack of adequate space in most pharmacies, the time to do such a test and the cost of testing were believed to make this unfeasible. As such most professional and PP participants saw the role of a pharmacist to be that of finding and engaging people appropriate for testing and then referring for it, rather than conducting testing themselves.

> 'I think, probably, [the pharmacists'] role would be more as that initial engagement, signposting on, educating, breaking down that first initial barrier of we have got people that can help you with this.' (C005/Clinician/52F)

### Bypassing GPs

Where a referral should be directed was considered by PP and clinician participants. The majority view was to bypass general practitioners (GPs) for a dedicated liver HCP, acknowledging healthcare structures may hinder this. This view was influenced by beliefs about GPs' roles and abilities, in particular that they are not the best person for specialized advice, that GPs do not want to be gatekeepers to other services, and above all that it is increasingly difficult to get a GP appointment.

> 'anything that's specific is usually outside their experience or their knowledge. Otherwise they'd have specialised in something. So they are a general practitioner, the first port-of-call, if you've got past triage of course' (C020/Public/71M)

Clinician participants expressed concern about overwhelming the already stretched capacity in primary and secondary care if a pharmacy role was not planned in consideration of this. Clinician participants considering bypassing GPs did not believe this could be direct to a hospital consultant clinic and proposed alternatives of a community liver assessment service or a nurse-led clinic.

Views of bypassing GPs were accompanied with the expectation that a person's GP still needs to be informed of any outcome—something paramount for two public participants who reported numerous chronic health conditions and saw their GP as central to their care. In contrast, both a public and clinician participant believed that for some pharmacy users the appeal of an assessment in pharmacy may be that their alcohol use is not shared with their GP.

### Benefits and challenges of the community pharmacy setting

Pharmacies were described as widely accessible both in reference to geographic proximity and access to 'walk-in' healthcare advice without an appointment. Some professional participants also perceived community pharmacies a less stigmatizing location for people with alcohol misuse compared to a hospital or GP practice. This view was in part a result of experience of working with pharmacies to treat patients with hepatitis C.

In the context of repeat prescriptions, most participants perceived pharmacy users have more contact with pharmacy staff than their GP, meaning more opportunities for engagement. Additionally, this regular, familiar contact was seen an attribute for an ArLD role through reducing likelihood of causing offence and facilitating provision of ongoing support.

Privacy was regarded by all participants to be paramount and perceived attainable in pharmacies. However, staff time and capacity were considered a potential barrier. Many professional and PP participants also perceived most pharmacy users want to minimize time spent in pharmacy. As such, time efficiency of any role in ArLD was seen particularly important, perceived achievable through integration with other pharmacy services or by offering pharmacy users to attend at a pre-designated time.

> 'everyday nowadays is short-staffed. [...] even if you don't have prescription, you've got phone calls, you've got a customer coming in, so you hardly find time for it. That's why I was suggesting like if they had pre-booked it' (C010/Assistant/32M)

### Optimizing a service model of delivery in pharmacy

Professional participants envisaged a pharmacy ArLD role would be delivered as a service. Three aspects in particular were perceived by most pharmacy staff and some clinician participants to facilitate service delivery. These were: appropriate

training for staff; strong external support; and remuneration at a level appropriate for the time required to deliver the service.

> 'a service that will pay us £30 or £20 or whatever it is for the 15 minutes as opposed to me spending 15 minutes checking prescriptions I'll only be paid £3 for, my time is obviously better well spent providing the service. Service provision and remuneration is very important' (C013/Pharmacist/50F)

Payment was also considered in relation to pharmacy users with the commonly expressed view that requiring pharmacy users to pay for a service themselves would deter engagement and one pharmacists believed it would exacerbate health inequalities.

### Communication, relationships, collaboration and support

#### Making referrals and pathways simple, clear and efficient

PP and professional participants described the potential use of secure email for referrals as part of an ArLD service and the importance of a dedicated referral form. For pharmacy staff this would provide a beneficial electronic audit trail and the ability to complete it at a time convenient to work demand.

Clinician participants also placed importance on pathways in ArLD being simple in terms of minimizing the number of patient-HCP visits required and maximizing what is delivered at each visit. This view was influenced by experiences that a proportion of patients disengage between each visit.

