Medicines advice out of hours: exploring the opinions of healthcare professionals on the use and provision of on-call pharmacy services in England

by

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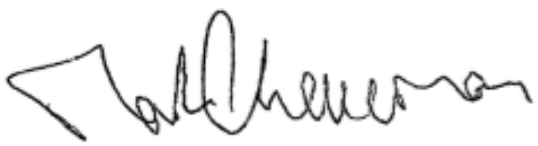

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ABSTRACT

Provision of NHS hospital pharmacy services has historically been delivered during typical ‘office’ hours. During these hours most pharmacy departments provide a medicines information (MI) service where any healthcare professional can ask for medicines advice. Outside of these hours questions are handled by an on-call pharmacist. This study aimed to investigate the provision of pharmacy services and medicines advice out of hours, from the perspective of pharmacists and other healthcare professionals, in NHS England.

A mixed methods approach was used: an online survey of all Chief Pharmacists in England (2012: n=220) and semi-structured interviews of on-call pharmacists (2014: n=8) and doctors and nurses (2015: n=3 & n=4 respectively) in the East of England. The online survey provided information about the provision of on-call pharmacy services in England, documentation of calls handled, and provision of relevant training. Semi-structured interviews generated 19 themes, grouped into 5 meta themes: documentation, individual’s knowledge and experience, information accessibility, use of service, and awareness of service.

On-call pharmacy services were provided by most hospitals, predominantly by less senior staff with limited years’ experience. Documentation of questions was variable, and less than half of Trusts had a documentation policy. Documentation by on-call pharmacists was found to be affected by their knowledge and experience, if they had any concerns about the enquirer’s understanding, the time the call was received, and remuneration and Information Technology (IT) issues. Both Chief Pharmacists and on-call pharmacists identified that training mainly consisted of operational issues, with on-call pharmacists believing a greater role could be played by MI staff in this training. Drug administration and ‘medication safety check’ were the main types of medicines advice questions sought out of hours. Chief Pharmacists stated on-call pharmacy services were well advertised but doctors and nurses seemed unaware of its provision and means of access; on-call pharmacists perceived this to be due to a lack of promotion. Access to information out of hours, particularly patients’ drug and clinical information, by on-call pharmacists was a barrier to providing medicines advice.

This is the first insight into the national landscape of on-call pharmacy services. There is a clear role for MI services to support on-call pharmacy services, and national standards should be developed for provision, information accessibility, documentation

and training. National pharmacy policy makers could also consider structured training, repeated on a regular basis, for all on-call pharmacists.

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ABBREVIATIONS

BYOD	Bring Your Own Device
CCGs	Clinical Commissioning Groups
DoN	Director of Nursing
EPMA	Electronic Prescribing and Medicines Administration (system)
HPTP	Hospital Pharmacy Transformation Programme
IRAS	Integrated Research Application System
NeLM	National electronic Library for Medicines
NHS	National Health Service
MD	Medical Director
MI	Medicines Information
R&D	Research & Development
SLA	Service Level Agreement
SPS	Specialist Pharmacy Service
SPSS	Statistical Package for Social Sciences
STPs	Sustainability and Transformation Plan
UIN	Unique Identification Number
UK	United Kingdom
UKMi	UK Medicines Information

CHAPTER 1 INTRODUCTION

The first section of this chapter introduces the background to this research including the researcher's personal motivation for undertaking this study. This is followed by a critical evaluation of the literature relevant to this research. The chapter concludes by outlining the research aim and objectives relevant to this study.

1.1 Background and personal motivation

The provision of National Health Service (NHS) hospital pharmacy services has historically been delivered during typical 'office' hours, i.e. 9am – 5pm. This is increasingly at odds with the provision of services by other areas within hospitals, particularly general medical and nursing services. There is now an expectation that hospital pharmacy services should extend their opening times, and, although some have achieved this, most continue to only provide an on-call pharmacy service outside office hours. [1, 2]

During normal working hours most pharmacy departments provide a medicines information (MI) service where any healthcare professional can ask for medicines advice. This service is usually provided by pharmacists with particular skills in locating, assessing and interpreting information about medicines.[3] These skills are mostly developed within the role which includes receiving regular feedback from peers. However, these skills can also be gained through attending a bespoke national training course and completing e-learning packages. [4, 5]

United Kingdom (UK) MI services are expected to operate to national standards during normal working hours, however there are no similar guidelines for on-call pharmacy services. [4] These national standards relate to how questions for medicines advice are handled, including: documentation; the resources available for use; risk management; and, training.

Outside of normal office hours, an on-call pharmacist will field calls typically from other healthcare professionals from within their own organisation (although infrequently from external organisations), involving either the supply of medication or provision of medicines advice. On-call pharmacists are usually employees from the pharmacy department of that hospital: they could be any pharmacist, including the MI pharmacist, and usually participate on a rota basis. The knowledge, experience and training between these on-call pharmacists does vary. [6, 7]

At a national level, most hospital Trusts have a dedicated MI centre, collectively referred to as UK Medicines Information (UKMi). [3, 4] The service handles over half a million enquiries each year during normal office hours. [3] High user satisfaction levels have historically been reported with the UKMi service, and more recently attempts have been made to determine patient outcomes based on UKMi advice. [8-15]

However, almost all UKMi research outputs have concentrated on enquiries received during normal office hours; very little is known about what happens outside these hours. This may, in part, be because on-call pharmacy services are not usually managed or staffed specifically by a hospital's MI service, as outlined earlier. [16-18]

Since qualifying as a pharmacist I have worked in the NHS for nearly 20 years, the majority of which has been within hospital pharmacy. During this time, I have worked as a MI pharmacist for 10 years across two regional medicines services – one in a large acute teaching hospital, the other in a medium sized acute hospital. Both MI centres provided an excellent service during 'office' hours according to data from user satisfaction surveys.[19 – 22] I have also worked as part of an on-call pharmacy service for approximately 5 years.

I have personally undertaken service evaluations/developments and some research related to medicines advice out of hours as part of my NHS employment. [23-25] Constraints on my time and limitations in my own research knowledge and skills meant that these have lacked the depth and rigour needed to draw any robust conclusions or recommendations. I believed that the need for MI by healthcare professionals did not stop when UKMi services closed because the care of hospital patients is 24 hours, 7 days a week. The standard and quality of MI enquiry handling and documentation, usually related to an individual patient, should be no different according to the time of day or night that this might be needed but I considered that in practice, there may be a difference. Therefore, based on the body of research and my own experiences, as both a MI and an on-call pharmacist, I began to strongly believe that there was a need to understand how medicines advice is managed out of hours. I wanted to find out how on-call pharmacy services are provided across England and the support that pharmacists receive, what the information needs (if any) are of those that use the service, how frequently medicines advice is provided, and how such enquiries are handled. Rather than just focus on quantitative methods, I also wanted to explore the opinions and perceptions of the on-call pharmacists that provide this service, and of those who use it. This might lead to a better understanding of the views of those providing, and those using on-call pharmacy services. This research might then lead to

recommendations for on-call pharmacy services or identify future research. I hoped that through formal study, culminating in this PhD, these questions/ambitions could be answered in a robust way and lead to an improvement in on-call pharmacy services and ultimately to improved patient care.

1.2 General overview

Hospital pharmacy services historically only supplied medicines to patients treated by the organisation. However, as medicines became more complex (circa1960s) hospital pharmacy developed from its supply function to a more 'clinical' role. [26] Hospital pharmacists' 'clinical role' involved them working in particular specialisms, e.g. medicine, surgery, trauma and orthopaedics, whilst reviewing the appropriateness of prescribing and advising clinicians accordingly. A specialism within pharmacy that developed alongside this 'clinical' role was drug information.

The term drug information was phased out in 2000 because 'drug' had become associated with drugs of abuse, and instead 'medicine' was adopted, and the service is now commonly known as MI. [27] Initially developed from two centres (London and Leeds) in 1969, today there are now approximately 200 'local' and 14 'regional' centres and are recognised as part of the Specialist Pharmacy Service (SPS). [28] Local centres are usually based in a hospital and provide a service to that organisation, whilst regional centres predominantly receive questions from primary care but also provide specialist services on medicines, for example medicines in lactation, pregnancy, renal disease and dental care. Today, as previously described, these MI centres, collectively termed UKMi, provide a service during typical 'office' hours similar to other hospital pharmacy services. Healthcare professionals usually working in the same hospital can contact the MI service with questions about medication. In a hospital setting, these questions usually involve those seeking advice to support and influence clinical decisions about the care of individual patients. However, sometimes clinicians may seek evidence-based information relating to the general use of medicines.

According to the Oxford Dictionary, 'information' is defined as facts provided or learned about something or someone. [29] MI has been defined as the provision of unbiased, evidence-based and critically evaluated information about medicines, in an attempt to improve patient care. [27] However, it is this researcher's opinion that the term medicines advice is a more appropriate term to use. Advice is defined as guidance or recommendations offered with regard to prudent future action [29] and this better reflects practice and demonstrates it is not just facts that are provided. Medicines advice could

therefore be defined as the provision of guidance or recommendations based on unbiased, evidence-based and critically evaluated information about medicines, in an attempt to improve patient care. It is for this reason that the terms MI and medicines advice are used interchangeably throughout the thesis. In recent years, one regional UKMi centre has changed their name from a MI service to a Medicines Advice service.[30]

MI services are typically provided by pharmacists, although a limited number employ pharmacy technicians and health science graduates. When MI staff receive a question or 'enquiry', they will first ensure that they have all the necessary background information from the enquirer. After agreeing a timeframe in which a response is needed, and how that would be communicated to them, a number of information sources are accessed by the member of MI staff to find information relevant to the enquiry. Once the information is collated, it is then critically evaluated allowing an answer/response to be formulated. This is then communicated to the enquirer either verbally or in writing as agreed. Throughout this process, all aspects of the enquiry answering process is documented using a bespoke database (MiDatabank).

Depending on the complexity of the enquiry the MI service assign a complexity level, 1, 2 or 3, to the enquiry. This is independent of the time taken to complete or the method used to communicate a response and does not have an impact on the urgency or the prioritisation of an enquiry. Level 1 questions are defined as 'simple enquiries' which can be answered using data from one or two standard sources. Level 2 and 3 questions are defined as 'complex' enquiries: level 2 require the use of multiple and more specialist sources where the available evidence provides a reasonably clear answer or course of action; level 3 is defined as an enquiry in the absence of a clear answer or course of action from available sources where professional judgement is required to provide advice. This may require specialist evaluation of multiple sources and the evaluation of primary literature. [4]

1.3 NHS policy development affecting MI services

In 2012, during the first year of this research, the NHS was in a relatively stable period. However, in recent years there have been a plethora of changes and policies developed by or on behalf of the NHS which had an effect on provision of pharmacy services and therefore potentially impacted on this study. Panel one identifies key policy documents up to January 2019, although the extent to which these will impact on UKMi is still yet to be fully understood.

Panel 1. Summary of key policy documents

- NHS England. The Review of Specialist Pharmacy Services in England; May 2014.
- NHS England. NHS Five Year Forward View; October 2014.
- Department of Health. 7-day NHS services; July 2015.
- NHS England. Transformation of seven day clinical pharmacy services in acute hospitals; September 2016.
- Lord Carter of Coles. Operational productivity and performance in English NHS acute hospitals: Unwarranted variations; February 2016.
- NHS England. The NHS Long Term Plan; January 2019.

