Risk Work in NHS 111: The Everyday Work of Managing Risk in Telephone Assessment Using a Computer Decision Support System

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Short title: Risk Work in NHS 111

 Abstract

The substitution of clinical with non-clinical staff to triage and manage calls in the NHS urgent care services is one of a number of measures designed to meet growing health services demand. The deployment of a Computer Decision Support System ‘NHS Pathways’ to support this work has created a new type of health worker and a new form of risk work. In this article, we examine how call-handlers manage, experience and respond to risk in their everyday practice of telephone assessment. We draw on data from an ethnographic study of five NHS 111 sites involving 356 hours of observation plus 6 focus groups with 47 health services staff in 2011-2012. We found that there was a ‘risk problem’ involving balancing the competing demands of assessing patients safely against rationing limited health resources. The new service used technology to support risk management but this technology also created risk work for call-handlers, clinicians and patients. We found that call-handlers engaged in risk work that involved interpretation, judgement and flexibility in using NHS Pathways. Call-handlers also deferred some risk work to both clinicians and patients/callers. Risk work now involves ‘making the technology work’ and much of this work has been delegated to non-clinical call-handlers. These new healthcare workers are interpreters of risk. Risk work creates a sense of responsibility (and sometimes anxiety) for these non-clinical call-handlers.

**Keywords:** Risk; work; organisations; healthcare, Computer Decision Support Systems

## Introduction

In this article, weexamine how risk is handled and interpreted in everyday healthcare work in the new urgent healthcare service, NHS 111. We draw on the concept of ‘risk work’ (Gale, Thomas, Thwaites, Greenfield & Brown, 2016; Horlick-Jones, 2005) to examine the interface between the NHS, patients and non-clinical call-handling staff working in this telephone-based service designed to triage, manage and prioritise demand for primary care services outside core business hours. NHS 111 has created a new form of healthcare risk work which is both generated and mediated by a Computer Decision Support System called NHS Pathways. The deployment of this Computer Decision Support System in urgent care has profoundly changed how telephone assessment is performed and who does this work, most recently by enabling non-clinical staff to undertake clinical triage and assessment (Pope, Halford, Turnbull & Prichard, 2013). In this article, we describe and explain how risk work is configured across this new context of NHS 111 as the introduction of call-handlers has changed how risk is managed and dispersed across the healthcare network. We examine how technologies have redistributed risk (whilst appearing to reduce or even remove risk) and as a consequence, how call-handlers manage and respond to the risks that they face.

Risk and the NHS 111 urgent healthcare service

***The concept of risk work in the context of clinical telephone assessment***

Beck’s concept of the ‘risk society’ provides a framework for examining the importance of risk in contemporary high income countries such as the UK. Beck (1992) argued that late modernity is characterised by high levels of sensitivity to risk alongside a distrust of technology and expertise (see for example Hanlon et al., 2005; Beck, 1992; Giddens, 1991; Smith, 2002; Horlick-Jones, 2005). From this sociological perspective, risk is a social construct shaped by social and cultural groups that determine what phenomena are considered as threats or risks and determine how these risk are dealt with (Lupton, 1999). The utility of this perspective in the context of this paper is twofold. Firstly, the social construction of risk (Hanlon et al., 2006, p. 272) focusses our attention on the interpreters of risk. In the context of NHS 111 this makes us attend to the actors who mediate risk by assessing clinical presentations and navigating patients through the healthcare system. Secondly, Beck (1992) proposes that technologies are increasingly implicated in risk work but that their use is problematic. We will show how a reliance on technology, to deliver NHS 111 produces new challenges for those delivering and seeking urgent healthcare services.

The term ‘risk work’ is useful for delineating and describing the nature, interpretation, management and experience of risk in everyday working practices. Gale et al. (2016) identified three main components of risk work in healthcare: translating risk information into different contexts for different audiences; implementing strategies to minimise risks where uncertainty exists; and caring for people in the context of risk. Horlick-Jones argued that informal working practices shape how risk work ‘gets done’ (Horlick-Jones, 2005) and we have drawn on these observations to conceptualise telephone assessment as risk work. For the purpose of this article we define risk work as the practices surrounding the management of threats to well-being (including the risk of death) in urgent care context. These, as we will show, include the elicitation, assessment and management of risk by human call-handlers and digital technology.

Prior to the 1990s managing and providing out-of-hours primary care was the domain of the general practitioner (Hallam, 1994). In the late 1990s the Department of Health initiated the development of telephone-based urgent care services provided by General Practitioners as a way to manage rising demand for out-of-hours care (Salisbury, 2000; Department of Health, 2000). The introduction of the 2004 General Medical Services Contract enabled General Practitioners to opt out of providing out-of-hours services, and local health agencies responsible for urgent care services increasingly looked to deploy telephone triage of urgent care using nurses supported by Computer Decision Support Systems (Lattimer et al., 1998; Department of Health, 2000). These systems were designed to minimise risk by standardising and monitoring triage practice, confining it to clear rules or decision sequences, informed by encoded expert knowledge. In their systematic review examining risk in relation to Electronic Patient Records, Greenhalgh et al (2009) pointed to the techno-optimist stance of much of the literature in this field, which frames technologies as standardising risk to protect against human error but noted that such technologies could introduce new risks. Critics of techno-optimism argue that attempts to standardise healthcare necessarily fail because they are reductionist and seek a single answer to complex problems (see Berg 1997; Greatbatch et al., 2005) and often have unintended consequences or generate work in other parts of the system (Berg and Timmermans, 2000). Greenhalgh et al. (2009) built on these ideas pointing out that technologies often require significant human effort to bring them into everyday use, relying on articulation work - the hidden work - to bridge formal/informal and social/technical divides. These ideas have important implications for how a non-clinical workforce might use a technology (NHS Pathways) to perform clinical triage and assessment and what this might mean for how risk work ‘gets done’ by these workers.