> 'a patient with possible liver disease [. . . ] They can have several different interactions, in which the Swiss Cheese Model might make them get lost to follow up, so it's about trying to simplify it and streamline it for the patient, and also for the clinician' (C004/Clinician/31F)

#### Two-way interprofessional communication

All professionals were unaware of any existing formalized routes of referral between pharmacies and clinical specialists. Pharmacy staff saw this reflective of the wider situation in community pharmacy, perceiving an absence of formalized communication routes to non-GP healthcare services and a reliance on signposting.

Regardless of communication route for any referral, pharmacy staff described only gaining knowledge of the outcome from pharmacy users themselves. Pharmacy staff enjoyed learning of benefits to pharmacy users of their referrals but some expressed frustration at the lack of direct feedback. They indicated that feedback could improve referral practices and, when concerned about a pharmacy user, alleviate worries about whether a pharmacy user received help.

> 'Because you never get any feedback, you just hope for the best.' (C002/Pharmacist/53M)

#### Establishing relationships and collaborating

For any collaborative working, many professional participants saw how establishing relationships between pharmacy staff and other HCPs was essential. These participants recognized difficulties in developing such relationships, with time to do so an evident barrier. Some also recognized how healthcare funding structures could inhibit collaborative relationships, as experienced in relation to flu vaccination services.

> 'a pharmacy and the GP practice really fell out over [providing flu vaccinations]. There was a notice from the GP practice saying, "You must come to us," and the pharmacy saying, "Actually, no, you don't"' (C022/Public/54M)

Pharmacy staff and clinician participants who had established pharmacy-HCP relationships recognized their benefits in creating two-way communication channels, agreeing common goals, and enabling more effective care for patients. These were described in the context of engaging patients with Hepatitis C treatment, the hypertension case-finding service, and providing opioid substitution therapy.

#### Unmet support needs

Existing interprofessional collaboration in relation to wider support for people with alcohol misuse (with or without ArLD) was perceived an unmet need by professional participants. Existing ArLD pathways were viewed as 'diagnosis-focused' and not providing the holistic support patients may require to reduce their drinking, consequently reducing pathways' effectiveness in preventing development or progression of ArLD.

> 'you're giving advice for a patient to make the changes, but there isn't enough support around [. . . ] to make those changes[. . . ] you do feel quite often with some of these pathways that you are just delaying the inevitable, rather than setting your patient up to succeed' (C005/Clinician/52F)

In reflection of this unmet support need, many PP and professional participants perceived providing access to support to be important for any pharmacy role in ArLD care. The presence of existing relationships between some pharmacies and drug and alcohol services was perceived to facilitate this.

## Discussion

We examined a role for community pharmacists in identifying ArLD and therefore went beyond existing work describing screening for alcohol misuse in community pharmacies (Dhital et al. 2015; Hattingh and Tait 2018; Smith et al. 2023) Pharmacists are seen as qualified HCPs but testing for and diagnosing ArLD was mostly believed to be beyond their scope of practice. Instead, the role of community pharmacists in a care pathway for ArLD should be limited to identifying people at-risk, providing advice and referring on. In this role there is acknowledgement that the accessibility of pharmacies is an asset and an expectation the role should form a remunerated service. There was belief that referral onwards should avoid reliance on general practice but foster a strong collaborative with liver disease and alcohol support services.

Our participants' perception that it is well known drinking 'too much' alcohol can cause liver disease corresponds to a 2017 survey of 2024 British adults in which 91% selected alcohol as something that causes or increases risk of liver disease (British Liver Trust 2017). ArLD being perceived in our study as a specific concern for some 'self-aware drinkers' contrasts with other qualitative research describing potential alcohol-related physical health impacts being considered a

relative non-issue by people with alcohol misuse (Wallhed Finn et al. 2014). We recognize our different finding may reflect the focus of our study and participant selection, meaning greater consideration was given to ArLD as a health concern. Our finding that symptoms drive liver health concern and help-seeking supports other research showing that most people with alcohol misuse seek help when health problems become symptomatic (Simpson and Tucker 2002; Naughton et al. 2012). An absence of symptoms therefore has the potential to delay diagnosis and rationalizes initiatives to identify early asymptomatic disease—including community pharmacy assessment. Case-finding approaches that focus on people at risk of ArLD will concomitantly identify those who would benefit, and should be offered, alcohol interventions and support services known to be effective in reducing alcohol use (regardless of the presence of ArLD) (Kaner et al. 2018; Thursz et al. 2018). Subsequent reduction in alcohol use would reduce an individual's risk of ArLD as well as more than 200 other alcohol-related health harms (Rehm and Shield 2019).