Since its conception in 1948, the NHS has undergone many structural re-organisations. In its current guise, the fundamental structure consists of primary, community, secondary and tertiary care. However, since the Health and Social Care Act was implemented from 1st April 2013, the NHS has become more complicated, with the introduction of Commissioners and Providers. [31] For example, in primary care, general practice and community pharmacies are Providers, with Clinical Commissioning Groups (CCGs) and Local Authorities being Commissioners. In secondary or tertiary care, the Providers are hospitals with NHS England, and CCGs being the Commissioners. These changes resulted in the abolition of Primary Care Trusts which had historically funded the majority of regional MI centres. This brought about uncertainty in the way in which MI services, predominantly regional services, were funded and led to the SPS Review in England (2014). [28]

The review, published in May 2014, made a number of recommendations about the organisation, commissioning, governance, accountability and leadership of SPS in England. The review made some key recommendations, the most significant for MI being that there should be four hubs (one per NHS region) and six spokes. As of early 2019 this re-organisation of regional centres and services is in progress. Although not seen to date, this could mean closure of some regional centres, or their work subsumed by other centres. The impact of this report is however unlikely to have a substantial impact on ‘local’ MI services, although this is not the case for subsequent reports described.

Greater integration of services is certainly something that the NHS is looking towards, as outlined in the Five Year Forward View published in October 2014. [32] This report set out the future of NHS services in England and stated that change was needed for the NHS to survive. It highlighted that the traditional divide between primary care,

community services, and hospitals is increasingly a barrier to the personalised and coordinated health services patients need.

As a result, every local health and care system in England was asked to come together to create a Sustainability and Transformation Plan (STP) to take forward the implementation of the Five Year Forward View. Of the 44 STPs developed, only a small number of STPs included pharmacy or medicines management services in their plans to encourage greater collaborative working within a sector, e.g. hospitals, and between sectors, e.g. hospital and primary care. However, the researcher is aware of organisations within STPs beginning to merge some MI centres and/or outsourcing them to other Trusts or regional MI centres.

In 2015, the UK government also announced that it would implement a 7-day NHS service by 2020. [33] Whilst this has until recently focused on medical staffing, NHS England published its report entitled 'Transformation of seven-day clinical pharmacy services in acute hospitals' in September 2016. [34] Although this report focuses on developing and extending the clinical pharmacy service, it does not explicitly refer to infrastructure services including MI.

In early 2016, Lord Carter of Coles published an independent report 'Operational productivity and performance in English NHS acute hospitals: Unwarranted variations'. [35] The significance of this was that all Trusts had to develop and implement a Hospital Pharmacy Transformation Programme (HPTP) by April 2017 and ensure that more than 80% of Trusts' pharmacist resource is utilised for non 'back office' functions, namely direct medicines optimisation activities, medicines governance and safety remits (not explicitly defined). This has the potential to impact MI services if Trusts perceive these not to be a patient-facing activity. The researcher is aware of Trusts classifying their MI services as 'back office' and merging or outsourcing to other Trusts or regional MI centres in order to achieve the 80% cited in HPTPs. Although less likely, this could be applied to on-call pharmacy services. [36]

In 2019 the NHS Long Term Plan was published and whilst it does not specifically refer to MI services, it does include a vision for developing pharmacy roles, e.g. clinical pharmacists as part of primary care networks, and a more integrated NHS. [37] Both the effect of the SPS Review and the Lord Carter of Coles report on MI services may be mitigated by the recommendations of this latest plan, as pharmacists within primary care networks may require greater support.

In summary, these reports will affect the organisational structure of MI services because of required efficiencies. As the national landscape changes so that the health system becomes increasingly integrated, this may present opportunities as there may be a greater need for MI services. However, at the same time this may create challenges for MI services to operationally deliver and respond to further developments

1.4 Literature Review

The literature review relates to both the provision of MI services and on-call pharmacy services, both of which provide medicines advice during and outside normal working hours, respectively.

In order to understand the provision of pharmacy services and medicines advice, the first part of this review has evaluated the literature for how such services are typically provided during normal working hours. The provision of medicines advice during normal working hours is usually undertaken by MI services as these are already well established and previously described (Section 1.2). The literature for MI has been summarised into three themes (Sections 1.4.2) to aid the reader in understanding the body of work published. The second part of this review evaluates the literature for on-call pharmacy services, which includes the provision of medicines advice, and has also been summarised into three themes (Sections 1.4.4). Within the themes for MI and on-call pharmacy services, the literature within the tables is presented chronologically to illustrate how it has changed with time. Review articles are the exception and are therefore presented at the beginning of each theme where applicable.

1.4.1 Search strategy

The bibliographic databases Scopus, Embase and Medline were searched. In addition, the catalogue of available UKMi Practice Development Seminar poster abstracts were reviewed as this resource is not included within the bibliographic databases. For thoroughness, Regional MI Directors were also contacted for any studies relating to MI out of hours that they, or their regional UKMi research leads, were aware of that may not have been published. Furthermore, the National electronic Library for Medicines (NeLM) and UKMi website were searched for relevant publications (grey literature).

The search terms chosen by the researcher, as outlined in Appendix 1 and 2, were used to identify the literature for hospital MI services or hospital on-call pharmacy services. These were the two areas that the researcher was particularly interested to

understand what had been published previously and the methods used. These search terms were broad and so when there was a high number of results, other keywords were combined to reduce the number of irrelevant hits whilst ensuring that relevant papers were not inadvertently excluded. For example, for one bibliographical database the search term ‘patient’ was used to avoid including studies that were about provision of MI services to patients. However, different combinations of search terms were used to minimise the likelihood of excluding relevant papers as outlined in Appendix 1 and 2. Using the thesaurus associated with each bibliographic database determined the most appropriate search term for the researcher to use, thereby enabling the use of controlled or standardised vocabulary. This was achieved as each bibliographic database has its own vocabulary for searching and so there can be subtle differences between bibliographic databases. For example, according to EMTREE the thesaurus associated with Embase, the correct search term to use for medicines information services was ‘Drug Information’. However when searching Medline, the thesaurus MeSH was used and the correct term for medicines information services was ‘Drug Information Services’. Identifying search terms using the associated thesaurus for each bibliographic database therefore ensured that the topics had standardised search terms or keywords assigned to them. To allow relevant articles to be located, the search term or keyword and all subheadings were ‘exploded. ‘Exploding’ a keyword in this way means that it minimises the risk of missing relevant information from the search because ‘narrower’ terms are included. Using the Medline search term ‘Drug Information Services’ as an example, the following illustrates its subheadings and what is included when the term is exploded:

Panel 2. MeSH search terms for use within the bibliographical database Medline

Drug Information Services+
- Adverse Drug Reaction Reporting Systems
- Clinical Pharmacy Information Systems
- Prescription Drug Monitoring Programs

An ‘exploded’ search term is illustrated by the prefix ‘ALL’ or ‘exp’ depending on the database used. For example (exp *DRUG INFORMATION/ OR exp *MEDICAL INFORMATION/) AND exp *HOSPITAL PHARMACY/ or (((ALL(medicines information)) OR (ALL(drug information)) OR (ALL(advice))) AND ((ALL(on call)) OR (ALL(on-call)) OR (ALL(emergency)))) AND (ALL(pharmacist)).

Where a search term was not available, free text or ‘all fields’ were used, for example “medicines information” or medicines information.af, respectively. These were chosen by the researcher based on the search term that would have been used had it been available or existed as a keyword in other bibliographical databases. This also meant that the likelihood of missing any relevant papers was further minimised.

The exclusion criteria were defined before the search strategy. This excluded studies which did not relate to the provision of a hospital-based MI service, those involving hospital-based MI services which solely provided a service to primary care, the community setting or patients, or studies about patient medicines helplines specifically because they were not relevant to the provision of MI services to secondary healthcare professionals. Opinion papers were also excluded Only studies relating to MI or on-call pharmacy services to healthcare professionals were included. Initially any paper which appeared related to these two services were included based on a review of the titles by the researcher. Following this first review, the abstracts of these studies were analysed by the researcher. Papers were only included if they related to the provision of MI or on-call pharmacy services to healthcare professionals.

The references cited by those papers identified via bibliographic database searches were also reviewed. Where relevant, these additional studies were obtained. References within the systematic reviews included in this critical discussion were excluded from the researcher’s analysis to avoid duplication. However, any papers cited by the reviews which were relevant and applicable to highlight within the critical evaluation were referenced by including the lead author(s) name. Where there was more than one paper of note, these were stated in alphabetical order.

The titles of publications generated from the search strategies for both MI services and on-call pharmacy services were first reviewed. The abstract of any that appeared relevant were then reviewed according to the inclusion and exclusion criteria previously described. As a result, papers were either accepted or rejected for inclusion within the literature review. The publications accepted for review were then reviewed to remove any duplicates. After this process was completed, a total of 23 papers (included 2 reviews) were identified relevant to MI services (Section 1.4.2) and 15 for on-call pharmacy services (Section 1.4.4).

1.4.2 MI provision

This initial part of the review evaluated the literature relating to MI provision during normal working hours and were summarised into the following three themes:

a. MI service provision, i.e. operational aspects such as opening hours, services provided, staff handling enquiries, types of enquiries and enquirers.
b. User satisfaction of MI services.
c. Impact of MI services on patient care or patient outcome.

Inevitably, there is some overlap between the studies included within these themes. For example, some of the literature about user satisfaction also included elements about the impact of MI services on patient care or outcome. Where this occurred, cross-reference is made within the critical evaluation completed in the relevant section.

For each of the three themes, relevant studies are detailed and critiqued individually within a table format. This format was used to ensure that information was not inadvertently omitted and provide a consistent structure to displaying study information. The headings used were reference (including country of publication/relevance), the aims and objectives, type of study, what was the study about, outcome measure(s) and key findings/conclusions (relevant to this research). The information documented for each of these headings is the researcher's analysis of the study/paper. A critical evaluation of the publications is provided after each table and general limitations associated with MI publications across all three themes is included in Section 1.4.3.

Eleven papers about MI service provision were retrieved and are summarised in Table 1 and critically evaluated in the text of the thesis. Six of the 11 studies reviewed and summarised in Table 1 concentrated on service provision. Five additional studies reported on elements of service provision although this was not the primary purpose of the study as they had either focused on satisfaction or outcome.

Table 1. Publications relevant to MI service provision

Reference (country)	**Maguire ME, D'Arcy PFD, Smith AMJ. From the drug information centres. A decade of drug information experience in Northern Ireland. Journal of Clinical and Hospital Pharmacy 1985; 10: 297 – 302 (Northern Ireland)** [38]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Outline development of combined Drug Information Service and Poison Information Service.	Descriptive study of single regional MI centre in Northern Ireland.	Staffing, enquirer type, enquiry category and time enquiries received.	Data analysis of enquiry workload (1975 – 1984) handled by regional MI centre. Survey (1978-1981) of time enquiry received.
Key Findings/ Conclusion	Staffing included principal pharmacist, 3 staff pharmacists, rotational pharmacist, rotational pre-registration pharmacist, secretary. Pharmacists were the most frequent users (46%, n=4407/9615), followed by physicians (34%, n=3268/9615) and nursing staff (12%, n=1178/9615). Other healthcare professionals (defined as dentists, dieticians, laboratory staff) accounted for the remainder of enquirers (8%, n=762/9615). The three most common enquiry types received were pharmaceutical (not defined) (19%, n=1754/9168), availability/supply (18%, n=1671/9168) and administration/dosage (15%, n=1360/9168). Other types of enquiry received comprised of adverse effects (10%, n=903/9168) choice of therapy/indications/contraindications (9%, n=844/9168) pharmacology/pharmacokinetics (8%, n=707/9168), identification (6%, n=528/9168), interactions (3%, n=320/9168), poisoning (2%, n=164/9168). Enquiries categorised as 'other' accounted for 10% (n=917/9168). Over a third of enquiries were received between 2pm and 5pm (37%, n=1442/3870), followed by 30% (n=1144/3870) between 11am – 1pm and 24% (n=939/3870) between 9am – 11am, and 8% (319/3870) between 1pm and 2pm. Only 0.5% (n=20/3870) were received between 5pm and midnight and 0.2% (n=6/3870) between midnight and 9am the following morning. Two bulletins were circulated to hospital clinicians and GPs.		