Triage is a way of identifying, assessing, and prioritising clinical work and, by extension, managing risk, specifically risk to well-being and, ultimately, to life. It began on the battlefield where mass casualties of war were sorted into immediate, urgent, and non-urgent categories (Robertson-Steel, 2006) and it is now used routinely healthcare settings to manage demand when clinical need exceeds capacity (Marsden, Newton, Windle, & Mackway-Jones, 2016). In any healthcare system where resources are limited, triaging involves seeking to minimise harm to patients while allocating and rationing healthcare resources efficiently and accurately, and in a timely manner. The triager is required to manage risk and uncertainty by accurately identifying the seriousness of patients’ symptoms; referring patients to care within an appropriate timeframe so that patients with more serious symptoms are seen more quickly; and referring patients to the appropriate healthcare service for their needs. When triage is performed by telephone the risks (of getting the assessment wrong) are exacerbated because the triager lacks visual cues and cannot conduct physical examinations and tests that are available in face-to-face consultation. Additionally, in emergency and urgent care services, medical history is often not available so assessment is reliant on the reliability and accuracy of information that patients provide (Coleman, 1997).

The risks entailed in this work therefore stem from the potential for inaccurate clinical assessment and inappropriate categorisation of severity. The consequences of such failure include potentially fatal, deteriorations in patients’ medical condition, or the patient experiencing delayed treatment and associated untreated symptoms. Patients may also experience anxiety if their healthcare needs are not met, and inconvenience in accessing and utilising healthcare. Accurate triage therefore needs to be highly sensitive (patients are correctly identified as sick, therefore triage is safe) but also have high specificity (patents unnecessarily referred or treated). In any system of triage there is the possibility of both underestimating urgency, for example, failing to refer patients to the most appropriate service (‘under-triage’) and overestimating urgency ‘over-triage’, for example, inappropriate referral to more expensive emergency services (Turner, O’Cathain, Knowles, & Nicholl, 2013).

## The ‘extra layer’ of risk work for NHS 111 call-handlers

NHS 111 is an urgent care service accessible by telephone 24 hours a day. Rolled out nationally across England by 2014, it was conceived as a means of providing a centralised entry point to the NHS in England to provide clinical assessment and direct callers to the most appropriate service for their needs (Department of Health, 2008; NHS England, 2013). These services could include a range of urgent care services such as out-of-hours primary care services, minor injuries units and walk-in centres, as well as hospital emergency departments and emergency ambulance services. NHS 111 uses predominantly non-clinical staff to assess calls supported by a Computer Decision Support System called ‘NHS Pathways’. The technology itself is discussed more fully elsewhere (Pope et al., 2013; Turner et al., 2013) but in brief it utilises a series of logical algorithms (pathways) and questions which a call-handler uses to assess symptoms and make a decision about how to manage the caller/patient. The software is based on an extensive clinical evidence base that aims to link all clinical questions and care advice ‘to at least three pieces of (preferably UK based) evidence and dated within the last five years’ (NHS Digital, Clinical Factsheet). Risk is managed and stratified by working on the ‘worst case scenario’, so each patient contact begins by eliminating and managing emergency presentations (such as life threatening blood loss, unconsciousness) before proceeding with the assessment of other symptoms. For example, when triaging chest pain, myocardial infarction (heart attack) is excluded before pleurisy (a lung inflammation which causes similar pain symptoms). The triage process offers the caller lower levels of care when particular ‘high risk’ conditions have been excluded. The assessment concludes with a disposition that determines the clinical care needed and the time frame in which this is required. 70-80% of NHS 111 calls are answered and assessed immediately by a call-handler and conclude with a disposition (Knowles, O’Cathain, Turner, & Nicholl, 2014). This suggests that call-handlers are engaging in significant risk work. If necessary, calls can be transferred to a clinical adviser (a nurse or paramedic usually located onsite) for further assessment and advice.

As professionals with requisite training, expertise and knowledge, doctors are accountable and autonomous using their judgement in clinical assessment. As such they usually bear the burden of managing uncertainty and clinical risk (Fox, 1980) in the NHS. When a nurse uses a computer decision support system, as they did in NHS Direct the precursor of NHS 111, the technology is designed to support, rather than replace, clinical decision making (Ruston, 2006). However in the use of non-clinical workers at NHS 111, there is an assumption (by NHS 111 service providers and by the technology developers) that clinical decisions making is primarily a function of the technology (provided that the call-handler correctly identifies the appropriate computer algorithm). This might suggest that the decision making and the management of risk ‘is done’ by the Computer Decision Support System. However, as Alaszewski and Brown have noted, ‘[s]uch systems provide a new context and set of resources but they do not remove judgement or negotiation from decision-making’ (Alaszewski & Brown, 2007, p. 6). It may be therefore a naïve assumption that the management of risk is ‘all in the machine’. The technology has therefore enabled lower status workers to undertake activity that identifies and manages health risks. This has changed how risk is experienced, managed and interpreted within NHS 111: risk work is no longer solely the domain of health professionals (Gale et al., 2016).

