An exploratory literature review of physician associates and of extended scope paramedic practitioners, physiotherapists, and pharmacists

Work in progress

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CBMM undertook the literature review re extended scope paramedic practitioners, physiotherapists and revised CB's initial shorter draft re physician associates and pharmacists.

Introduction

We undertook a very rapid review of the literature in relation to physician associates, extended scope paramedic practitioners, extended scope physiotherapists and extended scope clinical pharmacists as well as studies that investigate more than one allied healthcare professionals engaged in some degree of task substitution for GPs. Because of limitations in time and resources, the review excludes extended scope nurse practitioners and advanced nurse practitioners. The findings are presented separately for each group with a tentative conclusion at the end. This is work in progress that we share with the PCP.

Background (Dr Catherine Matheson-Monnet)

The difficulty in making appointments with GPs and the unmet demand have been attributed to a lack of sufficient resourcing for general practice in England (*i.e.* shortage in GPs and nurses, decreased funding and increased costs) in a context of rapidly growing demand, brought about by the rising demographics, especially, but not exclusively, ageing population with long-term and complex conditions (RCGP 2015; Goodwin et al, 2011; Rosen and Parker, 2013; Deloitte, 2014; Baird et al, 2016). In both the English and Wessex contexts, workforce shortages, growing financial pressures and policy expectations along with the ever increasing demand are straining primary care to near breaking point (Matheson, 2016a; Matheson et al, 2016).

Since the current model of care is unsustainable, new care models have been designed to be in line with the findings of consecutive reviews of successful national and international integrated care systems for a more collaborative approach and greater partnership working

for better person centred care, greater efficiency, improved health and well-being outcomes (Wanless et al, 2004; Cameron and Lart, 2003; Banks, 2004; Williams and Sullivan, 2010; Ham and Curry, 2011; Clark, 2012; Rand Europe and Ernst and Young, 2012; NHS England, 2014a, 2014b; Robertson et al, 2014; Clay and Stern, 2015; NHS Confederation et al, 2016; Baker and Mawby, 2016).

Various solutions have been proposed to decrease GP workload while also increasing the accessibility of primary care: improving health and self-management (Goodwin et al, 2011); collaboration between GP practices (Naylor et al, 2013); telephone consultations (Longman, 2012; Longman et al, 2012); emails (Atherton et al, 2012) and e-consultations (Adamson and Bachman, 2010; Madan 2014; Longman and Diggines, 2014) and a number of multi-specialty or multi-disciplinary new integrated models of care (Smith et al, 2013; NHS England 2015; Snow-Miller, 2015; Roland et al, 2015; Matheson, 2016b, 2016c).

In fact, the pressures on primary care have started to drive fundamental transformations which might create a more sustainable service what had been the traditional model of a doctor in a small local GP practice treating a sick patient (Castle-Clark, 2015). Two of these trends are general practice at scale through online hubs and call centres and greater patient self-care, both of which are supported by digital technologies (reflected by an 18% increase in clinical commissioning group (CCG) funding). The third is the input of a mixed teams of other healthcare professionals [HCPs] (NHS England et al, 2016).

All GP practices need medical and nursing input but major opportunities to expand the primary care workforce through the use of other HCPs (Roland, 2015). A landmark GP workforce commission suggested that in many instances other allied healthcare professionals could successfully substitute for GPs. Among its key recommendations were calls for piloting and evaluating the potential benefits of introducing physician associates and integrating among others extended scope allied healthcare professionals in primary care to substitute for GPs: physiotherapists especially musculoskeletal practitioners, advanced paramedics, pharmacists (Roland, 2015).

HCPs started to develop extended roles well before the current primary care workforce crisis. Secondary care workforce issues and a desire for more autonomy and better career pathways going back up to two decades in the UK led to various AHCPs developing extended roles in secondary care (McPherson et al, 2006).

A Wessex based study of the views of GPs about the extent to which HCPs could replace GPs in face-to-face consultations with patients who presented with one condition found that out of a total of 212 questionnaires received from a total of 23 GP practices spanning 9 Wessex CCGs (recording 4,303 patient visits) 35% could have been seen and appropriately managed by another HCP, including extended scope physiotherapists and paramedics (approximately 7% of responses) (Matheson et al, 2016).

Some leading GP practices are making the most of a multi-disciplinary workforce. Patients might consult with a physician associate, advanced specialist nurse, extended scope pharmacist, extended scope musculoskeletal physiotherapist or extended scope paramedic rather than a GP (Langridge, 2015; Castle-Clark, 2015).

Physician Associates (Dr Catherine Matheson-Monnet with Cindy Brooks)

Physician associates are defined as dependent practitioners who work for, and with, doctors. In the UK, they are usually recruited from biosciences and undertake 2 years full time education and training programme ending with a single national examination of knowledge and skills before receiving a postgraduate diploma (though offered as a Masters option at some universities involving submission of a thesis) (Parle and Ennis, 2015). Their scope of practice depends on their competence and local contexts and is determined by their supervising doctor (work under GMC delegation clause) (GMC, 2013 cited in Parle and Ennis, 2015).

In the US, 80,000 PAs (Hodgson, 2014) work in all fields of medicine from family medicine to prisons, gynaecology to elderly care, with the greatest numbers in family medicine and then trauma service (HPRAC, 2011; AAPA, 2013). Physician associates have only recently been introduced in the UK (Parle and Ennis, 2015). Of the 250 PAs in the UK in 2015, only 25% worked in General Practice (n=63). The rest work in secondary care, in fields as diverse as paediatrics, forensic psychiatry and with 20% (n=11) in surgery (mostly trauma and orthopaedics). They perform a range of diagnostic and therapeutic skills such as same day and urgent consultations, examinations, ordering tests, test results reviews, diagnosis, prescribing, chronic disease management, supporting GPs in the management of complex caseloads counselling, prevention, education, research, and administrative services. Their autonomy varies considerably depending on setting, experience, competence, and local needs (HPRAC, 2011; Drennan et al, 2012; Drennan et al 2015; Parle and Ennis, 2015).

PAs have the potential to provide a complementary role to the medical workforce in General Practice (Drennan et al, 2015). PAs can contribute to extending GP workforce, continuity and partnership in patient care, balancing difficulties of recruitment and retaining general practitioners, reducing GP burnout and supporting GPs without taking clinicians away from other professions for e.g. nursing (Parle and Ennis, 2015).