Reference (country)	Maguire ME, D'Arcy PFD. Drug information services in four capital cities in the United Kingdom. 'A tale of four cities' – London (North East Thames), Cardiff, Belfast, Edinburgh. Journal of Clinical Pharmacy and Therapeutics 1988; 13: 207 – 212 (UK) [39]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Not clearly stated. Authors (note two same as study above) makes reference in the discussion section that one of the prime objectives was to gain information on the actual costs of a hospital pharmacy-based UKMi service.	Survey.	Purposeful sampling of four hospital-based UKMi centres (London, Cardiff, Belfast, Edinburgh). Survey conducted in 1985.	Service provision and population served, staff, available resources, enquiry workload and other services.
Key Findings/ Conclusion	Data for all centres was collected. All centres provided a service between 9am and 5pm Monday to Friday (one centre also provided a service on Saturdays). All provided voluntary emergency on-call cover and each of their hospital pharmacies provided a 24 hour service, although the nature of this service is not defined by the authors. The authors summarise the different staff groups that work within each centre and the total salaries paid per year. All centres were staffed by pharmacists. A list of computer hardware and software is provided and on-line resources accessible. The number of enquiries are provided by each centre (mean 2,249) and enquirer type is stated for three of the services; pharmacists being the largest users (58%, 50% and 43%), The cost of any enquiry at the four UKMi centres surveyed based on the time involved in this activity and staff salaries ranged from £5.36 - £10.80.		

Reference (country)	Rosenberg JM, Koumis T, Nathan JP, Cicero LA, McGuire H. Current status of pharmacist-operated drug information centers in the United States. American Journal of Health System Pharmacy 2004; 61: 2023 – 2032 (US) [40]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Identify the current provision of MI services in the US and Puerto Rico and compare the results to previous studies conducted in past 30 years.	Postal survey of US and Puerto Rico MI services.	Sent to 151 centres to complete 44 multiple choice and 'fill in the blank' questions.	Information on service provision, resources and cost-effectiveness, resources and training, and the impact of advice provided on prescribing. Identify trends in MI centre growth and development.
Key Findings/ Conclusion	A total of 81/119 (68%) MI service responses met inclusion criteria and were included in the analysis. Nearly half (48%, n=39/81) provided out-of-hours services with 72% (n=28/39) stating that this was provided by staff in the organisation's pharmacy department. A small number (5%, n=4/81) provided a 24 hour MI service. MI services were staffed by pharmacists (average 2.5 per centre). The most common type of enquiries reported were therapeutics (defined as therapeutic use and compatibility), adverse reactions, identification of US or foreign products, and dosage. These had remained unchanged from previous study results. Pharmacists (not differentiated between hospital and community) were the most frequent users of the service, followed by physicians and nurses. This finding was also consistent with previous study results. On average, 82% of enquiries were received by telephone. A response was provided verbally in 70% and in writing in 10% of enquiries. The five most frequently reported resources considered useful by MI centres according to each category type, was provided. Micromedex Healthcare was reported as the most useful resource in answering 93% (n=14/15) enquiry types. Half (50%, n=76/151) respondents reported being involved in experiential training. Other centres also		

	reported as being a Pharm.D. programme training site, an undergraduate pharmacy degree (no longer provided), programme training site and involved in MI fellowships. Just over half (51%, n=40/78) reported having a formal QA programme which primarily focused on enquiry answering, as per previous study result. The survey found that 52/77 (68%) of the responding organisations believed that physicians frequently altered their patients' drug therapy as a result of the advice provided by the MI service. However, only 18/52 (35%) organisations objectively measured this, primarily by enquirer follow up. Unfortunately, no details were given to assess this. Overall the authors conclude that the number of MI centres and MI pharmacists has declined since 1986 when the first survey was completed.
Reference (country)	**Timpe M, Motl SE. Increased availability of information resources and the effects on the complexity of drug information requests asked to an academic center. Pharmacotherapy 2004; 24 (10): 1429 (US)** [41]

Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Determine the impact of increased availability of information resources on the number, type and complexity of enquiries handled by a MI service over a 9 year period.	Retrospective analysis of documented enquiries handled.	Enquiries received by a US MI service over a 9 year period (1995 – 2003).	Number of enquiries handled, time spent answering each enquiry, the type and number of resources used and classification of the question.

Key Findings/ Conclusion	Number of enquiries decreased by a third, but the time spent answering an enquiry increased from a mean of 28 to 55 minutes. Enquiries involving primary literature searched and critical evaluation increased from 11% of total enquiries to 37% ($p<0.0001$). The time spent on literature search requests increased from an average of 70 minutes to 104 minutes. The type of enquiry remained largely unchanged. Decrease in reference and monograph requests, product identifications and product availability.

Reference (country)	Bertsche T, Hammerlein A, Schulz M. German national drug information service: user satisfaction and potential positive patient outcomes. Pharmacy World and Science 2007; 29: 167 – 172 (Germany) [42]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Assess and explore user satisfaction of a single German drug information service and its impact on patient outcomes.	Prospective survey	Piloted survey sent by fax immediately after advice was provided to every healthcare professional that had contacted the MI service with a patient-related enquiry over 1 year.	Route answer received, helpfulness regarding patient physician counselling, clarity & understanding of advice, timeliness of response, professional quality of the service, advice/counselling impact on patient outcome; any comments/suggestions.
Key Findings/ Conclusion	A total of 1,639 enquiries were answered during the year, with the majority of enquirers being community pharmacists (95%). Most enquiries were answered by phone (69%), followed by fax (28%), postal mail (1%) and email (1%). A total of 1,107 surveys were sent to enquirers and just under half returned a completed response (45%, n=455/1,017) all of which were included for analysis. Overall satisfaction ratings (rating 1=poor, 2=sufficient, 3=satisfactory, 4=good, 5=very good) for study outcomes were 4.6 +/- 0.6 (helpfulness regarding counselling patients and/or physicians), 4.6 +/- 0.7 (timeliness of response), 4.7 +/- 0.5 (clarity of/understanding advice) and 4.7 +/- 0.5 (professional quality of service). In 42% cases (n=190/455), a potential positive patient outcome was reported. The remaining 58% stated unknown or no response was reported.		

Reference (country)	Fathelrahman AI, Awang R, Bashir AA, Taha IA, Ibrahim HM. User satisfaction with services provided by a drug information center in Sudan. Pharmacy World and Science 2008; 30 (6): 759 – 763 (Sudan) [43]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Assessed satisfaction of enquirers that had previously used the MI service	Retrospective	Semi-structured telephone follow-up piloted questionnaire of randomly selected enquirers (n=423/3,308) over a 3 year period. No users were included more than once.	General service, response time and communication of advice satisfaction Likelihood of contacting the service in the future
Key Findings/ Conclusion	All enquirers (except one) consented to participate (99.8%): pharmacists (36.1%), physicians (29.5%), members of the public (22.3%), students (7.5%) and other medical professionals (4.6%). Enquirers ranked their satisfaction as excellent or good for the following: general service (95.4%, n=399), time taken to answer the enquiry (86.5%, n=364) and communication of advice (defined as the way of asking questions, counselling, and answering different calls) (98.1%, n=413). The majority of enquirers would 'probably' call the service again (94.7%, n=397).		
Reference (country)	**Bramley D, Mohandas C, Soor S, Erskine D, Oborne CA. Does a medicines information service have a positive impact on patient care? Pharmaceutical Journal 2009; 282: 139 – 140 (England) [12]**		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Identified the proportion of enquiries involving patients, actions taken by enquirers as a result of	Prospective survey.	Patient-specific enquiries received from healthcare professionals by 2 MI centres during a 2 week period.	The expected patient outcome (according to enquirer) at the time of contacting the MI service, the number of enquirers waiting

advice, impact on patient outcome.		Healthcare professionals were asked by the MI staff at the time of the call (before advice given) three questions. Same healthcare professionals were then contacted between 7 and 28 days later.	for answer before proceeding with treatment and the action that they would take without access to MI service.
Key Findings/ Conclusion	A total of 40 patient-specific enquiries were from 17 (43%) pharmacists, 16 (40%) doctors, 6 (15%) nurses and 1 (3%) dentist. Most common enquiries were for information about choice of therapy, followed by drug administration or dosage, and adverse effects. The majority of enquirers (80%, n=32/40) were waiting for an answer from MI before proceeding. A quarter of enquirers (25%, n=12) stated that they would search the Internet if the MI service did not exist, 21% (n=10) would approach another member of the ward pharmacy team, 19% (n=9) would ask another professional colleague, 19% (n=9) would look in books, 15% (n=7) would use other MI sources, 10% (n=5) would contact the drug manufacturer and 10% (n=5) mentioned other resources. At the time of the call, 14 enquirers (55%) predicted the patient would improve, 11 (38%) aimed to maintain the patient's state of health, 4 (12.5%) stated prognosis was not known at this stage, and 2 (5%) thought the patient would deteriorate. 1 patient had died. A total of 32 (80%) follow-up telephone surveys were completed. Respondents indicated that 19 patients (59% of outcomes) matched the expected outcome, 3 (9%) had improved when it was expected that they would remain the same or deteriorate or the expected outcome was unknown and 6 (19%) remained the same when they had been expected to improve. Four outcomes (13%) were unknown. Of those followed-up, 30/32 (94%) had used the information or advice provided by MI.		

Reference (country)	McEntee JE, Henderson SL, Rutter PM, Rutter J, Davis HJ, Randall CJ. A survey of UK dental health professionals using a medicines information service: what questions do they ask and do they get useful answers? British Dental Journal 2011; 211 (1): 17 – 21 (England) [44]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Assess what dental health professionals contacting a specialist regional MI service ask about, how advice provided to them is used, and whether they find the advice useful for patient care.	Multiple choice, piloted questionnaire.	Sent to 205 dental health professionals who had contacted the centre with an enquiry during a 6 month period.	Enquiry type, how advice was used by enquirer, service quality.
Key Findings/ Conclusion	A total of 151/205 (74%) questionnaires were returned. The majority (89%, n=135/151) were from general dental practitioners, i.e. from primary care. The most frequent type of question concerned antibiotics (32%). Enquiry categories not specific to antibiotics included choice of therapy (5%), adverse effects (5%), availability (4%), drug interactions (3%), drugs in pregnancy (3%), drug identification (3%) and dosage (2%). Enquiries were answered by telephone (89%), email (9%) or letter (2%). Nearly all enquirers (99%, n=144/145) considered that the advice received answered their question. Most used the advice provided (97%, n=146/151), for example in managing current patients or planning care (45%, n=65/144) of future patients. Of those who used information to inform current or future care of patients, nearly all (99%, n=141/142) considered the advice useful.		