There are many layers of risk associated with telephone clinical assessment at NHS 111. Staff, the technology, the organisation and patients are all involved in risk work and accountability for risk is spread across the care network. An additional layer of risk is introduced because clinical assessment is undertaken by those without clinical training. We suggest that risk work is performed by a combination of the call-handler and the Computer Decision Support System - each managing risk in slightly different ways. The Computer Decision Support System aims to minimise risk by providing standardised pathways to balance demand and safety via a set of protocols, using standardisation to solve the problem of risk. Additionally, it includes mechanisms for reporting and surveillance of telephone assessment activity. Since in the example studied here the Computer Decision Support System is designed to be used mainly by workers without clinical training - the technology is set to be risk-averse; it is in effect hardwired to ‘over-triage’. Therefore, the Computer Decision Support System shapes the nature of risk work for call-handlers. We suggest that call-handlers play an equally important role in managing risk. Call-handlers are required to make clinical decisions by their accurate use of the system and by interpreting the Computer Decision Support System pathways. Our earlier research found that call-handlers are not simply 'trained users' of computer software (Turnbull, Prichard, Halford, Pope, & Salisbury, 2012). However, what is not clearly understood is how the presence of risk makes everyday call-handling work more complex than simply following formal processes.

Previous research has examined how nurses managed risk in telephone-based triage (Ruston, 2006) but there is limited research that has applied the concept of risk work to this new category of non-clinical call-handlers. Specifically there is a lack of understanding of how risk (ultimately the threat to life) makes healthcare call-handling work more complex for these staff. In a previous research project (Pope et al., 2013; Turnbull et al., 2012) we examined healthcare call-handling work in out-of-hours General Practice services and 999 emergency care. Whilst we did not explicitly focus on risk management in our analyses, when we turned our attention to NHS 111 in a subsequent project (Turnbull et al., 2014) we saw the same complex interactions between the Computer Decision Support System technology and the call-handling workforce. During the NHS 111 project there were some high profile cases reported in the national press and television relating to the failure of NHS 111 to correctly identify and manage serious illness and this promoted the examination of the ideas about risk discussed in this article. We were keen to follow Horlick-Jones’s (2005) lead and to examine the practices that shape risk work. The analysis presented here is grounded in the data collected for a project examining the work of call handling, and seek to unpick the risk work entailed in call-handling.

Methods

In this article we draw on an ethnographic study of NHS 111 call centres. This detailed observation of the NHS 111 environment and its staff, supplemented with focus groups, has enabled us to describe and analyse the everyday experiences and routine behaviours in naturalistic settings (Savage, 2000). The study was approved by the National Research Ethics Service North East - Tyne & Wear South (11/NE/0198).

## Setting and NHS 111 sites

Since the NHS 111 services was created established using a competitive tendering system,NHS 111 providers are characterised by differences in organisational size, form and ethos, in the type of workforce employed and professional roles and skill mix within it. We accessed a range of sites to explore the implications, benefits and challenges across different organisational models which included both private and social enterprise providers as well as different NHS organisations. We selected five sites that maximised variation so sites were chosen for diversity in the type of NHS 111 provider and their coverage of different sizes of patient population and different geographies. This enabled us to combine a detailed understanding of local context and being able to document variation that may have occurred in different settings with the opportunity to identify shared patterns across sites to provide systematic analytical and theoretical generalisation (see Table 1). Each site had a call centre plus a General Practice-led urgent care centre. NHS 111 calls that required urgent care telephone advice or an appointment with a healthcare professional were referred to clinical staff in the urgent care centres.

[Insert Table 1 near here]

The skills, educational qualifications and training of call-handlers are described in detail elsewhere (see Turnbull et al., 2012) but in brief, most sites require a minimum ‘school leaving’ educational level of 5 GSCEs or equivalent, qualifications that would enable individuals to progress to 16+ further education. At all sites call-handlers undertook a 2-week training (designed by the Computer Decision Support System developers) which they had to pass to demonstrate competency before taking live calls. The Computer Decision Support System developers viewed as essential, communication skills, such as call control, questioning, listening and providing accurate information, as well accurately using the technology. The staff at each sites provided up to 2 weeks’ further mandatory training that typically included data protection and training in other software (for example appointment booking software).

## Ethnographic methods

In this article we draw on data derived from 356 hours of observations and six focus groups with call-handlers, clinical advisers (nurses or paramedics) and organisational managers to provide a detailed understanding of the everyday work, workforce roles, the technology in ‘use’ and the wider contextual factors in each setting. The observation were largely unstructured but was supplemented by informal interviews during the observation process (see for Hammersley, 1990; Savage, 2000). All the authors of this article (except Simon Brook) did some observation. Each observer hand wrote fieldnotes in a ruled notebook during the observation period, noting the date and time of particular observations and then adding to these immediately after observation period ended to ensure that they captured as much detail as possible. The fieldnotes including recorded conversations were then transcribed using standard word processing software. We imported the fieldnotes into Atlas.Ti software 6.2 (Scientific Software Development GmbH, Berlin) to facilitate data archiving and retrieval and facilitate analysis.