Participants in our study indicated that a 'test' for liver disease could increase engagement with a pharmacy ArLD service. The offer of a test for a specific condition in community pharmacy is known to boost engagement, e.g. pharmacy users undergoing a diabetic risk questionnaire and fingerprick blood glucose test had significantly higher uptake of subsequent referral to a GP than those undergoing the questionnaire alone (Krass et al. 2007). It may be that a physical test increases confidence in the result of an assessment, subsequently modifying engagement behavior (Krass et al. 2007; Saramunee et al. 2015).

The limited experience of alcohol advice being sought or provided in pharmacies in our study is expected. A 2017 study (Mackridge et al. 2017) found only 5% of pharmacies in England provided an alcohol screening and intervention service. However, our study supports other research indicating the public generally perceive community pharmacists appropriate and capable to assess and advise on alcohol use (Sheridan et al. 2012; Fitzgerald et al. 2015; Mackridge et al. 2016). Our study adds new insights in that clinicians involved in the care of patients with ArLD share this view.

Our findings indicate uncertainty about capabilities of pharmacies in diagnosis and further management of ArLD. A systematic review of PP perceptions of pharmacists described similar concerns (Hindi et al. 2018). As such, the described desire to bypass GPs expressed by participants in our study emphasizes the importance of interprofessional collaboration between pharmacists and clinicians in liver services to enable a pharmacist role in identifying ArLD. Such collaboration has been seen as a key factor in the success of community pharmacy hepatitis C screening and treatment (Radley et al. 2020; Klepser et al. 2022).

### Limitations

Our study has limitations. We recruited pharmacy staff from independent, small and large chain pharmacies but not from supermarket-based pharmacies nor any of the three largest pharmacy chains in England (NHS Business Services Authority 2024). However, we do not believe this a major limitation given the majority of pharmacies in England are small chain or independent and that these are preferred by the public (Duxbury and Fisher 2022; NHS Business Services Authority 2024). Need and expectation of appropriate remuneration for a pharmacist role in ArLD described in our study reflects wider research recognizing remuneration as a key feature for the success of a pharmacy service (Weir et al. 2019) However, many countries' health systems do not provide remuneration for such services (Hussain and Babar 2023) and as such our study's findings may not apply to such settings.

Participants were either working in healthcare or recruited via healthcare services and so findings may not reflect those who do not currently access healthcare. However, many participants had either personal experience of not accessing healthcare or working with people who don't tend to, which we believe will have increased relevance of findings to this population. Recruited pharmacy staff may have been those more interested in, and positive about, expanding pharmacy roles. The potential for such selection bias is well recognized in qualitative research but we believe we reduced this through recruiting multiple different stakeholders as well as specifically exploring perceived challenges to a pharmacist role in ArLD in the interviews (Kaae and Traulsen 2020). Lastly, participants were considering a hypothetical role for pharmacists. We encouraged participants to reflect on their own experiences to provide experience-informed views but recognize further feasibility work in which a role is delivered, rather than conceptualized, is needed to gain further understand and fully develop a pharmacist role in identifying ArLD.

## Conclusion

Relevant stakeholders recognized a potential role for community pharmacists in identifying ArLD, with the focus being on finding people at risk and engaging them with care. To be realized, a collaborative approach with liver and support services is essential, with access to community based liver testing an anticipated requirement. Coupled with the increasing drive for pharmacists to be a first port of call for illness in the community, a pharmacist role in ArLD identification could increase awareness and enable earlier diagnosis and subsequent care for ArLD and alcohol misuse in people who may not access healthcare elsewhere.

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## Author contributions

Alexander Smith (Conceptualization [lead], Data curation [lead], Formal analysis [lead], Funding acquisition [lead], Investigation [lead], Methodology [lead], Project administration [lead], Writing—original draft [lead], Writing—review & editing [lead]), Ryan Buchanan (Conceptualization [supporting], Funding acquisition [supporting], Methodology [supporting], Project administration [supporting], Supervision [supporting], Writing—review & editing [supporting]), Julie Parkes (Conceptualization [supporting], Funding acquisition [supporting], Supervision [supporting], Writing—review & editing [supporting]), Kinda Ibrahim (Conceptualization [supporting], Formal analysis [supporting], Funding acquisition [supporting], Investigation [supporting], Methodology [supporting], Supervision [supporting], Writing—review & editing [supporting]).

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## Data availability

The data underlying this article cannot be shared publicly for the privacy of individuals that participated in the study. The data will be shared on reasonable request to the corresponding author.

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