Reference (country)	Bramley D, Innes AJ, Duggan C, Oborne A. The impact of Medicines Information enquiry answering on patient care and outcomes. International Journal of Pharmacy Practice 2013; 21 (6): 393 – 404 (England) [10]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Assessed healthcare professionals' opinions of the impact of MI advice on patients' care and outcomes. Evaluated the views of independent clinicians on the impact.	Prospective survey.	During a 2 week period, MI centres (n=71) in Southeast England asked healthcare professionals contacting the service to participate in the study. Initial questionnaire was completed at the time of enquiry submission by enquirer. Enquirers contacted 2 weeks after receiving advice to complete follow-up questionnaire. Sample of enquiries (n=24) assessed by panel (3 medical consultants, 3 senior clinical pharmacists).	Impact of MI advice according to rating scales used by the enquirer and panel.
Key Findings/ Conclusion	35/71 (49%) MI centres participated in the study. Total of 179 sets of matching initial and follow-up questionnaires obtained. Hospital pharmacists/pharmacy staff (57%) were the most common enquirer, followed by hospital doctors (20%) and hospital /midwife/nursing staff (13%). Over half (54%) of enquirers used advice to check medication		

	safety, 44% to form part of their decision-making process, 30% to tell them the best plan of action and 22% to confirm a change in therapy was needed. The majority of enquirers (81%, n=145) who used the advice from MI rated the impact on patient care or outcome as positive: 19.6% (n=35) said it improved patient outcome and 61.5% (n=110) replied that their patients' care was improved. Only 15.1% (n=27) reported no impact. No negative outcomes or cases of worsened patient care were reported. In 19.5% (n=35) of enquiries, MI pharmacists actively provided advice on issues that enquirers had not identified themselves. There was a trend for these enquirers to rate the impact of MI advice on their patients' care more positively (P=0.057). No significant differences were found between enquirers' professional roles and their impact rating of patient care or outcome (P=0.3).
Reference (country)	**Alkhaldi N, Desborough J, Wright D, Wood J, House T. A five year review of patient focused medicine information queries at a large UK teaching Trust: assessing the trends, predicting the future. Journal of Pharmaceutical Care and Health Systems 2014; 1: (3): 116 (England) [45]**

Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Describe how the nature of MI enquiries has changed over time and to use this to predict how this may affect future demand.	Retrospective analysis of enquiries at a single MI centre.	All individual patient-based enquiries in the same two time points over a 5 year period (2006 to 2010) were included.	For each enquiry, origin, enquirer status, contact method, enquiry type, time taken to complete response, reply route, complexity of enquiry was collated.

Key Findings/ Conclusion	The authors found that enquiry numbers had increased by 50% over the study period, and the number of more complex enquiries had increased. The most common enquiry type received was administration (36%, n=583/1641), followed by choice of therapy/indication/contraindications (n=13%, n=211/1641), pharmaceutical (12%, n=203/1641) and availability/supply/formulary (12%, n=204/1641). Hospital pharmacists were the main user of the

	service at both time points during the 5 year period (41%, n=654/1605). 'Others' were the next most frequent users of the service (33%, n=532/1605) and this group consisted of hospital nurse/midwife, primary care nurse/midwife, professionals allied to medicine, dentist and members of the public. Consultant (8%, n=127/1605), junior hospital doctors (7%, n=111/1605), Registrars (5%, n=80/1605) and GPs (4%, n=71/1605) are cited as the most common users after 'Others'. The authors reported that Level 2 and 3 enquiries, and those enquiries received from dieticians, required more time to process. Enquiries classified as either administration or pharmaceutical enquiries took less time to answer than other enquiry types.
Reference (country)	**Entezari-Maleki T, Taraz M, Javadi MR, Hajimiri MR, Eslami K, Karimzadeh I, et al. A two-year utilization of the pharmacist-operated drug information center in Iran. Journal of Research in Pharmacy Practice 2014; 3 (4): 117 – 122 (Iran) [46]**

Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Assess health services of a drug and poisons information service to enquirers during a 2 year period.	Retrospective analysis.	Enquiries received by a single MI service over a 2 year period.	Enquirer demographic, enquiry type, summary of question and answer, resources used, route by which answer was provided.

Key Findings/ Conclusion	A total of 110,310 calls were received during the two year period. Of these, 9.2% (10,118) were received from healthcare professionals and the remainder from the public. Pharmacists (40%, n=4025) were the most frequent users of the service, followed by general physicians (19%, n=1923) and nurses (11%, n=1144). Specialists (5%, n=470), sub-specialists (1%, n=56), and other healthcare professionals (undefined) 24% (n=2400) accounted for the remaining calls. The most common types of enquiries handled included therapeutic use of drugs (19.3%), drug identification (18.7%), drug availability (15.9%), adverse drug reactions (15.1%) and drug administration (7.6%). 'Up To Date', an evidence-based electronic clinical decision support tool,

	was the most common resource used (35.5%) by call handlers when answering enquiries. The telephone was the most frequently used route when providing responses to enquirers (approx. 98%, p=0.001).

Published work dates from the 1980s to present day and mainly originates from the US and UK. This is to be expected as these countries have the longest history of providing MI through established centres. Other parts of the world such as Brazil, Canada, Denmark, Germany, Norway and Sudan have developed MI services but have mainly reported on user satisfaction and the impact of MI advice on patient care or outcome (Table 2 and 3). As some of these publications report, to some extent, about MI service provision any relevant data has been included within Table 1 and in this critical discussion.[10,12,42-44] Most studies were conducted at a single point in time, i.e. cross-sectional, but two studies were longitudinal and focused on service provision over a 9- and 10-year period, [38,41] with a further study that looked at data over a 30-year period. [40] The data generated from the combination of both longitudinal and repeated cross-sectional studies allow trends/patterns in service provision over time to be identified. However, depending on the time period of the study it may mean that findings are no longer relevant to current practice. This is especially true over long time periods, for example in the survey where 30 years had elapsed. In such time periods practice and policy will have changed and is particularly true for organisations such as the NHS as these policy changes will impact on UKMi service provision and so findings of such studies need to be viewed alongside policy that may have affected organisational delivery of services (e.g. Carter [35]). This is where cross sectional studies can be helpful as these snap shots provide data at a point in time and may be more appropriate where changes in practice are observed quickly due to implementation of policy.

Two studies that focused primarily on service provision involved postal surveys of centres, [39,40] with the remainder undertaking analysis of workload data. [38,41,45,46] Whilst the methods reported may have changed over time, the types of data collected, and their findings, have largely remained the same. The studies summarised in Table 1 primarily provided quantitative data and included information about the opening hours and time enquiries received, [38,39] staff working in MI centres, [38-40] the types of enquirers, [10,12,38-40,42-45] and enquiries, [10,12,38,40-42,44,45] routes of communication, [40,42,44,46] resources used, [39-41] time spent handling an enquiry, [41,45] the training provided, [40] and the complexity of the enquiry. [45] These will now be discussed in more detail.

Maguire et al and Rosenberg et al, were the only studies that provided information about opening times for UK and US MI services respectively. [39, 40] Both authors

reported low levels of non-standard working hours with Maguire et al finding just one UKMi centre open on a Saturday [39] and Rosenberg et al identified four US MI centres which provided a 24 hour MI service. [39] Both authors make the point that the hospital pharmacy provided a 24 hour service, i.e. on-call pharmacy service. It is unclear whether the authors were therefore implying that a MI service out of hours was therefore not required. [39, 40] Based on the limited published literature, it appears that MI services provide very little support outside of normal working hours. A more detailed discussion of on-call or pharmacy services and MI support out of hours can be found in Section 1.4.4.

Pharmacists were frequently reported as the most common users of MI services (where data was available) irrespective of the study's country of origin, followed by doctors and nurses. [10,12,38-40,42,43,45,46] The data is not unexpected as MI centres are usually provided by the pharmacy department and it is reasonable to assume that there is a greater awareness by pharmacists about the services MI provides.

Only three studies, two UK and one US, have detailed the types of staff to work in MI centres. [38-40] The two UK studies published in the 1980s and therefore relatively dated, reported MI services were almost exclusively staffed by pharmacists. [38,39] These findings are now outdated and do not reflect the types of staff working in UKMi services today as previously described, i.e. pharmacists, pharmacy technicians and health science graduates. [47]

Studies have attempted to categorise the type of enquiry fielded, and whilst there is no universal categorisation choice of therapy, therapeutic use, drug availability and drug administration appear to be the most common enquiry types cited (where stated). [12,38,40,44-46] Only one study, evaluating an Iranian MI service, linked the most common enquiry categories according to the type of enquirer. [46] Recording of enquiries handled by UKMi centres and the ability to readily report this data, has improved during the last 15 years through the implementation of the bespoke MI enquiry answering database (MiDatabank). [48] This can be seen in the improved enquiry workload data reported by four UK studies since 2009. [10,12,44,45] MiDatabank is now available in other countries but none of the studies in Table 1 originate from these areas of the world. [48] It is not known if such enquiry answering databases (or similar) are used to document medicine advice calls out of hours. Therefore, if quantitative research methods were only used to determine the types of enquiries handled by on-call pharmacy services, this data may not be documented or if it is, recorded in the same way as MI services. For the

purposes of this research, qualitative methods may be an alternative approach to determine the types of enquiries handled by on-call pharmacy services.

Little information was provided in the published studies as to the route of communication used by MI services for receiving enquiries. However, one study reported that most enquiries were received by telephone (82%). [40] The same US study also reported that 70% of its responses were provided orally (did not specify telephone or in person), 20% both oral and written and 10% in writing only. An Iranian study reported that nearly all MI service enquiry responses were made by telephone (98%). [46] This is also reflected in a UK study in which most responses were provided by telephone (89%). However, email (9%) and letters (2%) were also used. [44] The use of telephone reflects an ease with which MI services can be accessed and enquirers can be contacted enabling information exchange and real-time clarification of any details if required. Both quantitative and qualitative research methods could be used to determine the routes used by healthcare professionals out of hours to seek medicines advice in the absence of MI services.

Two studies (US, UK) reported information about the time taken for MI services to handle and process enquiries. [41,45] The US study gave details on an increased time to answer enquiries but no further details were provided. [41] A more detailed analysis of enquiries in the UK study reported that enquiries involving ‘complex’ cases such as drugs in pregnancy, adverse effects and drugs in breast milk took the most time to complete. In comparison, administration/dosage, pharmaceutical (medicines stability, formulation and compatibility) and availability/supply/formulary took the least time to complete. [45] This complexity was further elaborated on, with the mean time taken to provide a level 1 response (the simplest enquiries) being 32 minutes, compared to level 2 (83 minutes) and level 3 (157 minutes). It is difficult to make any firm conclusions based on this published data from a single site but suggests that as the complexity of an enquiry increases, so does the time required to provide a response. Based on the researcher’s own experience, the nature of questions handled out of hours reflects those reported here, i.e. level 1 and 2, taking less time to complete. Qualitative research methods could be used to determine the complexity of enquiries handled out of hours by on-call pharmacy services.

Information about the training provided by MI services is limited to one US study which reported that 50% of centres were involved in experiential training. [40] None of the other service provision publications summarised in Table 1 explored or evaluated the training

provided by MI centres. Based on the researcher's own experience, UKMi services deliver training to a range of healthcare professionals including pharmacists, doctors and nurses to support the development of their MI skills.

All publications that focused on service provision had some methodological limitations. For example, two studies did not clearly state their aims/objectives, or the methods used which makes it unclear whether the results reported was what the authors set out to find and how these data were generated. [38,39] Three studies did not fully report the data based on the stated aims which means the omission of some expected information. [38 41,45] This included for each of the MI services in the studies not reporting on the available resources, [38] the number of enquiries handled, [41] or a breakdown of enquirer origins. [45] It is therefore important that to ensure rigour in this research study, the aims, objectives, methods and results are clearly stated.

In summary, studies evaluating the provision of MI advice showed that MI services are used by healthcare professionals, particularly pharmacists, during normal working hours. These provide some evidence about the level of service provision but due to the dates of publication and countries of study, these data are limited when compared to current UK practice. There are also difficulties establishing workload activity from the data because of a lack of universal enquiry categorisation. Based on the studies reported, quantitative methods will be used for this research to understand how on-call pharmacy services are provided by pharmacy departments across England and the workload handled, not restricting this to a single or small number of hospitals. This will increase the likelihood that the data generated is representative of hospital on-call pharmacy services in England. Quantitative methods will also be used to collect data on the staff providing on-call pharmacy services, the number of calls received, the enquirer type and the routes used to contact on-call pharmacists and what information is documented by the on-call pharmacist. However, studies which have reported workload data have based this on the enquiries that have been received and documented by MI services, and this may be an issue when determining the workload for on-call pharmacy services if there is a variation in documentation, as anticipated.