Our data included observations of what participants did plus their reflections in informal interviews and informal conversations of what was happening and why it was happening. We conducted observation in call centres and urgent care centres. In call centres we shadowed individual call-handlers and observed calls, or observed a group of staff interacting, for example when a clinical advisor came to discuss a case with one or more call handlers. In urgent care centres we were able to observe patient-clinician interactions. Our observations had an element of participation as during the observation periods we were visibly present and interacted with those present. Our data, therefore, include both descriptions of what was observed and near verbatim accounts of conversations – the latter being similar in format to qualitative interviews. Observation covered all or part of a shift (typically 6 hours at a time), conducted at different times of the day, over 10-14 days in each setting over several months.

We also organised six focus group interviews (one each at Sites 1–3 and 5 and two at Site 4), that were between 1 and 2 hours in duration. We invited a purposive sample of staff in different job roles mostly from the call centre but also some form the urgent care centres. In these interview we invited participants to reflect on the impact of NHS 111 on the nature of their work and on the organisations as a whole. The facilitator for each group used a topic guide that provided flexibility for participants to explore issues that arose during the focus groups (for example, tacit working practices or staff views about NHS 111). Each focus group consisted of six to nine individuals. Of the total 47 staff that participated 26 were call-handlers.

## Qualitative analysis

We analysed the fieldnotes and group interview transcripts together. The approach to analysis was predominantly inductive so that categories and themes were derived from the data (Pope, Ziebland and Mays, 2000). The analysis was also informed by our previous work (Pope et al., 2013; Turnbull et al., 2014) and therefore we drew on some *a priori* coding relating to the everyday use of a Computer Decision Support System. Each researcher read a sample of transcripts independently identifying topics and issues. We then compared and discussed the different ways in which each researcher had coded their transcripts and sought to create an agreed set of codes which were then applied to the rest of the data using Atlas.Ti. We then examined how different elements fitted into categories and how these categories related to each other creating sets of themes and sub-themes (Pope, Ziebland and Mays, 2006; Mason, 2002). We wrote narrative and data summaries to support our analysis, and also included the use of matrices and charting to facilitate comparison. Our analysis of risk work developed out of research team discussions about the ways in which call-handlers talk about how they managed risk and our growing awareness of the tensions between the promises of the technology and the realities of everyday work. All names used in the article are pseudonyms.

Findings

Our analysis of the observations of call-handling work showed that a substantial part of the everyday practice, experience and interaction of staff on the frontline of delivering urgent care, concerned the management of risk. In their informal conversations with us and in focus group interviews call-handlers stated that they recognised the risks inherent in their role. We start our analysis by examining the nature of risk work for call-handlers and how this risk work gets done.

## The risk ‘problem’: balancing safety and efficiency in telephone assessment

NHS 111 aims to minimise risk to both individual patients and to health systems, identifying people who require care, but also minimising risks associated with referring patients to health services unnecessarily. Clinical safety was emphasised in the call-handler training at sites and there was a shared view across all sites that the Computer Decision Support System provided a standardised assessment that was very safe. Call-handlers and other stakeholders described NHS Pathways as a ‘risk-averse’ system in its design. They perceived the technology as highly effective at identifying people who required care (that is it had high sensitivity) but felt that it could not always discriminate between life-threatening and less urgent cases (that is it lacks specificity). As the following observations indicate this was generally felt to be a positive feature, in that it supplied a necessary ‘safety net’, allowing trust in the technology when used by non-clinical staff.

Sarah [manager] says she thinks NHS Pathways … ‘offers good solutions’ […] ‘It is conservative but better than the alternatives … it has to be conservative to be used by this group of workers.’ *Observation*, *Site 5, call centre*

Yvonne [clinical adviser] says that Pathways is ‘a very risk averse system’ and that ‘you need clinicians [present in the call centre] as it’s so risk averse otherwise you’d end up with an ambulance for everything’. *Observation, Site 1, urgent care centre*

When using the Computer Decision Support System call-handlers were required to interpret the caller’s description of the medical problem and use this interpretation to assess and manage the possible risks to health associated with patients’ symptoms. The NHS Pathways algorithms involved a set of clinical assumptions which were designed to manage clinical risk which required managing by the call-handler during the telephone assessment. The structure of the algorithms - which open with questions related to serious and life threatening health risks - and the emphasis in training on precautionary practise meant that the call-handlers begin the assessment by initially selecting the pathway for the most serious types of health risk. A symptom of chest pain might initially be triaged as cardiac in origin, rather than stomach pain/indigestion. The emphasis on caution in training and in the technology itself could also lead call-handlers to be cautious, and in the following extract from field notes it is clear that the call handler used the callers’ anxiety to justify a cautious response noting it was ‘better to be safe than sorry’:

Amanda [call-handler]: ‘The caller was quite young to have cardiac pain, but she seemed quite concerned and it’s better to be safe than sorry’. *Observation, Site 2, call centre*

Sally [call-handler] describes a call about a toddler with a possible allergic reaction. She felt it was best to ‘err on the side of caution; especially with babies; you never know and the aunty … didn’t seem to know the answers’. O*bservation Site 1, call centre*

At the same time call-handlers recognised that this risk aversion created problems for health services. Staff were aware that the way in which they used NHS Pathways could create demand in other parts of the healthcare system such as urgent care centres, emergency departments and 999 ambulance services. Call centre and urgent care staff suggested that the nature of standardised algorithms in the Computer Decision Support System in managing risk placed additional burdens on ambulance services and on urgent care centre workload. For example a general practitioner and a call handler both reflected on the consequences of the ‘safety first’ approach:

Sonia [GP] says that she thinks [NHS] 111 ‘is better than NHS Direct used to be … the problem with NHS Direct was that you had … clinically qualified nurses who just used to follow the system and send every patient anyway … you might as well use non-clinical call-handlers as they are less costly, but the end result is the same’ [that most patients end up with a 999, Emergency Department, or Urgent Care Centre disposition] *Observation, Site 1, urgent care centre*

David [call-handler] [tells me] that they have to follow a protocol and this ‘is a real problem when we are busy’. He seems concerned about ambulances being ‘taken up’ when patients ‘don’t necessarily need them’ … ‘but we have no choice if that’s what the system says’. *Observation, Site 3, call centre*

## Call-handler telephone assessment as risk work

While a ‘safety first’ Computer Decision Support System may minimise the risk of serious harm for individual patients, it can create additional burdens on the wider network of health services. Using the Computer Decision Support System required call-handlers to engage in risk work that involved flexible use of interpretation and judgement to manage the perceived weaknesses of the standardised (risk averse) knowledge contained in the pathways.

### Interpretation, judgement and flexibility in using the Computer Decision Support System

NHS Pathways was designed with some flexibility so that call-handlers could ask questions in different ways using ‘supporting information’ provided, which is termed ‘probing’ by the NHS Pathways developers (NHS Digital). An example of this was prompting patients to describe the nature of their chest pain as ‘crushing’, ‘shooting’, ‘aching’ and so on. Probing was a key skill in NHS 111 call-handling and was designed to elicit accurate information to provide the ‘most appropriate’ service for the patient’s needs. Chris [call-handler] noted:

‘it’s hard on the phone as it’s not face-to-face, but you are taught to probe, because if you didn’t probe it would have been an ambulance … I audit [call-handlers’ performance] as well. I have audited calls where it is safe, but sometimes it is over-safe. The job here is to give the right care, the appropriate care’. *Observation, Site 5, call centre*

Experienced call-handlers said they had learnt to judge what might be risky (‘probing too much’) and what might be too risk-averse (‘not probing enough’). They aimed to elicit accurate information whilst not straying too far from the clinical information in NHS Pathways and are aware of the risks of drawing on their own judgement. A trainer and a call-handler described this balancing act in the following ways:

Louise [trainer]: It’s getting the balance right between the ability to probe well enough to get the right information and not probe too much…that’s the balance all call-takers struggle with… Because you get feedback [during call audit] on one response that that was inappropriate so next time you probe a bit more, but then you’ve gone too far and that’s inappropriate. *Focus group, Site 1.*

Call-handlers indicated that getting the balance right was difficult. Their training emphasised ‘letting NHS Pathways drive the assessment’ but they are also told not blindly follow the algorithms, to use a wider range of skills including ‘critical thinking’ and ‘common sense’. Call-handlers were sometimes required to merge their experiential knowledge of what a particular condition or circumstance requires with the standardised advice of the Computer Decision Support System. A call handler and a trainer described the ways in which this created risk management work in the following way:

Tim [call-handler] says ‘we are not clinically qualified to make clinical decisions’ but ‘probing introduces an element of clinical decision making’. *Observation, Site 3, call centre*

Dev [trainer]: I think [the role needs] high level skills … It’s also the critical thinking because … one of the things I want people to use is bags and bags of common sense … Like, if you’ve got a worry and something’s telling you this is not right, we encourage them to act on that […] Pathways might be saying ‘this’ but I’m really not happy with it, and … people are encouraged to actually say that. *Focus group, Site 5*.

Participants saw the line between probing and leading the caller as a fine one. If a call appeared to be low risk the call-handler might be able to use his/her questioning to achieve a different outcome to that offered by the algorithm as the following call handler indicated:

Paulo [call-handler] says, ‘I rarely follow a pathway to the end. You can’t. You’d never get to a disposition. You have to go off of the exact questions and ask them slightly differently. Depending on how you ask the questions … you can ask them in such a way as to change the response and convince someone’. *Observation, Site 3, call centre*

The participants in our study talked about a system that was designed to be ‘very safe’ but which could also create uncertainty and errors. They tended to attribute such errors to human failures, either inaccuracy in the assessment by the call-handler, or inaccuracy of information provided by callers. For example call handlers and other participants described the possible errors in the following way:

Victoria [clinical adviser]: I think it’s because [call-handlers] don’t have an understanding of palpitations and MI [myocardial infarction]; that’s why it’s giving two different dispositions […]

Louise [trainer]: I mean Pathways is safe, it’s never been found to be our fault.

Neil [call-handler]: The fact of the matter is there is always going to be human error doing Pathways. You can have excellent call-takers but there’s always going to be a little bit of human error...

Priya [call-handler]: Human error with face-to-face consultations. That’s the nature of healthcare, isn’t it?