Clinical and financial impact of introducing physician associates

A recent literature review of physician assistants for the Health Professions Regulatory Advisory Council (HPRAC, 2011) in Ontario, Canada identified 66 pieces of work (51 peer-reviewed articles, 8 systematic reviews and 6 pieces of grey literature). Most of this literature was from the USA and often grouped together PAs and Nurse Practitioners known as Mid-Level Providers [MLPs] (See Parekh and Roy, 2010; Kleinpell et al, 2011; Tsai et al, 2010; Laurent et al, 2011; Buch et al, 2008). Limitations of the reviewed studies were small sample size, lack of randomised controlled trials, limited populations of interests, shortcomings in study design (See Kleinpell, et al, 2008, Wilson, 2008, Doan et al, 2011) and

unsatisfactory description of selected study settings (See Kleinpell, et al, 2008) resulting in lack of generaliseability (See Parekh and Roy, 2010). Most of the studies reviewed showed that care from PAs and NPs was equivalent to that of physicians (no increased morbidity and mortality, complications, readmissions and malpractice claims) (HPRAC, 2011). A small number of studies reviewed found worse outcomes for PAs (and NPs) in respect of pneumonia but not for stroke or heart failure (HPRAC, 2011; Van Rhee et al, 2002).
A systematic review with no meta synthesis (49 studies of which 46 were from the USA of weak to moderate quality) found that approximately half of PAs are reported to work in primary care in the USA with good support from employers and a willingness to employ. The majority of their workload was the management of (younger) patients with acute presentations. Studies of costs provided mixed results. Acceptability to patients and potential patients was consistently found to be high (Halter et al, 2013).

Although consultations were with younger and less medically complex patient groups, processes and outcomes of PA and GP consultations for same-day appointment patients were comparable, but at a lower consultation cost (Drennan et al, 2015) while PA consultations were identified as competent and safe, but GP consultations rated as more competent (De Lusignan et al, 2016). The PAs attended younger and medically less complex patients than the GPs, which is consistent with US findings (Grzybicki et al, 2002; Morgan et al, 2012 cited in Brennan et al, 2015) and findings from the Netherlands. (Simkins et al, 2009 cited in Drennan et al, 2015). In adjusted analyses that controlled for variations in the case mix of GPs and PAs, no significant differences were found in rates of re-consultation, referral to secondary care, diagnostic tests, referrals, prescribing, ordering investigations, or undertaking procedures (Drennan et al, 2015). PAs made more detailed consultation records and a higher percentage of PA records of re-consulting patients were deemed appropriate than GP records. On average, the consultation times with PAs were longer than with GPs (15 or 20 mins instead of 10 mins) and could explain more detailed consultation records (Drennan et al, 2015).

Although shorter, the cost of a GP consultation exceeded that of a PA by some GBP £6.22 The economic analysis was limited to consultation times only, rather than total cost of treatment. Lack of data on time spent by GPs on supervising PAs and signing their prescriptions indicate that the real costs of PAs were likley to have been underestimated (Drennan et al, 2015).

To summarise, the findings of this study suggest that PA consultations in England, for same-day appointment patients, result in similar outcomes and processes for similar consultations by GPs, but at a lower consultation cost, thus having the potential to free up GP time to concentrate on more complex cases (Drennan et al, 2015). This study therefore offers information to clinicians, managers, and commissioners of primary care services in the NHS of the acceptability, effectiveness, safety and potential cost effectiveness of PAs when substituting for doctors (Drennan et al, 2015).

Impact of the introduction of physician associates on patients and GPs

Doctors supervising PAs (surveyed in 2012) were overall mostly satisfied with PAs and their clinical and communication skills and reported high levels of patient satisfaction with PA consultations (Drennan et al, 2015). Acceptability and patient satisfaction were high (Halter et al, 2013; Williams and Ritsema, 2014).

A study underlined that some doctors believed patients may not be able to distinguish PAs from doctors. This was perceived either as positive, because it reflected the competency of the PA or as negative and harmful since it reflected negatively on the PA and the medical team (Williams and Ritsema, 2014). The high levels of reported by GPs patient satisfaction with PA consultations (Drennan et al, 2015) are in line with high levels of patient satisfaction with reports in a survey of Medicare patients in the US (Hooker et al, 2005 cited in Drennan et al, 2015). General practice employees other than doctors generally perceived PAs as a positive contribution to a mixed skill team and helping to meet patient demand (Drennan et al, 2011).

Enablers and barriers

In the USA PAs and NPs are considered equivalent and often grouped together in studies, in the UK PAs are conceptualised as working as dependent practitioners trained in a medical model guided by a national curriculum who have undertaken national assessment and re-assessment (Parle and Ennis, 2015).

Overall, PAs were satisfied with their work. PAs were most satisfied with their relationships with doctors in their teams (Ritsema and Roberts, 2016). PAs were least satisfied with their ability to completely apply their training (which was perceived as being due to their likely youth in the profession, absence of prescriptive rights and a deficiency in the understanding of the PA role) (Ritsema and Roberts (2016).

The present lack of governance and regulatory framework for PAs unregulated status of the PA profession was perceived as a barrier (Drennan et al. 2011; Ritsema and Roberts 2016). Doctors who supervise PAs very much advocate statutory support for PAs which was perceived as being both beneficial to doctors and patients alike, enabling PAs to carry out a fuller range of duties, including prescribing and ordering XRays under established non-medical prescriber regulations (Woodin et al, 2005; Williams and Ritsema 2014). The present unregulated status of PAs also put doctors and PAs in legal risk. (Williams and Ritsema 2014). Issues such as legal authority to prescribe need attention if the potential for using PAs in primary care is to be fully realised in the UK (Woodin et al, 2005; Drennan et al, 2015).

In addition to confusing role expectations and limitations of the role, and despite a national curriculum and national examination for PAs, there are disparities in respect of both admission criteria and the approach and standards of training with the application of the

Competence and Curriculum Framework for the PA lacking systematisation (Williams and Ritsema, 2014).

Paramedics (Dr Catherine Matheson-Monnet)

Background

Paramedics with extended training have successfully worked in local out-of-hours service for some 20 years (Roberts, 2015; Evans, 2016), i.e. even before the recognition of the paramedic profession, which began in 2003 with the introduction of statutory registration to a professional body, the British Paramedic Association [BPA] that would establish defined standards of practice and promote graduate entry.(Ball, 2004).

A systematic analysis of key reviews and commentaries published between January 1995 and April 2004 about paramedic practice as well as informal discussions with experts and researchers in the field attempted to identify the skills, training, and professional capacity required of future paramedics. The review concluded that little high quality published evidence was available to validate many aspects of the paramedic practice (in 2004) (Ball, 2004).

The BPA recommended that in the short term, paramedics must be taught to appropriately identify and manage a far wider range of commonly occurring conditions, minor illnesses, and trauma, a number of pilot programmes were established to train paramedics. These varied considerably with respect to type and duration of training, permitted scope of practice, and even the job title (Woollard, 2006). The BPA proposed that Emergency Medical Technicians have a university Certificate, paramedics a university Diploma; paramedic practitioners an Honours Degree; and advanced paramedic practitioners a Masters Degree with consultant paramedics holding PhDs and supporting their peers in furthering professional practice (Woollard, 2006).

It was expected that advanced paramedics, capable of operating as independent practitioners and trained to a much higher level in patient assessment and decision making skills would be increasingly required in the future (Ball, 2004). They were likely to be based within a primary care setting and would need to be able to accurately recognise a wide range of both adult and paediatric conditions and of carrying out diagnosis and management of patients with minor illnesses and injuries who typically present via 999 calls (Woollard, 2006), that is, rapid on-scene assessments, instigate treatments in line with evidence based guidelines, and fast-track patients in a stable condition to the nearest, most appropriate, destination (Ball, 2004).