In this second section, 14 papers were retrieved which related to user satisfaction of MI services. This consisted of 5 cited in the reviews by Hands et al and Spinewine et al, and a further 9 publications through the search strategy employed and are summarised in Table 2. The specific studies referred to within the two reviews were by Baker and Gallo, Cardoni and Thompson, Moody, Pearson, and Repchinsky and Masuhara. These 13 papers are critically discussed in the text of the thesis.

Table 2. Publications relevant to user satisfaction of MI services

Reference (country)	**Hands D, Stephens M, Brown D. A systematic review of the clinical and economic impact of drug information services on patient outcome. Pharmacy World and Science 2002; 24: 132 – 138 (UK) [9]**		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Determine if MI services improve patient's clinical outcomes to justify future investment in their provision and development.	Systematic review In addition, a questionnaire was sent to all UKMi services which requested information on any relevant work carried out locally.	Literature search from 1980 onwards. Questionnaires sent (n=244) to all MI services via regional MI centres (n=19) for information on relevant local work. Also sent to all UK Schools of Pharmacy Practice Research Departments.	Establish clinical and economical impact of MI services on patient outcomes.
Key Findings/ Conclusion	Six published and one unpublished article met the assessment criteria according to the authors. Published studies included 5 retrospective analyses and 1 prospective evaluation; 2 of which were multi-centre and 4 single centre. Four studies assessed the impact of advice provided by a MI centre on patient care. One study reviewed hospital mortality rates. Three of the studies were conducted in the UK, 2 in US and 1 in Canada. Studies included in the review were:		

	Stubbington et al: 3 month study using piloted questionnaire sampling doctors, nurses and pharmacists (n=161). Response rate (82%). A total of 125 respondents found information helped to prevent a potential adverse event (n=21); initiate new treatment (n=21); stop patient's existing treatment (n=20); modify patient's existing treatment (n=20); stop adverse event from getting worse (n=7); justify current therapy (n=16). Outcomes self-reported. No independent verification. **Najabat et al:** Enquiries (n=304) received from healthcare professionals during 1 month period. Piloted questionnaire sent to each enquirer. Response rate 77% (n=234): 39% pharmacists, 32% doctors, 21% nurses. 224 (96%) said the information had been of use in some way. 138 (62%) cases where beneficial uses to patients identified. Benefits listed relate to patient management and not clear if these changes did have a positive impact on patient care. Outcome self-reported. No independent verification. **Adams:** questionnaire sent to enquirers to 3 MI centres (hospital doctors (n=262) and hospital pharmacists (n=191)). Advice useful in subsequent management of 94% (n=394). Impact self-reported. Sample of questionnaire responses audited against medical records and corroborated in 92% of cases. A subsidiary study evaluated advice provided by a single MI centre. A total of 43 patients specific enquiries were available to follow-up, of which medical records could be obtained for 17 patients. In 15 (88%) of these, the questionnaire responses were corroborated by medical records. **Bond et al:** analysis of Medicare mortality rates and US Clinical Pharmacy Database across 1,209 hospitals. Analysed association between hospital mortality rates (adjusted for severity of illness) and clinical pharmacy services (including MI). Where present (n=237 hospitals), associated with 44 fewer deaths per hospital per year compared to those without MI service. Authors did not consider other patient outcomes. **Cardoni and Thompson:** A total of 491 enquiries, of which 350 were patient specific received during 4 month period. Enquirers followed-up by telephone by a member of the MI team. General and specific outcomes were identified. 329 (94%) were judged to have provided useful information and of these, 202 (58%) affected patient outcomes. Outcomes self-reported. No follow-up of patients.

	Melnyk et al: Prospective evaluation of patient specific advice calls at single Canadian hospital (n=245/577). Enquiries were included if desired outcome could be identified, MI made a recommendation involving patient's therapy and the enquirer was willing to participate (n=98/245). On completion of the enquiry, the MI pharmacist and enquirer identified possible desired outcomes (n=101) and agreed timeframe for follow-up. Desired outcomes included resolution of a therapeutic problem, reduction or elimination of symptoms, correction or slowing of the disease process, prevention of disease or symptoms, and optimisation of medicines administration. Approximately 1 – 2 days after completion of the enquiry, a primary investigator (not defined) phoned the enquirer to confirm actual recommendation made by the MI service (n=230). Most of the recommendations (83.5%, n=192/230) made by the service were used by the enquirer. A panel (2 clinical pharmacists, 2 general medicine physicians) concluded that 93 (94.9%) of the enquiries had been handled appropriately by the MI service. They found that 36 (46.8%) resulted in a positive patient outcome and in 24.7% cases a tangible outcome could not be measured if accepted interventions are evaluated, but the patient benefited from education about his/her therapeutic regimen. In 4% the patient experienced a negative outcome. **Drolet & Repchinsky (unpublished):** excluded as it related solely to community pharmacists.

Reference (country)	Spinewine A, Dean B. Measuring the impact of medicines information services on patient care: methodological considerations. Pharmacy World and Science 2002; 24: 177 – 181 (UK) [8]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Critical appraisal of papers assessing impact on patient outcome of passive information given to healthcare professionals by MI services.	Review.	Medline, EMBASE and the International Pharmaceutical Abstracts database (1970 – 2001) were searched.	Identify key methodological issues Make recommendations for future research.
Key Findings/ Conclusion	Nine papers were identified: two studies undertaken in the UK, 5 in the US and 1 in Canada. Studies included in the review dated from 1975 - 2000. The studies included were: **Pearson:** US study which analysed random sample of requests from healthcare professionals (n=551) for accuracy, relevance, timeliness, adequacy and usefulness of information; also, use of information by the enquirer. Evaluation of these measures completed by multidisciplinary committee and enquirer survey. Physicians altered patient's therapy mostly (56.4%), followed by pharmacists (40.8%) and nurses (35%). **Cardoni and Thompson:** see Hands (Table 2). **Baker and Gallo:** US study which assessed how advice provided by a MI service was used by enquirers (nurses, physicians and pharmacists) and user satisfaction. A random selection of enquirers (process not defined) were sent a questionnaire (n=77). Majority of respondents (91.1%) indicated that the information provided was frequently applied to patient care situations. Most of these arose regarding a specific patient (87%), and in 81% of these the information was applied. Respondents indicated that the information provided was most often used when starting a drug (31%), or when changing a schedule (18%), followed by discontinuation of a drug (5.5%) or changing the drug (3.7%). A fifth of respondents indicated		

	that the information did not change the planned use of a drug. Nearly all respondents agreed or strongly agreed that the response directly answered their question (91.6%), was clear (98.3%), was provided in a timely manner (98.3%) and provided enough information (93.3%). **Repchinsky and Masuhara:** Canadian study which analysed all requests from healthcare professionals (n=158) over a 4 week period for timeliness, accuracy, objectivity and completeness of the enquiry; also, use of information by the enquirer. Evaluation via enquirer survey. **Golightly et al:** all requests from healthcare professionals (n=11,424) over 2 years were analysed to determine the outcome (any beneficial effect on patient therapy) according to a physician. **Moody:** a random sample (method not stated) accounting for 10% of all requests from all physicians were analysed for correctness, completeness, timeliness and appropriateness of advice as evaluated by the Director of clinical services. **Stubbington et al:** see Hands (Table 2). **Melnyk et al:** see Hands (Table 2). **Shah et al:** UK study involving all patient-specific requests from all healthcare professionals (n=27) analysed for use of information, action taken, and patient outcome as assessed by the ward pharmacist. A number of factors are outlined by the authors of the review that they consider important when evaluating studies of MI services: study design, sampling, collecting and evaluating data, choice of endpoint measures, and validity. In conclusion, the authors make 7 key suggestions for future studies measuring the impact of MI services on patient care.

Reference (country)	Schjott J, Pomp E, Gedda-Dahl A. Quality and impact of problem-orientated drug information: a method to change clinical practice among physicians? European Journal of Hospital Pharmacy 2002; 57 (12): 897 – 902 (Norway) [49]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Determined impact of MI advice on clinicians.	Prospective survey.	Structured postal questionnaire sent with written answer to enquirers who had contacted single MI centre over 18 months. Telephone enquiries excluded.	Quality of written response (timeliness, relevance, 'adequately' comprehensive, valuable references included) and impact of advice (change in clinical practice).
Key Findings/ Conclusion	A total of 117/163 (72%) physicians (hospital and GP) returned completed questionnaires. The assessment by enquirers of the quality of the written response was 96% (n=112) timeliness, 96% (n=112) relevance, 94% (n=110) adequately comprehensive and 85% (n=99) value references included. According to enquirers, 61% (n=71) reported that MI advice resulted in a change in clinical practice and 30% (n=35) no change. A small number did not answer this question (9%, n=11/117).		
Reference (country)	**Bertsche T, Hammerlein A, Schulz M. German national drug information service: user satisfaction and potential positive patient outcomes. Pharmacy World and Science 2007; 29: 167 – 172 (Germany) [42]**		
See Table 1.			
Reference (country)	**Fathelrahman AI, Awang R, Bashir AA, Taha IA, Ibrahim HM. User satisfaction with services provided by a drug information center in Sudan. Pharmacy World and Science 2008; 30 (6): 759 – 763 (Sudan) [43]**		
See Table 1.			

Reference (country)	Basselin C, Ferreira E, Martin B, Touzin J, Morin C, Bussieres JF, et al. A survey on sources consulted by health care providers and on the satisfaction of the IMAGe service. Birth Defects Research Part A - Clinical and Molecular Teratology 2009; 85 (5): 494 (Canada) [50]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Understand the information sources used by enquirers prior to contacting a Canadian teratogen information service, and enquirer's satisfaction with the service.	Prospective survey.	Online survey (SurveyMonkey) sent to healthcare professionals who contacted the service during a single month.	Enquirer and enquiry type, number and type of information resource consulted, enquirer service satisfaction.
Key Findings/ Conclusion	A total of 261 healthcare professionals completed an online survey (124 pharmacists, 97 physicians and 34 nurses, 6 other health care providers). The majority (91%, n=238/261) had used the service before. Enquiries involved antidepressants (36%), antibiotics (22%) and antipsychotics (13%). Over three quarters of enquirers (76%, n=198/261) had consulted one information source prior to contacting the service. These had consisted of drug monographs (58%), reference books (46%), computer databases (30%) or Internet sites (27%). Half of the respondents (51%) had consulted at least two other information sources. Enquirers contacted the service because they had been unable to find information themselves (67%), the need for further information (43%) or they had difficulty interpreting the data they had found (29%). Nearly all (99%, n=258/261) were satisfied with the information received.		