Neil [call-handler]: It happens and people will make mistakes. And it gets massively busy, sometimes you just think ‘oh god, okay, he’s saying he’s got chest pains, fine, send it [an ambulance].’ *Focus group, Site 1*

Jay [clinical adviser] says ‘I was very sceptical and tried to find errors, but it is safe’. That was my biggest concern. In a lot of cases that don’t work quite right, it’s not the software or call-handler that has failed, it’s the fact that the patient hasn’t given concise information. *Observation, Site 4, call centre*

### **Transferring risk work to others**

Whilst call-handlers managed risk in conjunction with the Computer Decision Support System, they also manage risk by transferring decision making (and therefore risk work) to clinicians and to callers. NHS Pathways algorithms did not encapsulate all possible contingencies and clinicians can be asked to step in to manage cases where there is a complex history or multiple symptoms, or a lot of uncertainty (for example, where the patient answers ‘not sure’ to three or more questions during triage). The clinical workforce played a key role by sanctioning ‘early exits’ (where the call-handler exited the assessment before it was complete) and ‘over-rides’ (where the call-handler chose not to follow a pathway/disposition) since call-handlers were not allowed to downgrade dispositions. This mediation of the risk assessment process by clinicians helped to counter the ‘safety first’ bias of the system as Phil [clinical adviser] noted:

‘You need clinicians as it is so risk-averse otherwise you’d end up with an ambulance for everything’. *Observation, Site 3, call centre*

The importance of this clinical role was particularly emphasised at Site 4 where call-handlers commented that clinical advisers have the clinical skills and professional autonomy to manage risk as the call managers and handlers noted:

Anya [call manager]: I was sat with a nurse . . . I was probing, and she was taking … more what I would have considered a risk, than I would have done as a call-handler …
Mags [call-handler]: Yes, because they know more.
Anya [call manager]: Because they know more, and they’ve got more information, and I felt quite uncomfortable that they were trying to push me to go further than I would have wanted to go.
Paula [call-handler]: That’s how I felt when I started. I sat with a nurse all the time . . . I found it really helpful in one way, but in another way, not, because they were asking me to think out the box, which I couldn’t. I kept trying to say, ‘I’m a call-handler, and I can’t go off from what’s in front of me. I can’t think clinical like you.’ *Focus group, Site 4*

Call handler indicated that they found calls designated as emergency ambulance dispositions as problematic for their risk work. There were strong normative messages within the NHS organisations that employed the call-handlers and externally (for example from ambulance trusts) about avoiding sending ambulances to patients ‘unnecessarily’ and ensuring that the number of calls resulting in an ambulance disposition were within ‘acceptable limits’ (measured against service norms). Call-handlers often felt unable to follow the dispositions to send an ambulance recommended by the Computer Decision Support System and transferred the responsibility for the decision making to a clinician as the following extract from the field noted indicates:

A man calls for his 90 year old wife. Linda [call-handler] begins the assessment and the caller says ‘Yes, yes, hurry up please’. He reports that his wife’s nose has just started bleeding. She is on warfarin. He says ‘I need to know what to do’. He is quite impatient to being asked the assessment questions. Linda explains that ‘some of the questions might seem irrelevant but they are to ensure that you get the right care’. The assessment ends with the patient advised to ‘attend the emergency department within one hour’. The caller is reluctant (or perhaps unable) to go to the emergency department so the call is, again, transferred to a clinical advisor. *Observation, Site 4.*

Even in cases that appeared less risky (for example calls that resulted in lower urgency dispositions) some call-handlers were reluctant to follow the disposition offered. In the following extract from field notes, the call-handler negotiated a different outcome for the patient.

Barbara [call-handler] takes a call … about a 62 year old male with diarrhoea and vomiting. The disposition is to ‘see own GP [General Practitioner] within 3 days’. The call-handler checks with the clinician about what to offer the patient who says ‘they can pop up to the walk-in centre if they’re worried’. After the call … the call-handler says that ‘sometimes on weekends (although today is Thursday) there could be a delay before the patient can see their own doctor’ so they are invited to the walk-in centre. *Observation, Site 3, call centre*

Participants described how probing and questioning could be used to enrol the patient in risk work, by requiring them to provide an accurate interpretation and prioritisation of their symptoms. The most common way this was done is at the call outset when the most important symptom is identified. NHS Pathways was designed to triage a single (most serious) symptom, but the patient often reported a number of different symptoms. To overcome this the patient may be asked to identify the symptom they are most worried about. For example in the following extract from field note, the call handler guides the caller towards a specific symptom:

David [call-handler] asks if the sore throat is the caller’s main concern and begins the ‘sore throat’ pathway. The patient reports a sensation of a lump in her throat and unable to swallow. The call-handler says ‘so your main concern is not being able to swallow?’ … The patient also reports … some neck pain. The call-handler says ‘so you have neck pain too, but would you say that your sore throat is your main concern?’ *Observation, Site 1, call centre*

As well as this risk work of prioritising the main symptom at the start of the call, call-handlers could also transfer defer risk to callers at the end of the call by offering a choice of final disposition as in the following extract from field notes:

Sam [call-handler]: ‘We recommend you contact your GP in the next 12 hours. You have a couple of options; go to your GP, or the drop-in centre. Or you could go to the urgent care centre at the hospital. Those are your options at the moment. What do you think you will be doing?’ *Observation, Site 2, call centre*

## The experience of managing risk: ‘not just a call centre job’

Call handlers told us that they did not find managing risk easy. Being accountable created some anxiety and this was particularly observable at sites less experienced in providing NHS 111 services (Sites 4 and 5). Some call-handlers felt a huge sense of personal responsibility for making the right disposition; we found a particular high levels of unease about ‘getting it wrong’ at Site 4 as is evident in the following quotes from the group interviews:

Anya [call manager]: It’s a massive, massive responsibility because one mistake, it can cost somebody . . . their life.

Jan [call-handler]: Which is a lot for somebody who is only call-handling and . . . not medically trained.