The ‘Paramedic Practitioner’ extended role developed against a background of increasing usage of emergency ambulance services and changes in primary care service provision. Extending the role of paramedic practitioners was on the basis that they could reduce the number of patients inappropriately transported to hospital by approximately half, thus

meeting an NHS aim of treating the right patients in the right place at the right time as well as handle the critical care and the management of the chronically ill in the community (Woollard, 2006).

Since the role was introduced in 2003, the NHS has seen a great expansion in the number of emergency care practitioners (ECPs) working in prehospital, primary and acute care settings (Hill et al, 2014). Although work in progress in respect of the piloting of the paramedic practitioner role in a wide range of settings appeared promising, it generated relatively little in the way of academic publications (See Callaham, 1997 Kwan et al, 2002; Mason et al, 2003).

Clinical and financial impact of introducing extended scope paramedics

The emergency care practitioner (ECP) is a generic practitioner who combines extended nursing and paramedic skills. The "new" role emerged out of changing workforce initiatives intended to improve staff career opportunities in the National Health Service and ensure that patients' health needs are assessed appropriately (Mason et al, 2006).

A study was undertaken to describe the development of ECP Schemes in 17 sites, identify criteria contributing to a successful operational framework, analyse routinely collected data and provide a preliminary estimate of costs (Mason et al, 2006). Most ECPs (77.4%) had trained as paramedics. Skills and competencies had been extended through educational programmes, training, and assessment. Routine data indicated that 54% of patient contacts with the ECP service did not require a referral to another health professional or use of emergency transport. On the limited data available, the mean cost per ECP patient contact was £24, instead of £55 for an ED contact. Indications are that ECPs could be having a significant impact on the emergency services workload (Mason et al, 2006).

Demographic changes, increased demands for health services and consequent health system economic pressures have led to the development of a disparate set of new health care roles for paramedic professionals (Cooper and Grant, 2008). Increasing demand on the UK emergency services with only 10% of emergency calls seen to be life-threatening provide the opportunity for paramedics to use their skills to reduce the demand on Emergency Departments (Evans et al, 2012). The worsening of the primary care crisis in the last two years and the need to rethink primary care has now renewed the interest in the role of paramedic professionals within primary care (Deloitte, 2014; Clay and Stern, 2015; Roland, 2015).

Using an expanded Cochrane Collaboration method because of an anticipated lack of randomized controlled trials and lack of heterogeneity of designs with papers excluded because they included neither qualitative nor quantitative data or because methodological flaws compromised data quality (and it was not possible to evaluate any pooled effects as patient health outcomes were rarely considered), a systematic review (n=21) was undertaken of potential benefit from extended roles and extended skills for allied health

professionals including paramedics and physiotherapists (McPherson et al, 2006). The systematic review concluded that a range of extended practice roles for allied health professionals were being undertaken, but health outcomes of patients had rarely been evaluated and that there was little evidence as to how best to introduce such roles, or how best to educate, support and mentor ESPs (McPherson et al, 2006). The systematic review recommended more focus us on health outcomes, rather than just consideration of the experience of AHPs moving to ESP role, and more evidence about the nature and impact of these roles to maximise benefits and minimise risks (McPherson et al, 2006).

A recent peer-reviewed publication described a personal view of the development of the pioneering role of paramedics in a general practice setting by providing a clear picture of what they do and how their role has developed. It highlighted how paramedics could be an effective additional resource to an established primary care team. (Daly, 2012).

A review of contemporary international literature of activity and impact associated with new and emerging roles in hospital emergency care found 48 publications: 34 from the grey literature and 14 empirical studies (Cooper and Grant, 2008). The review found that emergency care and paramedic practitioner roles (ECP & PP) were having an positive impact on patient care, including an average 25% reduction in the transport rate to hospital, improved inter-professional working, immediacy of treatment and referral, and high patient satisfaction. Limited economic data suggests savings of between £31 (USD 55) and £37 (USD 65) per case when ECPs replace standard ambulance responders (Cooper and Grant, 2008). A later study found that paramedics relied more on intuition than formal decision-making procedures and transported patients 'just in case' (Halter et al, 2011).

identify evidence of the impact on patient care of paramedics trained with additional skills considered enhancing care skills in relation to a variety of patient groups Additional or enhanced care skills concerned history taking, examination, diagnostics and decision-making as well as teamwork and partnership working (Limitations of the studies were methodological flaws in most of them, lack of randomised controlled trials and lack of control groups as well as the varied skills and patient groups across different countries which made comparisons problematic and prevented meta-analyses from being performed with the result that deductions were based on narrative synthesis onlyA systematic review updating and expanding on two previous reviews of ECP roles summarised national evidence-based literature on the impact of ECPs on healthcare delivery, effectiveness of practice and related health service resource use (Hill et al, 2014). Studies from the peer-reviewed literature (n=15) and project reports (n=6) were included (Hill et al, 2014). Overall, it was found that investment in ECP roles was beneficial for quality of care and cost efficiency savings (Hill et al, 2014). Care processes (diagnosis, investigations instigated and treatment initiated) provided by ECPs were deemed to be equivalent to or better to that provided by practitioners with traditional roles. (Hill et al, 2014). Prehospital ECPs provided 'added value' by treating more patients at the scene thereby reducing unnecessary referral to ED. It was often unclear whether the ECP intervention was part of a larger service change

and/or new investment (Hill et al, 2014). Further evaluations should consider whether the beneficial impact of the role transfers equally across all operational settings and patient groups, and is not just a reflection of new investment in clinical services (Hill et al, 2014).

Paramedics working with enhanced skills are acceptable to service users and in the main reduced the burden on other care providers (Mason *et al*, 2007). The strongest evidence is for paramedics assessing and managing acute minor conditions in elderly patients *(*Mason et al*,* 2007), which has the potential to save costs and resources and is beneficial and acceptable to paramedics and GPs (Everden et al, 2003).

The role of paramedics in the UK can successfully be extended within General Practice with enhanced skills paramedic professionals assessing and managing patients aged over 60 in respect of treating minor injuries and making home visits alongside normal paramedic care. (Dixon et al, 2009; Mason et al, 2007; Shah et al, 2010). There is some evidence that paramedics can accurately identify health and social problems in patients, especially those aged over 60 (McPherson et al, 2006; Dixon et al, 2009).

valuable evidence (acceptable to patients and carers) for paramedic assessing and managing patients autonomously to reduce transport to Emergency Departments. Because of the difficulty of conducting rigorous research in prehospital emergency care, evidence for other paramedic skills is less robust (Evans et al, 2013).

Evidence for cost effectiveness compared with routine (control) care is lacking. Patients receiving care from trained paramedics are less likely to go to the ED or to be admitted to hospital but had more secondary care contacts within 28 days (Mason et al, 2007; Dixon et al, 2009). Although many viable extra skills for paramedics were identified, the evidence is not strong enough to guide policy. The findings should therefore be used to guide future research, particularly into paramedic care for elderly people (Evans et al, 2013).