Reference (country)	Frost Widnes SF, Schjott J. Drug use in pregnancy-physicians' evaluations of quality and clinical impact of drug information centres. European Journal of Hospital Pharmacy 2009; 65 (3): 303 – 308 (Norway) [51]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Assessed clinical impact of MI answers provided about medicines in pregnancy.	Prospective survey.	Structured postal/email questionnaire sent with written answer to doctors who had contacted 5 MI centres over 12 months.	Quality (satisfaction, importance for therapeutic decision, recommend the service to colleagues) and clinical impact of MI advice (Likert scale).
Key Findings/ Conclusion	Most questionnaires were returned (76%, n=123/162): 95% (n=117/123) were included and 6 were excluded). Respondents strongly agreed that they were satisfied with the answer (95%, n=111/117), the importance of the advice for therapeutic decision (78%, n=91/116) and would recommend the service to colleagues (96%, n=111/116). The clinical impact of the MI advice resulted in the starting/continuation (38%) or avoidance or discontinuation (29%) of treatment; was important for risk/befit assessment (11%); avoided termination of pregnancy (9%) or led to induced abortion (1%). A small number (8%) reported no clinical impact as a result of the MI advice.		
Reference (country)	**Hedegaard U, Damkier P. Problem-orientated drug information: physicians' expectations and impact on clinical practice. European Journal of Hospital Pharmacy 2009; 65 (5): 515 – 522 (Denmark) [52]**		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Assessed user satisfaction and	Prospective survey.	Structured postal (piloted) questionnaire sent	Usefulness and clinical impact of MI advice.

clinical impact of MI advice.		with written answer to doctors who had contacted a single MI centre with a patient specific enquiry over 12 months.	
Key Findings/ Conclusion	Most questionnaires were returned (93%, n=183/197): 97 (53%) worked as GPs, 86 (47%) in secondary care. During the 12 months, the service was used by some doctors once (85%, n= 134), twice (13%, n=20) and a small number three times (n=3). MI advice was used for patient information (79%, n=145), a change in therapy (45%, n=82), dissemination to colleagues (51%, n=93), for use for future patients (67%, n=123) or for personal interest (43%, n=78). In one case the information was not used. Doctors were completely or partially satisfied with the written answer (99.5%), timeliness of response (85.7%), 'extent' of the response (96.1%) and usefulness of the answer (96.8%).		
Reference (country)	**McEntee JE, Henderson SL, Rutter PM, Rutter J, Davis HJ. Utility and value of a medicines information service provided by pharmacists: a survey of health professionals. International Journal of Pharmacy Practice 2010; 18: 353 – 361 (England) [53]**		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Assess how advice provided to healthcare professionals from a specialist regional MI service was used and whether the advice provided was useful for patient care.	Prospective survey.	A pre-piloted questionnaire was sent to all healthcare professionals 2 weeks after they had contacted the service with an enquiry during a 6 month period to find out how advice used and its usefulness for patient care.	Satisfaction with the service; how the advice provided was used; usefulness to patient care; and, general comments on the service.

Key Findings/ Conclusion	Of the 672 questionnaires sent, a total of 459 (68%) were returned: 144 (32%) dentists, 96 (21%) community pharmacists, 79 (17%) primary care pharmacists, e.g. prescribing advisors, 47 (10%) hospital pharmacists, 37 (8.2%) GPs and 2 (0.4%) hospital doctors. Most respondents (81%, n=350/430) used the advice for managing a current patient and 29% (n=125/430) for planning the care of future patients. A quarter used the advice for their own continuing professional development and 16% for training or teaching others. The majority (95%, n=376/396) found the advice provided useful with over half (51%, n=186/366) using it to check if current or proposed management of a patient was appropriate. Nearly all respondents were satisfied with how the service was provided (99%, n=455/459), 456 able to contact the service at the first attempt, 455 were happy with the way their enquiry was initially handled and 456 confident that their question was understood. For those that did not need immediate advice, 92% (n=220/238) said a timeframe for a response had been agreed with them, 3% (n=8) said a timeframe had not been agreed with and 4% (n=10) were unsure. All but 7 respondents (n=98%, 448/455) said the advice was provided in time to be helpful. General comments by 35% of respondents (n=116) included the helpfulness of staff, and 34% (n=112) commented on the good or excellent quality of the service.
Reference (country)	**McEntee JE, Henderson SL, Rutter PM, Rutter J, Davis HJ, Randall CJ. A survey of UK dental health professionals using a medicines information service: what questions do they ask and do they get useful answers? British Dental Journal 2011; 211 (1): 17 – 21 (England) [44]**

See Table 1.

Reference (country)	**Fischer MI, Tavares LA, Dal Pizzol TS. User's satisfaction in a Brazilian Drug Information Center: evaluation under a new approach. Latin American Journal of Pharmacy 2012; 31 (8): 1138 – 1142 (Brazil) [54]**

Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Evaluated user satisfaction.	Prospective survey.	Piloted questionnaire of healthcare	Access to information;

		professionals who had contacted a single MI service over a 12 month period.	quality and timeliness of information; likelihood to use again
Key Findings/ Conclusion	Based on sample size calculation, (43%, n=108/254) users were contacted to participate. Over two thirds (69%, n=74/108) completed the survey by phone (62%, n=46) and by email (38%, n=28). All were pharmacists. The service was rated as very easy to contact (72%, n=53) or easy to contact (28%, n=21). Information provided by the service was totally clear (53%, n=39), clear (42%, n=31) or somewhat clear (5%, n=4). Information was totally objective (35%, n=26), objective (53%, n=39) and somewhat objective (12%, n=9). Users were totally satisfied with the timelines of the response (50%, n=37) or satisfied (50%, n=37). The reply provided totally met the needs of the user (61%, n=45), partially (35%, n=26) or not really (4%, n=3). All respondents stated that they would use the MI service again.		

Studies about user satisfaction of MI services have been published over the last 40 years (1975 – 2012) from Brazil, Canada, Denmark, Germany, Norway, Sudan, UK and US. [8,9, 42-44,49-54] All studies originated from a single MI site and probably reflects the relative ease with which it is possible to undertake such evaluations compared to a multi-site approach.

Publications surveyed a range of healthcare professionals: nurses, [8, 50] physicians (medical or dental) [8, 43, 49 – 53], pharmacists, [8, 42, 43, 50, 53, 54] and other healthcare professionals [8, 43, 44, 50]. One study also included members of the public and students. [43]

Studies used various selection strategies to recruit participants ranging from randomisation to including all users. With regards to numbers recruited this was, in part, due to the length of the study. Study duration varied from 1 month to 3 years. [8, 42-44, 49-53] Just one study detailed a sample size calculation, but the desired number of users were not recruited. [54]

Surveys were conducted via telephone, [43, 54] post, [49, 44, 51, 52] fax, [42] email [54] or online. [8, 50] Using the telephone to conduct satisfaction surveys removes user anonymity which may affect interviewees responses, compared to postal, fax, email and online surveys

which ensure user anonymity (depending on the design). Parameters chosen to measure user satisfaction varied and included professional quality, [42] general satisfaction, [43, 53] ease of contact, [53, 54] enquiry handling, [53] confidence the question was understood [53] and whether the timeframe was agreed. [53] Other parameters included clarity of advice, [42, 54] helpfulness or usefulness of advice, [42, 44, 53] quality of response, [49] timeliness of advice, [8, 43, 49, 52-54] communication of the advice [43] and if the advice answered the question. [8, 44, 52] In addition, advice being adequately comprehensive, [49] usefulness of the response, [52] satisfaction with advice, [50-52] if the advice met the needs of the user, [54] extent of the response, [52] objectivity of the information, [54] if the advice contained enough information, [8] if the advice included references, [49] and whether the enquirer would use the MI service again, [43] were also used.

Although there are similarities between these parameters, there is a lack of standardisation making it difficult to make comparisons between studies. However, in general, all studies report positive user satisfaction and the availability of these data over the time period (1975 – 2012) provides some reassurance in this regularly reported finding.

Some of the publications which focused on user satisfaction of MI services had some methodological limitations: two studies had not previously piloted the survey to be used. [8, 50] This means that their reliability and validity is unknown which may call into question their findings. In addition to the different aspects of satisfaction measures used various methods for measuring satisfaction were employed. These included a 5-point scale (1 is poor and 5 is very good), [42] a positively skewed 4-point scale (excellent, good, satisfactory, poor), [43] a weighted 4-point scale which varied depending on the question asked [54] and a questionnaire that required binary responses, i.e. yes or no. [53] The use of a positively skewed or a weighted scale to determine satisfaction with a MI service may lead to inaccurate or misleading results because the participant is presented with more ‘positive’ options to select from compared to ‘negative’ or neutral choices. Binary choices as options for participants to report their satisfaction do not allow for any differentiation within a response. For example, if a user has slightly negative/positive feedback, but can only select from a yes or no option, this may not fully reflect their experience and lead to a superficial understanding.

In this third and final section, 12 papers about the impact of MI services on patient care or patient outcome, which included two reviews, were included for evaluation and are shown in Table 3.

Table 3. Publications relevant to the impact of MI services on patient care or patient outcomes

Reference (country)	**Hands D, Stephens M, Brown D. A systematic review of the clinical and economic impact of drug information services on patient outcome. Pharmacy World and Science 2002; 24: 132 – 138 (UK) [9]**
See Table 2.	
Reference (country)	**Spinewine A, Dean B. Measuring the impact of medicines information services on patient care: methodological considerations. Pharmacy World and Science 2002; 24: 177 – 181. (UK) [8]**
See Table 2.	
Reference (country)	**Kinky DE, Erush SC, Laskin MS, Gibson GA. Economic impact of a drug information service. Annals of Pharmacology 1999; 33: 11 – 16 (US) [55]**

Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Determine what resources might be used in a typical healthcare encounter. Would additional resources have been used if a MI request had not been made.	Retrospective analysis.	Review of patient specific advice calls handled by a MI centre within a single US hospital during a 6 week period In addition, a panel reviewed these enquiries daily.	Cost avoidance estimate of a MI service provided (using a model previously developed).

Key Findings/ Conclusion	A total of 570 enquiries from healthcare professionals were received, of which nearly a third (29%, n=163/570) were patient-specific. Just over half (51%, n=83/163) of the responses were considered to have insignificant or unmeasurable cost impact. The remainder (49%, n=80/163) of the responses were classified into outcomes of treatment failures (17%), new medical problems (25%), and treatment

	failures with new medical problems (7%). With regards to severity, 86 requests were considered to result in no economic value. However, 80 questions did have potential cost savings. Of these, 3 were deemed to have potential cost savings ranked as signifying no harm or no potential cost savings. The remaining 77 requests were determined to have relevant potential cost savings but only represented 14% (77/570) of the total number of drug information questions answered during the study. During the six week period, potential cost savings were estimated to be approximately $195,000 which extrapolated to one year, was predicted to save $1.7m.
Reference (country)	**Schjott J, Pomp E, Gedda-Dahl A. Quality and impact of problem-orientated drug information: a method to change clinical practice among physicians? European Journal of Hospital Pharmacy 2002; 57 (12): 897 – 902 (Norway) [49]**
See Table 2.	
Reference (country)	**Bertsche T, Hammerlein A, Schulz M. German national drug information service: user satisfaction and potential positive patient outcomes. Pharmacy World and Science 2007; 29: 167 – 172 (Germany) [42]**
See Table 1.	
Reference (country)	**Bramley D, Mohandas C, Soor S, Erskine D, Oborne CA. Does a medicines information service have a positive impact on patient care? Pharmaceutical Journal 2009; 282: 139 – 140 (England) [12]**
See Table 1.	
Reference (country)	**Frost Widnes SF, Schjott J. Drug use in pregnancy-physicians' evaluations of quality and clinical impact of drug information centres. European Journal of Hospital Pharmacy 2009; 65 (3): 303 – 308 (Norway) [51]**
See Table 2.	
Reference (country)	**Hedegaard U, Damkier P. Problem-orientated drug information: physicians' expectations and impact on clinical practice. European Journal of Hospital Pharmacy 2009; 65 (5): 515 – 522 (Denmark) [52]**
See Table 2.	

Reference (country)	Alkhaldi N, Desborough J, Wright D, House T. What would you do without medicines information: a feasibility study to determine whether clinical outcomes resulting from the absence of an MI service can be elicited? International Journal of Pharmacy Practice 2013; 21 (Suppl 1): 34 (England) [13]

Aim & objectives	Type of study	What was the study about?	Outcome measure(s)
Determine if it was possible to identify the actions of enquirers in the absence of an MI service.	Prospective.	Healthcare professionals contacting a single MI service were asked before an answer was provided, what action they would take for the patient if MI were unable to provide an answer.	Action that healthcare professional would take without advice from the MI service.