Sarah [call manager]: . . . It’s always at the back of your mind how serious and how important it is. *Focus group, Site 4*

Call-handlers talked about their anxiety after calls that they had not triaged accurately or had given incorrect advice. For example we recorded in the field-notes one handler’s anxiety in the following way:

Amy [call-handler] describes being ‘really worried’ about the previous call, during which she advised the patient they could take aspirin. She followed the ‘breathing pathway as it’s the most risky’ but the patient later reported chest pain and abdominal pain. ‘I forgot you can’t have aspirin with abdominal pain but I’d followed the [Pathways] advice for chest pain, which was saying aspirin’ … She talks to the clinical adviser who reassures ‘Sorry I missed that too; the ambulance is there now’. *Observation, Site 3, call centre*

Call-handlers talked about feelings of guilt when triage was not completed accurately, or they did not probe for enough information during the call, for example when an ambulance had been sent unnecessarily as in the following extract from field notes:

Alex [call-handler] says ‘It’s when a person from [the ambulance service] phones up … because someone has sent an ambulance [for a] person that needs a prescription. And you think, “Was that an ambulance *I* sent?” And you feel guilty. You have to trust the patient, but you do have to probe’. *Observation, Site 5, call centre*

Call-handlers said that they were aware the risks inherent in their role and this led them to distinguish their role from other non-health call-handling roles. In our conversations they were clear that their identity was closer to (clinical) healthcare workers than to other types of call centre workers. Call-handlers were proud of their status, with some acknowledging the clinical knowledge and decision making in their role as in the following extracts form field notes and interviews.

Stefan [call-handler] explains that ‘it takes experience and skill to remember to do all these things; it’s not all on the screen’. [He] is eager to portray his role not as a ‘call centre job’. He says that if his friends tell him ‘that it’s just a call centre job’, he says that ‘it’s not’ and describes feeling quite angry about this. *Observation, Site 1, call centre*

Anya [call manager]: It isn’t just a call-handling role anymore… It used to be … you answered the phone, you asked your questions, that was it. Now, call-handlers have got to have some degree of knowledge of physiology, to be able to know how to probe, what questions to ask.

Mags [call-handler]: I think it’s a highly skilled job. I do, honestly. *Focus group, Site 4*

Some call handlers said there should bea recognised qualification or for a job title for NHS 111 call-advisers as a means of formalising and recognising the training undertaken and legitimising call-adviser identity. Some felt that the title of ‘call-adviser’, ‘call-taker’ or ‘call-handler’ did not fully reflect the serious nature of their engagement in clinical work and the risks they managed, a view which both call managers and handlers endorsed as in the following quotes from interviews:

Anya [call manager]: [I would] like a recognised qualification, and a title as a healthcare . . . something to do with ‘health’ in it so that they realise that they’re not just . . . you can be a call-handler for a catalogue firm … [but] to recognise the work they’re actually doing.

Mags [call-handler]: We’re almost healthcare providers now, giving healthcare advice, aren’t we?

Sarah [call manager]: It’s got a lot of responsibility attached to it [. . .]

Anya [call manager]: . . . The other day, somebody collapsed in [shopping centre] in front of me. I went up to this lady and says, ‘I’ve got no medical knowledge’, and I waited for this first aid person to come. But I turned to [a colleague] and she says, ‘Well, really, you shouldn’t say you’ve got no medical knowledge, because you do Pathways. You have got medical knowledge’.

Mags [call-handler]: And we do . . . life support.

Anya [call manager]: . . . basic life support . . . but really, we’ve not got a title [. . .] A recognition that this is a clinical environment. *Focus group, Site 4*

Discussion

Prior to the development of NHS 111, non-clinical call-handlers did not undertake extensive risk work. At NHS Direct, a service that preceded NHS 111, call-handlers undertook initial prioritisation of calls using ‘emergency protocols’ (Goode et al., 2004) but nurses were responsible for clinical assessment, and thus, most of the risk work. Whilst it has been suggested that ‘an increasing number of professionals find their everyday work articulated in the language of risk’ (Horlick-Jones, 2005, p. 293), we found in our study that lower status call-handling workers are now also engaging in everyday risk work. NHS 111 is predicated on a model of labour substitution and the use of a technology has dispersed risk so that this lower level risk work is less visible. Yet it is clear that while the call centre organisation is responsible for mechanisms that manage and monitor risk (for example documenting telephone assessment, provide sufficient training, operationalising the Computer Decision Support System, adhering to wider quality service standards), the actual risk work is undertaken by call-handlers.

It is assumed that the technology (NHS Pathways) can minimise and thus manage risk through standardisation but we found that this was not the case. Instead, we suggest that risk work is generated by the deployment of the Computer Decision Support System and managed ‘outside’ the software system by, predominantly, clerical staff. Greenhalgh et al., (2009) noted the significant human effort needed to bring technologies into use. Our study extends this observation by identifying the effort call-handler and managers had to make in relation to risk work associated with Computer Decision Support Systems. We found that the algorithms generate risk work for human actors, and this directly shapes the everyday work of call-handlers. Echoing Gale et al. (2016), we see call-handlers acting as translators of risk (performing a mediating role between the Computer Decision Support System and the health service and the patient) and as minimisers of risk (delivering safe but effective triage). They use questioning and prompts to translate the probability of risk contained in the algorithms to the caller, and then translate or recode the caller’s description of their health state (and potential health risk) back into the Computer Decision Support Systems categories. In this way, risk work is not ‘in the machine’ or ‘in the call-handler’ but it is accomplished by both. The way in which call-handlers probe and use the technology may shape the decision making process. This reflects Lipsky’s insight that front-line workers use discretion and judgement precisely because, in bureaucratic work, machines have not been able to replace these human skills (Lipsky, 1980).