A study using a self-completed postal questionnaire study as part of a pragmatic quasi experimental trial in five paired sites with intervention (ECP) services matched with control (usual provider) services to compare patient experiences of care provided by emergency care practitioners (ECPs) and usual providers in different emergency and urgent care settings found that a greater percentage of ECP patients reported being very satisfied with overall care in all five pairs of sites. In three pairs, these percentage differences were statistically significant. Users of ECP services were more likely to be highly satisfied with overall care than usual provider patients in the study settings. (O'Keeffe et al, 2014). Investment in ECP roles was beneficial for the quality of care reported by patients and there was clear support from staff and patients for ECP services (Hill et al, 2014).

Enablers and barriers

Factors contributing to a successful operational framework were strategic visions crossing traditional organisational boundaries and flexible skilled workforce. Issues were patient

safety, appropriate clinical governance, supervision and workforce issues (Mason et al, 2006).

Concerns have been expressed about patient safety, recruitment and training levels, regulatory and role implementation issues. The review recommended further work to fully understand the patient safety, clinical practice, professional role and financial implications of these new roles (Cooper and Grant, 2008).
There is limited research regarding training of allied health professionals, including paramedics, in evidence-based practice and learning outcomes. A systematic review showed significant changes in knowledge and skills, but no significant changes in attitudes and behaviours (Dizon et al, 2012).

Extended scope physiotherapists (Dr Catherine Matheson-Monnet)

Background

The convergence of rising health care costs and physician shortages have made health care transformation a priority in many countries resulting in the emergence of new models of care that often involve the extension of the scope of practice for allied health professionals. (Desmeules et al, 2012). Extended scope physiotherapy was introduced in the UK more than 20 years ago (McPherson et al, 2006). Extended scope physiotherapists were required because of a need to relieve workload pressures on medical staff consequent to junior medical doctors having increasingly restricted working hours (EPC, 1998; Reeve et al, 2009; MacKay et al, 2009 cited in Morris et al, 2014). A main aim was to improve patient waiting times (Harisson et al, 2001).
Physiotherapists were trained in-house in reading imaging, prescribing, and administering medicines (including injecting), requesting investigations including blood tests and making referrals to medical or other healthcare practitioners (Atkins, 2003; McPherson et al, 2006). This extended role has provided physiotherapists with autonomy to request investigations such as Magnetic Resonance Imaging (MRI) and X-ray as part of the diagnostic process (Langridge et al, 2015) or prescribing, including injection therapy skills (Atkins, 2003).

Clinical and financial impact of introducing extended scope physiotherapists

The early research on extended scope physiotherapists focussed on their availability, safety and effectiveness in both ED and orthopaedic outpatient settings (Hattam, 2004; Oldmeadow et al, 2007; Anaf and Sheppard, 2010). Various studies found that extended scope physiotherapists were an effective way of managing patients with uncomplicated musculoskeletal problems (Maddison et al, 2004).

A systematic review of HCPs indicated that ESP roles for physiotherapists in outpatient clinics were found to have the potential effective ways of managing patients with uncomplicated musculoskeletal problems (Maddison et al, 2004 cited in McPherson et al, 2006).

One randomized controlled trial (RCT) with methodological limitations found that orthopaedic physiotherapy specialists were as effective as junior orthopaedic surgeons in the initial assessment and management of new referrals to outpatient orthopaedic departments (Daker et al, 1999). Whether overall extended scope physiotherapists were in fact safe or effective options for patients could not be asserted, but they had the potential to be so (Atkins, 2003; Hattam, 2002). While they enjoyed more professional autonomy (Ellis and Kersten, 2002), extended scope physiotherapists reported experiencing greater stress due to higher levels of perceived accountability, safety requirements and internal drivers for competence than non-ESPs (Langridge et al, 2015).

A structured literature review that focussed on studies presenting original quantitative data that addressed the impact or the effect of APP care found that physiotherapists in advanced practice/extended scope roles have become key providers of services to patients with musculoskeletal disorders (Desmeules et al, 2012). However, evidence of the systematic evaluation of advanced physiotherapy practice (APP) models of care is scarce. The structured literature review was based on a total of 16 studies that met all inclusion criteria. Pairs of raters used four structured quality appraisal methodological tools depending on the design of studies for analysis. Just under half the papers were rated 70% or more on the methodological quality rating scales (Desmeules et al, 2012). Included studies varied in designs and objectives were: diagnostic agreement or accuracy compared to medical providers, treatment effectiveness, economic efficiency or patient satisfaction. Their findings are however consistent and suggest that APP care may be as (or more) beneficial than usual care by physicians for patients with musculoskeletal disorders, in terms of diagnostic accuracy, treatment effectiveness, use of healthcare resources, economic costs and patient satisfaction (Desmeules et al, 2012).

Musculoskeletal conditions are thought to make up as much as 30% of all GP appointments. Best practice guidance about musculoskeletal services and how services could be improved through a multi-disciplinary approach was outlined a decade ago (DoH, 2006). Many initiatives have recently been launched to promote an extended role for physiotherapists within both secondary and primary care.

A questionnaire survey of primary care musculoskeletal extended-scope physiotherapists (ESPs) investigated conversion rates and referral barriers, with regard to radiological and consultant referrals (Griffiths et al, 2012). A sample of 200 musculoskeletal ESPs classified as having a speciality in orthopaedics and working in primary care were recruited via the 'ESP Professional Network'. A total of 100 (50%) responses were received. Forty-seven per cent of primary care ESPs indicated that they recorded their conversion rates, but only 31 participants submitted conversion rate data. Overall, the average conversion rate for all participants was 74% (range 30-95%) (Griffiths et al, 2012). Forty-three per cent of responses identified that they had experienced problems when referring for radiological investigations and 38% that they experienced problems when referring patients to secondary care for a consultant opinion. Poorly commissioned care pathways were the most

common barriers in both radiological and consultant referrals. Fifty per cent of respondents identified that they used a referral criteria when referring patients to secondary care. Commonly, these criteria had been developed in conjunction with secondary care consultants or commissioners (Griffiths et al, 2012). ESPs in primary care have reported similar conversion rates to those working in secondary care. There is a need for further empirical conversion rate studies in primary care to validate these self-reported findings and to enable ESPs to demonstrate clinical efficiency and benchmark their performance (Griffiths et al, 2012).

A review of the evidence on the diagnostic ability of ESPs in MSK triage clinics to assess, diagnose and refer patients for appropriate management, and on patient and general practitioner (GP) satisfaction when seen by an ESP in a MSK clinic reported favourable outcomes for ESPs in MSK triage clinics, with ESPs demonstrating a good level of diagnostic ability in comparison with a gold standard such as surgery. In addition, patients and GPs were satisfied with the overall performance and service provided by ESPs (Oakley and Shacklady, 2015). From 146 studies initially identified, 14 were eligible for review. Data extraction was compiled using the Centre for Reviews and Dissemination (2009) method. Diagnostic accuracy studies were assessed for methodological quality using the Scottish Intercollegiate Guideline Network (SIGN). Patient/GP satisfaction was assessed using a tool adapted by Desmeules et al. (2012). Only one diagnostic study was of high quality, and satisfaction study scores ranged from 40% to 73% (Oakley and Shacklady, 2015). The evidence suggests that ESPs are clinically effective. However, there were methodological shortcomings in the reviewed studies. Further research, using larger sample sizes, multiple locations and comparisons of the same patient cohorts, would strengthen the evidence available to influence future commissioning of these services (Oakley and Shacklady, 2015).