Key Findings/ Conclusion	Half of those who used the service during the study period (50%, n=30/60) agreed to participate in the study. This consisted of pharmacists (37%, n=11), doctors (30%, n=9), dieticians (7%, n=2) and nurses (27%, n=8). All respondents were unwilling to state their clinical action without an answer from the MI service. However, nearly a third stated that in the absence of MI they would look for the information themselves (30%, n=9). Other actions included asking a ward pharmacist (27%, n=8), calling the manufacturer (20%, n=6), seeking advice from colleagues (17%, n=5) and seeking advice from specialists (7%, n=2), e.g. consultant.
Reference (country)	**Bramley D, Innes AJ, Duggan C, Oborne A. The impact of Medicines Information enquiry answering on patient care and outcomes. International Journal of Pharmacy Practice 2013; 21 (6): 393 – 404 (England) [10]**
See Table 1.	

Reference (country)	Innes AJ, Bramley DM, Wills S. The impact of UK Medicines Information services on patient care, clinical outcomes and medicines safety: an evaluation of healthcare professionals' opinions. European Journal of Hospital Pharmacy 2014; 21: 222 – 228 (UK) [11]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Determined the impact of UKMi advice on medicines safety, and patient care and clinical outcomes.	Prospective survey.	Same methodology used as described in the previously cited study. [14] A total of 1450 healthcare professionals contacted MI services with a patient-related enquiry. A questionnaire was sent to 1367 enquirers to identify how the advice was used and its impact on patient care.	Impact of MI advice according to rating scales used by the enquirers and panel.
Key Findings/ Conclusion	A total of 62 (33%, n=189) MI services across England, Scotland and Wales were involved. Most enquirers (81%, n=1111/1367) needed advice from UKMi before proceeding with their patient's treatment. Nearly all (98.8%, n=639/647) used the advice for their patient's care. Most respondents self-reported that the advice had a positive impact on their patients (92%, n=597/647): 85% (n=547) on patient care or outcome; 77% (n=499) on medicines safety. The panel rated the impact of UKMi advice on medicines safety, and patient care and outcomes separately using a six point scale for 23/40 sample enquiries. Of these, the panel's consensus rating of impact agreed with the enquirer's rating within one rating scale point in 74% (n=17/23) cases for patient care/outcomes, and 83% (n=19/23) cases for medicines safety/risk, and of these there was full agreement in		

	53% (n=9/17 and n=10/19, respectively). The panel fundamentally disagreed with enquirer's ratings for care/outcome in 4% (n=2/23) cases and for safety/risk in 17% (n=4/23) cases.		
Reference (country)	**Strobach D, Gruber AC, Mohler NC, Vetter-Kerkhoff C. Clinical impact of the hospital pharmacy drug information service: how does information on drug-drug interaction enquiries translate into clinical decisions? European Journal of Hospital Pharmacy 2015; 22: 83 – 88 (Germany) [56]**		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Determined the impact of advice on clinical decision making by hospital physicians.	Prospective.	Structured telephone follow-up of physicians with patient-specific drug interaction enquiry to single MI centre (3 – 60 days after written answer had been provided) over 12 months.	Reason for enquiry (preventative, clinical problem, general test); severity (category 1, 2 or 3); action taken as result of MI advice.
Key Findings/ Conclusion	A total of 127 drug interaction enquiries meeting inclusion criteria were included. Of these, 113 follow-up interviews were completed. Enquiries originated from paediatrics (30%), psychiatry (30) and general medicine (17%). Drug interaction enquiries were classified as preventative (63%, n=71), i.e. physician was checking for possible effect of medication change on drug regimen, a clinical problem (16%, n=18), i.e. unexpected side effect of TDM or treatment failure with interaction suspected cause, and a general test (21%, n=24), i.e. polypharmacy and interaction check for reassurance but no actual problem suspected. A fifth (20%, n=85) of enquiries were classified as category 1, i.e. clinically relevant drug interaction requiring action, 50% (n=210) as category 2, i.e. clinically relevant drug interaction requiring observation, and 30% (n=125) as category 3, i.e. theoretical drug interaction. Total of 114/232 clinical actions were initiated following written MI advice to manage possible drug interactions as identified from follow-up interviews. These included starting a drug (n=34), monitoring of clinical parameter (n=22), discontinuation of, or not starting a drug (n=21), modification of therapy (n=15), specific		

	patient counselling (n=14), dosage modification (n=6) and additional actions (not specified) (n=2).Remainder (n=118) actions were taken for other reasons and not solely based on MI advice.

Two publications in 2002 reviewed studies that focused on the impact of MI services on patient care or patient outcome. [8,9] Most studies conducted since these reviews have predominantly been published in the UK [10-13] but also the US, [55] Denmark, [52] Germany, [42, 56] and Norway. [49, 51]

The two reviews, published by different UK authors, reflect the development of MI services in this country and recommendations from the authors for MI services to better demonstrate impact on patient care or outcome. Although both reviews were published at the same time and focused on the impact of MI services on patient care, only three of the same studies were cited in each (Cardoni and Thompson, Melnyk et al, Stubbington et al) and reflects the different inclusion and exclusion criteria used by the two reviews. [8,9] The review by Hands et al, aimed to establish the clinical and economical impact of MI services on patient outcome whereas Spinewine et al, identified methodological issues associated with publications that focused on assessing the impact of MI services on patient care. One paper (Drolet & Repchinsky) within the review by Hands et al, only included community pharmacists as enquirers of MI services. [9] Although this is noted within Table 3 for completeness, the details were not included as it met the exclusion criteria for this literature review.

A total of 12 relevant publications were cited by these two reviews. The majority of these papers (n=11) surveyed enquirers about the impact of MI services although it was unclear from the review what methods were used for three of the studies. In eight of the nine studies published subsequent to the two reviews, enquirers were similarly surveyed using either questionnaire or telephone (or a combination of both). [10-13, 49, 52, 56] Two of these eight studies surveyed enquirers used piloted questionnaires; for the remaining six studies this was not clear or not stated.

One further paper cited by the reviews (Bond et al) undertook an analysis of US mortality rates and enquiries documented within a clinical pharmacy database from more than 1,000 hospitals. [9] This study found a lower rate of mortality for hospitals that had a MI service compared to those who did not. Although the authors adjusted for severity of illness, confounding variables did not seem to be taken into account which makes the reported results invalid.

Both reviews concluded that there were methodological limitations associated with the studies included in their respective reviews, which limited their usefulness, and both called for better designed studies to be undertaken to assess the impact of MI services. [8,9] Since those reviews, there have been a number of publications which have attempted to do this. Over half of these studies published since the reviews included all healthcare professional enquirers and these typically consisted of pharmacists, doctors and nurses. [10-13, 42, 55] Remaining studies, all conducted in Europe, included doctors as enquirers only. [49, 51, 52, 56] Only including doctors in these types of studies may increase the likelihood that the impact can be better assessed because these healthcare professionals have traditionally been the prescribers and led the decision-making process for patient care. However, in recent years UK practice has evolved such that pharmacists, nurses and other healthcare professionals are now able to independently prescribe and manage aspects of patient care. However, none of the studies have completed subgroup analysis for these different healthcare professionals so it is not known if any were prescribers and if that affected the results.

Data collection for these studies ranged from 2 weeks to 18 months. [12, 49] Data reported in the publications were generated from both longitudinal and repeated cross-sectional studies. For the reasons outlined previously, a cross sectional study can be helpful as the snapshot provides data at a point in time and would be more appropriate compared to a longitudinal study for this research study.

Studies published since the reviews have reported on various outcome measures. These range from the actions taken in relation to the patient's management as a result of MI advice, [49, 51, 56] what actions enquirers would take if MI advice was unavailable, [12,13] the reasons enquirers were seeking advice and whether that received affected patient outcome. [10,11] These two latter studies also employed the use of a panel to assess a sample of enquiries to corroborate these findings. One study reported on the patient outcome predicted by enquirers at the time of seeking MI advice and whether this had changed once a response was received. [12]

When the MI service was unavailable, enquirers confirmed that they would seek out advice themselves. [12,13] This involved searching the internet, [12] contacting another member of the pharmacy team, [12,13] calling the manufacturer, [13] contacting a colleague, [12,13] looking in books, [12] using other MI resources [12] or contacting specialists, e.g. consultants. [13] Both studies included a relatively high number of pharmacists (43% and 37%), and some of these actions may not be taken by other healthcare professionals.

However, it is clear that in both studies healthcare professionals would contact another member of the pharmacy team or a colleague if the MI service was unavailable.

There were many limitations associated with these studies. The first is that there was a lack of consistency in defining the terms patient care or patient outcome. One study by Bramley et al, has attempted to define patient care as, "*Healthcare interventions intended to preserve or improve a patient's mental or physical health"*, and patient outcome as, *"A change in the patient's health status that could be a consequence of an intervention in the preceding healthcare."* [10] No other studies except that by Innes et al, which was co-authored by Bramley, have adopted these definitions. [11] Therefore the metrics used to measure the impact of a MI service on patient care or patient outcome varied between studies. Furthermore, the effect of MI advice on patient outcome was self-reported by enquirers and so the findings were subjective rather than objective. Four studies attempted to validate the results using other sources: three studies utilised a panel consisting of hospital doctors and pharmacists to assess a sample of enquiries. Despite these limitations making it difficult to draw firm comparisons, all the studies published since the reviews in 2002 reported positive results. [10-13, 42, 49, 51, 52, 56]

1.4.3 General limitations associated with MI provision publications

Limitations were identified from the papers summarised in Tables 1 to 3. This section outlines these limitations and discusses their implications.

The first limitation was that some studies were undertaken at a single site. It is difficult to generalise the results reported for one service to all MI services and across countries because individual MI service provision can vary. The second limitation was that participants self-selected to take part in studies across all three themes, irrespective of the method chosen. For example, when contacting a MI service with an enquiry participants were then contacted to take part in the research study. There is therefore a potential risk that those who chose to participate may have biased the results. The third limitation is that not all studies were piloted. It is important that any questionnaire used for research purposes is first piloted to ensure that it provides the types of data expected which helps increase the reliability of the data generated. Finally, all studies included at least one author from the MI service(s) that was being evaluated. This may have led to potential bias because the author's views may have affected the interpretation of the results, although this may have been useful for the team of researchers because the author's knowledge and understanding of the subject

matter may have aided the study design. This is an important consideration for this researcher to be aware of when undertaking this research considering his own role.

1.4.4 On-call pharmacy services

This second part of the review has evaluated the literature relating to on-call pharmacy services. After reviewing the literature and aims of the studies included, these were summarised into the following three themes:

a. Extended hours pharmacy services, i.e. provision of a pharmacy service beyond normal working hours present within a hospital.
b. On-call pharmacy services, i.e. provision of a pharmacy service that could be called upon outside normal working hours.
c. Medicines advice out of hours, i.e. provision of, or related to the provision of MI services outside normal working hours.

For each of the three themes, relevant studies are again detailed and critiqued individually within a table format. The rationale for this format and the headings used are the same as though outlined at the start of Section 1.4.2. A critical evaluation of the publications is provided at the end of each section.

In this first section, just two papers about extended pharmacy services were found and are shown in Table 4.