Researchers have studied how nurses tailor Computer Decision Support System standardised scripts using their professional expertise and autonomy to manage the range of contingencies that arise in telephone consultation work. They have shown that nurses are able to pre-empt the ‘rules’ to override standardisation (Greatbatch et al., 2005) and that significant human effort is involved in this type of work (Greenhalgh et al., 2009; Murdoch et al., 2015). Other researchers have examined how nurses engage in risk management work (Hanlon et al., 2005; Smith, Valsecchi, Mueller, & Gabe, 2008; Ruston, 2006) engaging in ‘informal risk management practice’ using the standardised Computer Decision Support System but also working ‘as professionals’, without supervision or standardisation of practice (Ruston, 2006). Clinical staff, especially doctors, are trained to deal with medical uncertainty (see for example Atkinson, 1984; Fox, 1980). However we have shown that non-clinical call-handlers working in the NHS 111 service do not possess the same status or experience and yet have significant accountability for risk. We found that, like nurses, call-handlers have some autonomy in call-handling which is why the risk work falls on them, but they do not have the ‘protection’ of clinical expertise. NHS 111 call-handlers perform the same kinds of risk management work described in studies of nurses working in NHS Direct. They use interpretation to gauge symptom accounts, they balance the dispositions offered with ‘common sense’, they draw on their experiential knowledge of when to probe and call on the professional judgement of other, clinical staff, to manage the risks generated by the Computer Decision Support System. This is their risk work.

Risk management has been described as: ‘one of the most sensitive activities undertaken by organizations, having a central role in determining the fortunes and indeed survival of the organization in question’ (Horlick-Jones, 2005, p. 299). This raises interesting questions for the management of risk in a healthcare setting where this activity has been pushed down the workforce hierarchy onto workers that do not have the clinical training, experience or qualifications of healthcare professionals. Whilst service providers and policy makers may view risk as a technical matter, one that relies on accurately gathering, measuring, sorting and control of clinical information (see Gabe, 1995; Goode et al., 2004) this is not the everyday experience of call-handlers. These clerical workers do far more than simply ‘follow the machine’. Of course, the observation that lower level staff do much more than their position signifies is not new, it is widely recognised in the sociological literature (see for example Mechanic, 1962) but what they do has not been extensively examined as risk work.

The impact of risk work for call-handlers is that it engenders feelings of responsibility and anxiety beyond their status as clerical workers. These staff were very aware of their status as lower order workers (in as much as they are not ‘medically trained’) but understood that they were performing clinical assessment, not usually associated with such a role (Mechanic, 1962). This is risk work. As others have noted (Gale et al., 2016) those that have the power to ‘define people as at risk’ can create new health-related identities. In our study it was evident that feelings of responsibility, and recognition that they were engaging in ‘risky’ healthcare decision making, contributed to call-handlers identifying as ‘healthcare workers’ rather than call centre workers.

The use of this workforce for this type of work raises questions for the provision of urgent and emergency care. There has been a shift towards ‘scientific-bureaucratic medicine, towards the standardisation of practice that relies on protocols, monitoring, and performance measurement’ (Checkland, Marshall, & Harrison, 2004; Ruston, 2006) and in urgent care these shifts have entailed labour substitution – replacing clinical expertise with Computer Decision Support System, and clinical workers with non-clinical. The evidence about the implications for cost-effectiveness of different levels of clinical decision making and risk management is unclear. Clerical call-handlers are cheaper but precisely because they are not trained or paid to manage risk and uncertainty in the same way as clinicians, but that does not mean they are exempt from risk work. There is an assumption that the Computer Decision Support System bears the burden of managing risk but our findings suggest otherwise. Risk has been distributed by the technology and NHS 111 is a service that relies on a non-clinical workforce to take on significant risk work. Whether NHS organisations fully recognise this is not clear.

Conclusion

This new model of urgent care has changed who performs telephone assessment and how it ‘gets done’. Technology designed to support risk management has meant that risk is managed in new ways – and is dispersed across a wider system of workforce, organisation and technology. Risk work now involves ‘making the technology work’ and much of this work has been displaced to lower order call-handlers. These new healthcare workers are interpreters of risk. Risk work creates a sense of responsibility (and sometimes anxiety) in non-clinical call-handlers. Even in this environment which attempts to standardise practice and contain risk, variation in practice, and thus new risks are created which in turn must be managed by the risk workers we have described.

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| 1. **Organisational characteristics of the study sites in England**
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|  | Site 1 | Site 2 | Site 3 | Site 4 | Site 5 |
| Start date of service | Aug 2011 | Nov 2011 | May 2011 | Nov 2011 | Mar 2012 |
| Location | North East | North West | South | Midlands | South |
| Geography | Urban & rural | Urban town | Urban town & rural | Urban city, town & rural | Urban |
| Population | 600,000 | 140,000 | 140,000 | 760,000 | 250,000 |
| Call-handling provider organisation | Ambulance Foundation Trust | GP-led out-of-hours organisation (part of larger consortium) | Ambulance Trust | GP-led out-of-hours organisation | Commercial provider |
| Number of call centres | 2 | 1 | 1 | 2 | 1 |
| Number of urgent care centres | 6 | 2 | 1 | 8 | 2 |