During a three-month pilot in West Cheshire, more than 700 patients accessed the service who would otherwise have seen a GP, leading to the scheme being expanded to cover all of the region's GP practices (Zenopa, 2016). The arrangement is now in place in 36 GP practices in the area. It calculated that a typical GP practice could save around £2,500 a week by sending patients with musculoskeletal conditions to see a physio rather than a GP. However, the deputy chair of the British Medical Association said that to make this a reality, funding from CCGs [Clinical Commissioning Groups] and NHS England was essential (BBC News, 2016). It was pointed out that if patients with musculoskeletal conditions had the option to see a physiotherapist first, increasing the availability of physiotherapy could make a significant improvement to GP workload (Zenopa, 2016).

Enablers and barriers to introducing extended scope physiotherapists

Evidence base for Australian physiotherapists seeking to obtain prescribing rights highlighted appropriate training and skills-based recognition within the discipline and the broader health team, and the need to overtly demonstrate effectiveness and safety. Regularly-evaluated service-delivery models should demonstrate efficiency, timeliness, patient centredness and equity (Morris and Grimmer, 2004). Concerns have been expressed

in relation to variations in training and fears of potential litigation (Atkins, 2003; Ellis and Kersten, 2002; Milligan, 2003 cited in McPherson et al, 2006).

A systematic review of the literature to inform policy and practice in Australia found that drivers behind pushing for an ESP role for physiotherapists were primarily organisational (reduction in waiting times, reduction in inappropriate referrals, helping relieve other practitioners) rather than aiming at improving stakeholder satisfaction and improving clinical accuracy, patient safety and patient outcomes or reducing costs. Most studies focussed on ESP physiotherapists in ED and to a lesser extent in specialist outpatient clinics (Lowe and Prior, 2008). Patient satisfaction (rather than experience of ESP or views of medical practitioners) was commonly investigated and found to be high 77%-100% (Maddison et al, 2004 and Oldmeadow et al, 2007 cited in Lowe and Prior, 2008). Clinical accuracy of diagnosis was also commonly investigated (rather than patient safety and patient outcomes). ESP physiotherapists were deemed more accurate than senior house officers (in their second year of training) (Bethel, 2005 cited in Lowe and Prior, 2008) and as effective as junior orthopaedic surgeons (Kersten et al, 2007). Organisational factors such as waiting times (although on average 76% reduction) and managing referrals in outpatient clinics for hospital consultants (although on average they managed 73% of referrals) were rarely investigated as was cost effectiveness (Lowe and Prior, 2008). There was a lack of data on quantifiable outcomes such as clinical efficacy, patient safety and cost effectiveness. (Lowe and Prior, 2008).The systematic review recommended support from medical practitioners, clear role definition, and rigorous evaluation of clinical competencies (Lowe and Prior, 2008).

An updated systematic review by the same team of researchers found that the literature had not considerably improved in term of quality or volume since 2008 (Stanhope et al, 2012). There was a lack of clarity of definitions about ESP physiotherapy as well as lack of clarity about standards of training, but ESP physiotherapists were comparable with doctors re clinical decision making and they improved the efficiency of outpatient management pathways (Stanhope et al, 2012).

Many new workforce redesign initiatives are not underpinned by prior planning, and this threatens their uptake and sustainability. Key to planning is a broad understanding of the concerns of all the key stakeholder groups (Morris et al, 2014). A cross-sectional qualitative study of key stakeholders in the redesign of extended-scope-of-practice physiotherapy in one Australian tertiary hospital underlined the following issues: marketing; proactively addressing barriers; using readily understood nomenclature; demonstrating service quality and safety, monitoring adverse events, measuring health and cost outcomes; legislative issues; registration; promoting viable career pathways; developing, accrediting, and delivering a curriculum supporting physiotherapists to work outside of the usual scope. The study recommended that initiatives to extend scope of usual practice should consider these issues before instigating workforce/model of care changes (Morris et al, 2014). It was clear from the fragmentation of effort reported in the UK literature that Australian initiatives to

introduce new ESP roles in any allied health discipline could benefit from a business plan that incorporated broad stakeholder perspectives (Morris et al, 2014).

Pharmacists (Catherine Matheson-Monnet with Cindy Brooks)

Background

For more than a decade the UK government has been encouraging an enhancement of the scope of the role of community pharmacists (DoH, 2005) to include independent prescribing, medicine use review, and health promotion in respect of stopping smoking cessation and a better diet (Coggans et al, 2001; DoH, 2005).

The contribution of pharmacists to improve public health and decrease health inequalities (DoH, 2005) has been identified as an important element of helping solving the primary care workforce (NHS Alliance/RPS, 2014). The increasing shortage of GPs (Rimmer, 2014), including problems with retention and recruitment (PCC, 2014b), which has increased GP workload and negatively affected accessibility and convenience for patients, requires new models of care (Ham et al, 2012) and innovative ways of working (PCC, 2014a) and has provided an opportunity for pharmacists to better use their training (Harrison et al, 2015).

Other countries have seen similar trends. An American study that provided an overview of the current context and scope of pharmacy practice, including the supporting role of pharmacy technicians, concluded that there were many new opportunities for pharmacists to perform extended functions and services beyond traditional roles (Paolini-Albanese et al, 2010). A French systematic review of the literature (n=16 studies) to better understand models of collaboration between community pharmacists and other healthcare providers found different models of care in action (Bardet et al, 2015).

Community pharmacists (more than 12,000 in the UK ten years ago) are well placed to provide a local service because they are highly skilled in drug problems and adherence and are used to interact with patients on a one to one basis (Holland et al, 2007). Between 30% and 50% of prescribed medicines for long term conditions are not taken as recommended (Barber et al, 2004). A quarter of the population has a long term condition and this quarter makes up 50% of GP appointments (NHS England, 2014). GPs spend significant amount of time prescribing and reviewing medicines ensuring compliance with treatment of patients with long term conditions. As there is an increasing number of highly skilled and trained pharmacists, and pharmacists' skills are underused, it makes sense to employ pharmacists to fill primary care workforce gaps, especially since a pharmacist would cost between half and two-thirds of the cost of a full time salaried GP (NHS Alliance/RPS, 2014). Evidence has shown that pharmacists in GP practices have helped drive significant improvement in care provision and working patterns. Patients are satisfied and feel safe (NHS Alliance/RPS, 2014).

Clinical and financial impact of pharmacists in primary care

The results of a randomised controlled trial to test whether a drug review and symptom self-management and lifestyle advice intervention from community pharmacists could reduce hospital admissions or mortality in heart failure patients (n=149 intervention and n=144 control) found that educational and symptom self-management intervention provided by community pharmacists was well received by patients with heart failure, but that the community pharmacist intervention [2 home visits within 2 and 8 weeks of discharge for medicines review and self-management advice] did not lead to reductions in hospital admissions after 6 months, in contrast to reductions found in trials of specialist nurse-led interventions in heart failure (Holland et al, 2007; Zaphirou et al, 2006 cited in Holland et al, 2007).

A randomised clinical trial found that pharmacists can optimise medication therapy for patients with long-term conditions resulting in improved outcomes and reduced exacerbations. Pharmacists were effective in recognising actual and potential medication problems and reduced health costs in specific groups (Altavela et al, 2008). Patients were more than twice as likely to have medication non-adherence problems addressed, six times as likely to have medication prescribed that had not been prescribed before, ten times as likely to have medication optimised and 11 times as likely to have more cost effective therapies prescribed, but total medical costs (excluding pharmacy) did not differ significantly (Altavela et al, 2008).

A systematic review to summarise the current and future roles of pharmacists in providing care to and educating patients with type 2 diabetes found that the pharmacist's role had expanded beyond dispensing medications, counselling on adverse effects, and monitoring for contraindications to become a vital member of interdisciplinary diabetes care teams, whether in the role of coach, educator, or direct-care provider, in a context of overwhelming numbers of patients with type 2 diabetes and increasing complexity of treatment plans (Sisson and Kuhn, 2009).The review suggested that pharmacists could substitute for GPs in responding to patient needs, but that well-educated and motivated patients were likely to benefit most from collaborating with a multidisciplinary patient care team, including pharmacists, seeking to optimise clinical outcomes (Sisson and Kuhn, 2009).

A study investigating inter-professional collaboration between general practitioners (GPs) and pharmacists involved in the delivery of enhanced pharmacy services under the local pharmaceutical services (LPS) contract in England (introduced in 2002) found that establishing inter-professional collaboration between GPs and pharmacists was a fragmentary process that relied on goodwill and trust (Bradley et al, 2009). Overall the level to which the LPS pharmacists felt integrated did not substantially increase with the introduction of LPS, although co-location was reported to have facilitated integration (Bradley et al, 2009).

A later Australian systematic review explored the evidence for the effectiveness of task substitution between GPs and pharmacists and GPs and nurses for the care of older people

with chronic disease. A total of 46 pieces of work were included (published, peer reviewed (black) and non-peer reviewed (grey) (Dennis et al, 2009). Task substitution between pharmacists and GPs and nurses and GPs resulted in an improved process of care and patient outcomes, and improved disease control. The interventions were either health promotion or disease management according to guidelines or use of protocols, or a mixture of both. (Dennis et al, 2009). The review concluded that pharmacists [and nurses] can effectively provide disease management and/or health promotion for older people with chronic disease in primary care. While there were improvements in patient outcomes no reduction in health service use was evident (Dennis et al, 2009).

A randomised controlled trial investigating adding pharmacists to primary care teams for the management of hypertension and other cardiovascular risk factors in patients with type 2 diabetes (with blinded ascertainment of outcomes within primary care clinics in Edmonton, Canada) found that significantly more patients with type 2 diabetes achieved better blood pressure control when pharmacists were added to primary care teams and that the 10-year risk of cardiovascular disease, based on changes to the UK Prospective Diabetes Study Risk Engine were predicted to decrease by 3% for intervention patients and 1% for control patients (P = 0.005), which suggests that pharmacists can make important contributions to the primary care of these patients (Simpson et al, 2011).

The same research team found that intervention patients had a significant 0.3% greater reduction in the annualized risk of a cardiovascular event (95% CI: 0.08%, 0.6%) compared with usual care. The overall one-year per-patient costs for healthcare usage were $190 lower in the pharmacist-led intervention group compared with usual care. For $4000 per 1% reduction in annual cardiovascular risk, the probability that the intervention was cost-effective compared with usual care reached 95%. A sensitivity analysis using multiple imputation to replace missing data produced similar results (Simpson et al, 2015).

A narrative review of the literature found that pharmacists were ideally placed to play a greater role in supporting people with a mental illness because medicines are a major therapy for many mental illnesses and there has been a growing burden of mental disorders (Rubio-Valerea et al, 2014). Pharmacists could usefully be involved in early detection of mental health conditions, development of care plans and follow up of people with mental health problems, undertake medication review, instigate strategies to improve medication adherence, take part in case conferencing or collaborative drug therapy management; design interventions to reduce inappropriate use of psychotropic medicines and take part in antipsychotic polypharmacy management (Rubio-Valerea et al, 2014).

A systematic review of the literature to determine the potential contribution of community pharmacists to improve the transfer of care of patients post-discharge from secondary to primary care settings retrieved 14 studies. Four studies reported that community pharmacists could recognise and resolve medication errors after patients are discharged from secondary to primary care. Impact on medication adherence and clinical control was

not consistent. Some variations in implementation and evaluation limited claims about true impact. Applying more stringent controls and closer adherence to protocols in both intervention and control groups would allow clearer correlations to be made between the intervention and the outcomes (Nazar et al, 2015).

Using a before-after comparison, a study found that community-pharmacist-led anticoagulation care utilising point-of-care testing and computerised decision support was safe and effective with significant improvements in time in therapeutic range. The median number of tests per month was not statistically different between GP- and pharmacist-led care. The study recommended a wider adoption of this model of collaborative care (Harrison et al, 2015)

A study to determine the impact of integrating pharmacists into patient-centred medical homes in Vermont (USA) found that inclusion prevented adverse drug events, avoided costs, and improved patient outcomes (Kennedy et al, 2015). Pharmacists were partnered into 5 primary care GP practices in Vermont for 1 day per week to provide direct patient care, population-based medication management, and prescriber education. The pharmacists identified drug therapy problems for 47.5% of patients through direct patient care; adjusted doses and discontinuing unnecessary medications for 38.9% of patients, and provided prescriber education in relation to 13.6% of patients. Pharmacists' recommendations to correct drug therapy problems were accepted by prescribers 86% of the time. The study suggests $2.11 in cost avoided for every $1.00 spent on a pharmacist ($373,092/$176,690) (Kennedy et al, 2015).

Enablers and barriers of introducing pharmacists

A study investigating inter-professional collaboration between general practitioners (GPs) and pharmacists involved in the delivery of enhanced pharmacy services under the local pharmaceutical services (LPS) confirmed the findings of previous research that a number of inter-professional barriers existed between community pharmacists and GPs which hinders the integration of community pharmacists into the primary health care team (PHCT). (Bradley et al, 2009). Factors enabling integration were: clearly defining the pharmacist role; a good existing working relationship with GPs as many were dependent on GPs for patient referrals; collective and cohesive working; establishing the practical steps of providing care; ongoing evaluation of the role as it develops; and seeking and receiving patient feedback (Bradley et al, 2009)

Another study identified clarity of definition of the pharmacist role as a key enabling factor, because if there is confusion regarding the role of the pharmacist this can impact upon the extent to which the pharmacist integrates within a team. If orientation and support from managers and supervisors are not provided then integration is made more difficult (Snyder et al, 2010). If pharmacists do not have sufficient office space or resources (e.g. room facility to see patients, computer) this may affect integration themselves into the role (Snyder et al, 2010).

A study aiming to provide guidance on how to integrate a pharmacist into an already established primary healthcare team used action research with a panel of established primary healthcare pharmacists identifying clinical activities tailored for the project site (Kolodziejak, 2010). The results were presented to the primary healthcare team, who worked with the pharmacist and researchers to define the role of the pharmacist, after which the pharmacist provided eight weeks of full-time clinical services. Upon completion, focus group data on how it went, along with the pharmacist's suggestions, formed a step-wise template for integration. The template consists of eight steps which highlight the importance of selecting a collaborative process and team, defining the role of the pharmacist, determining the logistics of providing care, establishing credibility, re-evaluating the role as it evolves, and obtaining patient feedback (Kolodziejak, 2010).

As little is known about how health care professional roles and routines develop in this environment, qualitative data derived from practice documents, field notes from practice activity and provider-patient interaction observations, and transcripts from interviews with patients and practice staff were analysed (using a constant comparative approach and immersion/crystallisation) in order to gain a better understanding of perceptions of their roles by community pharmacists and perceptions of other providers toward the community pharmacists (Farrell et al, 2012). Some pharmacists were found to be physician oriented: responding to physician requests for drug information and other projects. Others were found to be providing patient-centred care, providing education/information, and initiating system-level interventions to improve drug therapy (Farrell et al, 2012). Pharmacist routines and their own perception of their roles differed depending on the teams. Differences could be attributed to educational background, philosophy of practice or individual differences, and leadership and communication. Team leaders wanting to include a pharmacist or any other HCP to improve medication therapy should demonstrate leadership and vision by clearly articulating needs and hiring a pharmacist with matching knowledge, skills, and qualities. (Farrell et al, 2012).

An observational study using data from one-on-one telephone interviews with pharmacists, physicians and nurse practitioners from the 23 teams that integrated a new pharmacist role evaluated the barriers and drivers that were experienced by all (Jorgenson et al, 2014). Seven key themes emerged about experienced barriers and drivers during the integration of the pharmacist: (1) relationships, trust and respect; (2) pharmacist role definition; (3) orientation and support; (4) pharmacist personality and professional experience; (5) pharmacist presence and visibility; (6) resources and funding; and (7) value of the pharmacist role (Jorgenson et al, 2014). The study concluded that the negative impact of these barriers could be mitigated with effective planning and individualised support for the type of community where the team is located (Jorgenson et al, 2014).

A systematic review found that key elements of success were: role definition, skills, communication, trust, inter-dependence, interest for collaborative practice and perceptions

and expectations of each other. When commencing relationships, it was important for pharmacists to initiate communication via face-to-face visits with physicians and to ensure transparent discussions relating to professionals roles (Bardet et al, 2015).

To be successful, pharmacists must have full permission to document findings in the primary care practices' electronic health records. Given that many pharmacist services do not involve billable activities, sustainability requires identifying alternative funding mechanisms that do not rely on a traditional fee-for-service approach (Kennedy et al, 2015).

Conclusion

The role of HCPs in substituting for GPs is far from being evidence based. As is often the case when solutions have to be found quickly to remedy workforce and other issues in a context of decreasing resources, a great number of interventions are pragmatic and hence with methodological shortcomings and they are rarely published (Jennnings and Matheson, 2017). The quality of the sparse literature has been variable. For all the HCPs there is limited evidence of effectiveness and a very limited number of systematic reviews. Most studies have small sample size, methodological and study design shortcomings and a lack of randomised controlled trials and lack of control groups. There is variable evidence of a benefit and of the potential to benefit. Although the evidence is variable and limited, HCPs substituting for GPs (or other medical practitioners) is seen as valuable by an increasing numbers of employers (Halter et al, 2013).

The table below compares physician associates, extended scope paramedics, extended scope physiotherapists and pharmacists in relation to status, skills, clinical and financial impact, stakeholder satisfaction and enablers and barriers.

Table 1 ***Comparison of HCP in key performance indicators***

HCP	Clinical impact	Financial impact	Stakeholder satisfaction	Enablers and barriers	Status/Skills
Physician associates	No significant differences in rates of same day/urgent appointments, re-consultation, referral to secondary care, prescribing, ordering investigations, or undertaking procedures (Drennan et al, 2015). PA consultations identified as competent and safe, but GP consultations rated more competent (De Lusignan et al, 2016). PAs made more detailed consultation records and consultation times with PAs longer than GPs (15 or 20 mins instead of 10 mins) (Brennan et al, 2015)	Although shorter, cost of a GP consultation exceeded that of a PA by £6.22 (Drennan et al, 2015) Economic analysis limited to consultation times only, rather than total cost of treatment. Lack of data on time spent by GPs on supervising PAs and signing their prescriptions = real costs of PAs likley underestimated (Drennan et al, 2015)	Acceptability to patients and potential patients found to be consistently found to be high (Halter et al, 2013*) Doctors supervising PAs (surveyed in 2012) mostly satisfied with PAs (Drennan et al, 2015) PAs were satisfied with their work + most satisfied with their relationships with doctors in their teams (Ritsema and Roberts, 2016).	Confusing and varying role expectations so need clear role definition (Williams and Ritsema, 2014). Unregulated status preventing PAs from carrying out fuller range of duties, including prescribing and ordering XRays (Drennan et al 2011; (Williams and Ritsema 2014; Ritsema and Roberts, 2016). Diversity of PA training and disparities in admission criteria and standard of PA training. (Williams and Ritsema, 2014).	No statutory registration to professional regulatory body Formal training 2 years pg in HEI + national examination A range of diagnostic and therapeutic skills such as same day and urgent consultations, examinations, ordering tests, test results reviews, diagnosis, prescribing, counselling, prevention, education, research, administrative services and their autonomy vary considerably depending on setting, experience, competence, requirements (HPRAC, 2011*; Drennan et al, 2012; Drennan et al. 2015) and supporting GPs in the management of complex caseloads (Parle and Ennis, 2015).
Paramedics	Positive impact on patient care (Cooper and Grant, 2008*) Strongest evidence is *for assessing and managing acute minor conditions in elderly patients (*Mason *et al,* 2007) Potential for identifying health and social problems in patients,	Average cost per ECP patient contact was £24, instead of £55 for an ED contact (Mason et al, 2006) Limited evidence for cost	High patient satisfaction (O'Keeffe et al, 2014; Hill et al, 2014*)	Roles varied considerably with respect to type and duration of training, permitted scope of practice, and job title (Woollard, 2006) Patient safety, appropriate clinical governance,	Statutory registration to a professional regulatory body Health and Care Professions Council (HCPC) British Paramedic Association as regulatory body Increasingly HEI training and various levels of training, including in-house or HEI or other modules

	especially those aged 60+ (McPherson et al, 2006*; Dixon et al, 2009). 25% reduction to ED (Cooper and Grant 2008*) 54% of patient contacts with the ECP service did not require a referral to another health professional or use of emergency transport (Mason et al, 2006)	effectiveness compared with routine (Mason et al, 2007) Savings of between £31 and £37 per case when ECPs replace standard ambulance responders (Cooper and Grant, 2008*) Efficiency savings (Hill et al, 2014*)		supervision and workforce issues (Mason et al, 2006). Strategic vision flexible skilled workforce (Mason et al, 2006)	Rapid on-scene assessments diagnosis and management of patients with minor illnesses and injuries who typically present via 999 calls, instigate treatments in line with evidence based guidelines, fast-track patients in a stable condition to the nearest, most appropriate, destination (thereby and the management of the chronically ill in the community Ball, 2004*; Woollard, 2006) History taking, examination, diagnostics and decision-making as well as teamwork and partnership working (Evans et al, 2013*)
Extended scope physiotherapists	More accurate than senior house officers (Dakker et al, 1999; Bethel, 2005) and as effective as junior orthopaedic surgeons (Kersten et al, 2007) Effective at managing uncomplicated MSK problems (Maddison et al, 2004;Hattam, 2004; Oldmeadow et al, 2007; Anaf and Sheppard, 2010) Lack of data on quantifiable outcomes such as clinical efficacy, and patient safety (Lowe and Prior, 2008*). APP care may be as (or more) beneficial than usual care by physicians for patients with musculoskeletal disorders, in terms of diagnostic accuracy, treatment effectiveness, use of healthcare resources, and patient	Lack of data re cost effectiveness (Lowe and Prior, 2008*). Improved efficiency of outpatient management pathways (Stanhope et al, 2012*; Desmeules et al, 2012*)	Patient satisfaction high (Maddison et al, 2004; Oldmeadow et al, 2007; Desmeules et al, 2012*; Oakley and Shacklady, 2015). Organisational factors not commonly investigated (Lowe and Prior, 2008*) Greater levels of work related stress reported than for non- extended scope physiotherapists (Langridge et al, 2015)	Worked for years in ED and outpatient clinics due to restricted hours for junior doctors (Lowe and prior, 2008*) Variations in training and fears of potential litigation (Atkins, 2003; Ellis and Kersten, 2002; Milligan, 2003 cited in McPherson et al, 2006). Drivers primarily organisation i.e. reduce waiting times for outpatient clinics (Maddison et al, 2004 and Oldmeadow et al, 2007 Need support from medical practitioners and rigorous evaluation of clinical competencies (Lowe and Prior, 2008*).	Statutory registration with Health and Care Professions Council (**HCPC)** Chartered Society of Physiotherapists (CSP) provides insurance and professional support Increasingly HEI level training i.e. degree in physiotherapy with Masters for extended scope but not necessarily (could be in-house training or HEI or other modules) Physiotherapists trained in-house in reading imaging, prescribing, and administering medicines (including injecting), requesting investigations including blood tests and making referrals to medical or other healthcare practitioners (Atkins, 2003; McPherson et al, 2006*). Autonomy (for some but not all) to request investigations such as X-Rays and MRI) as part of the diagnostic process (Langridge et

	satisfaction (Desmeules et al, 2012*). Comparable with doctors re clinical decision making (Stanhope et al, 2012*)			Need to incorporate stakeholder perspectives before implementing intervention (Morris et al, 2014). Need clear role definition (McPherson et al, 2006; Lowe and Prior, 2008; Stanhope et al, 2012*; Morris et al, 2014).	al, 2015) or prescribing, including injection therapy skills (Atkins, 2003).
Pharmacists	Helped drive significant improvement in care provision and working patterns in GP practice. (NHS Alliance/RPS, 2014). Can optimise medication therapy for patients with long-term conditions resulting in improved outcomes and reduced exacerbations + effective in recognising actual and potential medication problems e.g. non-adherence (Altavela et al, 2008). Care to and educating patients with type 2 diabetes could substitute for GPs in responding to patient needs, but that well-educated and motivated patients were likely to benefit most (Sisson and Kuhn, 2009) Pharmacists [and nurses] can effectively provide disease management and/or health promotion for older people with chronic disease in primary care (Dennis et al, 2009).	Reduced health costs in specific groups (Altavela et al, 2008). More cost effective therapies prescribed, but total medical costs (excluding pharmacy) not significantly different (Altavela et al, 2008). No evident reduction in health service use (Dennis et al, 2009). The overall one-year per-patient costs for healthcare usage were $190 lower in the pharmacist-led intervention group compared with	Patients are satisfied and feel safe (Holland et al, 2007; Zaphirou et al, 2006 cited in Holland et al, 2007; NHS Alliance/RPS, 2014).	Fragmentary process that relied on goodwill and trust (Bradley et al, 2009). Clearly defining pharmacist role (Bradley et al, 2009; Snynder et al, 2010) Good existing working relationship with GPs establishing the practical steps of providing care; ongoing evaluation of the role as it develops; and seeking and receiving patient feedback (Bradley et al, 2009; (Kolodziejak, 2010; Bardet et al, 2015) Orientation and support from managers and supervisors (Snyder et al, 2010) Pharmacist routines and their own perception of their roles differed depending on the teams (Farrell et al, 2012)	4 year master of pharmacy degree + in-house or HEI or other modules for additional training Regulated by the General Pharmaceutical Council (GPhC) for England, Scotland and Wales since 2010 Royal Pharmaceutical Society of Great Britain as professional body Understand the biochemical mechanisms and actions of drugs, drug uses, therapeutic roles, side effects, potential drug interactions, and monitoring parameters Highly skilled in drug problems and adherence + used to interact with patients on a one to one basis (Holland et al, 2007). Between 30% and 50% of prescribed medicines for long term conditions are not taken as recommended (Barber et al, 2004). A quarter of the population has a long term condition and this quarter makes up 50% of GP appointments (NHS England, 2014).

	Significantly more patients with type 2 diabetes achieved better blood pressure control when pharmacists were added to primary care teams (Simpson et al, 2011). recognise and resolve medication errors after patients are discharged from secondary to primary care (Nazar et al, 2015) Safe and effective with anticoagulation care utilising point-of-care testing and computerised decision support with significant improvements in time in therapeutic range (Harrison et al, 2015) Prevented adverse drug events and improved patient outcomes (Kennedy et al, 2015).	usual care (Simpson et al, 2015) Avoided costs: $2.11 in cost avoided for every $1.00 spent on a pharmacist (Kennedy et al, 2015)		Demonstrate leadership and vision by clearly articulating needs and hiring a pharmacist with matching knowledge, skills, and qualities. (Farrell et al, 2012). Negative impact of barriers could be mitigated with effective planning and individualised support for the type of community where the team is located (Jorgenson et al, 2014). Full permission to document findings in the primary care practices' electronic health records (Kennedy et al, 2015)	

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