Table 4. Publications relevant to extended hours pharmacy services

Reference (country)	**Foster JJ, Rudall NL. Re-engineering out-of-hours pharmacy services for a new decade. Clinical Pharmacist 2010; Suppl 3: S23 (England)** [17]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Evaluation of a re-engineered out-of-hours hospital pharmacy service.	Service evaluation in a single hospital. Electronic survey pre – and post-implementation of	Pre-implementation survey sent to nursing and medical staff. Post-implementation	Satisfaction of clinical activities during daytime, on-call, and extended pharmacy services

	extended pharmacy service to Emergency Admissions Unit (EAU).	(after 4 months) sent to same groups with addition of Band 6 pharmacists providing extended service.	(0 very poor to 4 excellent).
Key Findings/ Conclusion	A total of 35 responses were received from the pre-implementation survey. Day service provided was well received but a clinical pharmacy presence was also required out of hours. As a result, the authors developed considerations to include in an extended pharmacy service which were: participation in consultant post-take ward rounds, conducting medicines reconciliation processes, prescription monitoring including antibiotic review, offering advice to patients, supporting staff, and supplying discharge medications where there is a valid need for immediate discharge. A rota (compliant with the European Working Time Directive) was developed which ensured a clinical pharmacy presence 8am – 10pm. After 10pm, an on-call pharmacy service was provided until the following morning. A total of 34 responses were received from the post-implementation survey. The authors stated that the results indicated a substantial improvement in the perceived quality of the out-of-hours service. A total of 91% respondents stated that extended hours had had a positive impact on their practice. The Band 6 pharmacists also experienced increased confidence, allowed integration into the MDT team and improved their clinical knowledge.		
Reference (country)	**Lewis P, Forster A, Magowan M, Butler G. Exploring the experiences and opinions of Pharmacists working in a 24/7 hospital pharmacy service. International Journal of Pharmacy Practice 2015 (Suppl 2): 16 (England)** [57]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Explore pharmacists' experiences and opinions of working within a 24/7	Survey of pharmacists working as part of a 24/7 pharmacy	Individual semi-structured interviews. Participants recruited by email	Advantages and disadvantages of 24/7 pharmacy service.

hospital pharmacy service.	service in a single hospital.	and via a poster advertising the study to all pharmacists working as part of the service. Data analysed using Framework approach.	
Key Findings/ Conclusion	The majority of pharmacists (81%, n=13/16) involved in the provision of the 24/7 pharmacy service were interviewed. Perceived advantages of the 24/7 service included directly improving patient care by the prompt supply of time critical medicines, completion of an accurate drug history on admission and prevention of adverse drug events. By having an onsite presence, with access to patient notes and a greater range of resources, pharmacists felt they were identifying more problems than would be possible when providing advice over the phone. In addition, integration within the MDT and unplanned interventions due to their physical presence on the ward was also reported as positive experiences. Disadvantages of the service included reliance on the service by nurses for non-urgent supplies of medicines ad delayed writing of discharge prescriptions.		

These two publications were UK-based [56, 57] and was not unexpected as UK clinical pharmacy services have, in recent years, been the subject of transformation to develop 7 day working. [34] Both studies were undertaken at individual hospitals Foster et al, reported findings from a single clinical area, [56] whereas Lewis et al, appeared to evaluate a hospital-wide extended clinical pharmacy service. [57]

The first study used a quantitative research method to explore the views of healthcare professionals about extended clinical pharmacy services. [56] Although the response rate is not given and/or cannot be calculated, the study reports that doctors and nurses reported an improvement in service quality and impact on practice of the extended pharmacy service. Whilst there were a number of methodological issues with this study, surveying the users of an extended pharmacy service, and those involved in its provision enabled triangulation of the data generated from each professional group.

The second study used semi-structured interviews with pharmacists to explore their opinions about the provision of an extended clinical pharmacy service. [57] Although the numbers of pharmacists interviewed were small and limited to one hospital, the study reported advantages, as perceived by pharmacists, of an extended pharmacy service. The use of semi-structured interviews was more likely to have provided a greater depth and richness to the data generated in this study compared to if quantitative research methods had been used. Very little reference was made, or information provided about the effect of these extended clinical pharmacy services on the medicines advice seeking by healthcare professionals or the handling of such requests by pharmacists although these were not stated objectives of either paper.

There were a number of methodological issues with these two studies. For example a 4-point scale was used by Foster et al, to assess satisfaction with the extended clinical pharmacy service although it was unclear if this had been validated. [56] Furthermore, it was unclear if the survey by Lewis et al, was completed anonymously by respondents.[57]

The section about on-call pharmacy services identified seven papers for review, are summarised in Table 5, and critically discussed in the subsequent text of the thesis.

Table 5. Publications relevant to on-call pharmacy services

Reference (country)	**Peak VJ, Greene SA, Hansen LA, et al. Twenty-four-hour clinical services provided by an on-call pharmacist. American Journal of Hospital Pharmacy 1986; 43: 1753-1754 (US) [58]**		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Determined the enquiry workload handled by a US hospital on-call pharmacy service.	Descriptive study.	Evaluation of the pharmacy on-call service during an 8 month period.	Number and types of enquiries received, enquirer type.
Key Findings/ Conclusion	The on-call pharmacy service was provided by a single pharmacist (taken in turn) resident within the hospital who could be contacted by bleep for consultation. All enquiries were recorded in a notebook each day. A total of 423 calls were received by the on-call pharmacy		

	service: 38% during the day (7am – 5pm), 52% in the evening (5pm – 11pm) and 10% during the night (11pm – 7am). The authors state that enquiries were primarily from physicians both inside and outside the hospital, nursing staff and pharmacists at the base organisation. The authors categorised requests handled by the on-call pharmacy service as therapeutics (27%, n=116), dosing and pharmacokinetics (23%, n=96), miscellaneous (15%, n=64), drug administration (13%, n=53), drug distribution (9%, n=40), drug studies (n=19, 5%), nursing consultations (n=18, 4%) and narcotic distribution (n=17, 4%). An analysis of the enquiries indicated that 32% could be answered with basic references. Basic references were defined as those that are readily available to the resident. Most (68%) required extensive research which meant using any reference in the hospital's MI centre or medical library, contacting a pharmaceutical company, or reviewing a patient's chart.
Reference (country)	**Pitner JK. Clinical pharmacy on-call service in a tertiary care hospital. Pharmacotherapy 1999; 19 (4): 530 (US) [59]**

Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Determined the enquiry workload handled by a US hospital on-call pharmacy service.	Descriptive study.	Each pharmacy resident documented therapeutic drug monitoring and medicines advice provided during a 1 year period.	Number of enquiries handled; enquiry type; enquirer type.

Key Findings/ Conclusion	Data were evaluated for 42 weeks of the service: 259 patients with 288 drugs were monitored, and 117 questions were handled. Questions were asked by physicians (n=70), pharmacists (n=33) and nurses (n=9). Most common MI enquiries involved drug dosing (n=50), followed by therapeutic use (n=25) and nutritional assistance (n=11).

Reference (country)	McRobbie D, West T. Open all hours—running a resident pharmacy service. Hosp Pharm 2002; 9: 127 – 129 (England) [1]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Not stated.	Descriptive.	Described the workload associated with the pharmacy residency service out of hours (after 9pm weekdays and 3pm weekends) at a large, single NHS Trust.	Workload data. Number and type of enquiries, and type of enquirer and clinical specialty.
Key Findings/ Conclusion	During a 12 month period, the pharmacy residency service handled a total of 11,716 calls out of hours from across two hospital sites. The majority of calls originated from the Emergency Department (27%), followed by General Surgery (22%) and cardiology (10%). Nearly a quarter (24%, n=2,781/11,716) of calls required advice, with the majority requests for supply of medication (59%, n=6,937/11,716) and a small number (6%, n=759/11,716) not recorded. The three most common types of medicines advice calls received by the service were dosage adjustment (30.5%, n=887), adverse drug reactions (30.5%, n=848) and therapeutic choice (12.6%, n=351). The remaining enquiry types accounted for 2.49% and 22.5% categorised as 'other'. The most common users of the residency service were hospital nurses (63%, n=7,428/11,716), followed by medical staff (8%, n= 951/11,716). Nearly a quarter (23%, n= 2,695/11,716) were not recorded.		
Reference (country)	**Heath EK, Welch SA, Costello N. On-call pharmacist enquiries and outcomes: an on-call database review, 2003–2012. Journal of Pharmacy Practice and Research 2014; 44: 201-204 (Australia) [60]**		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Determine the enquiry workload	Retrospective analysis.	Data recorded onto an Access	Number of enquiries handled;

handled by an Australian hospital on-call pharmacy service.		database between 2003 and 2012.	enquiry type; enquirer type.
Key Findings/ Conclusion	A total of 963 enquiries were received and documented, of which 94% (n=909) were drug based enquiries. The majority of calls were answered from home (74%, n=711/963) mostly received between 5pm and 8am the following day. The most common 'drug-based' enquiry was about drug availability (59%, 540/909) and MI (26%, n=235/909). The majority of enquiries were answered using a reference source (54%, n=495/909) most commonly dispensing software (25%, n=124/495), followed by an on-call folder resource/database (22%, n=108/495) and other pharmacists (21%, n=102/495). Most enquiries were placed by nursing staff (74%, n=675/909) followed by doctors (n=18%, n=165/909). Of the 47 drugs involved in five or more enquiries, 64% (n=30/47) of these could be classified by 'A PINCH High Risk Classification'. The most common 'A PINCH' subtype was antimicrobials (40%, n=12/30), followed by narcotic (17%, n=5/30) and chemotherapeutic agent (17%, n=5/30). Non-drug based enquiries involved issues with logistics of discharge medication, refrigerators and security alarms, most of which were handled from home (69%, n=37/54).		
Reference (country)	**Kapadia T, Kelly D, Singal R. Evaluating the out-of-hours residency pharmacy service at a large NHS Trust. International Journal of Pharmacy and Practice 2016; 24 (Suppl 3): 85 (England)** [61]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Evaluated on-call residency pharmacy service at a single hospital Trust.	Retrospective.	Data collected from calls (n=1386) made outside of normal working hours over a 6 week period, categorised and themed.	Understand nature of calls received by pharmacy out of hours. Assess pharmacy staffing levels between weekend and weekday

			services against workload.
Key Findings/ Conclusion	The average number of calls per week received by the residency pharmacy service was 255. Medicines advice questions were responsible for 10% of the weekly calls, the remainder being for the supply of medication (78%). The remaining enquiries were categorised as 'Other' (not defined by the authors), accounting for 12% of calls. Most calls were received on Mondays (n=40) and Fridays (n=50). The weekday out of hours staffing provision to handle these calls was an average of 1.5 pharmacists and 0.4 technicians. This is against a weekend average of 1 pharmacist and 0.2 pre-reg pharmacist.		
Reference (country)	**Kilcullen N, O'Brady C. Do you need the on-call pharmacist? European Journal of Hospital Pharmacy 2016; 23: A159 – A160 (Ireland) [62]**		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Quantified and identified the frequently occurring enquiries to the on-call pharmacist and address any issues arising.	Retrospective analysis.	Review of on-call record forms (n=402) during a 9 month period at a single hospital pharmacy department. Data entered into Excel spreadsheet.	No. of questions related to supply and advice Medication involved in questions asked.
Key Findings/ Conclusion	A total of 295 requests involved supply and 141 for information (it is assumed that some record forms involved requests for both supply and advice). A total of 12% of requests for supply resulted in the pharmacist coming into the hospital. The top five medicines involved in out of hours requests were (in rank order): gentamicin, fentanyl, parenteral nutrition (PN), oxycodone and vancomycin. In addition to reviewing stock holding of fentanyl patches at ward level, supporting information for PN requests, and improvements to the gentamicin and vancomycin intravenous monographs, a flow chart "Do you need the		

	on-call pharmacist?" was developed in collaboration with nurse practice development to help improve provision of the service.		
Reference (country)	**Dunn J. On-call hospital pharmacy services: a perspective from NHS Tayside, Scotland. European Journal of Hospital Pharmacy 2018; 25: 72 – 78 (Scotland)** [18]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Described enquiries handled by a pharmacy on-call service. Described the activity of this service from April 2015 – March 2016.	Retrospective analysis.	All enquiries received by on-call pharmacists throughout NHS Tayside (Scotland) during period and documented using a bespoke on-call pharmacy App. Data analysed using OpenOffice Calc. Activity of the service, users of the service, types of calls handled and how long calls took to answer.	Number of calls and when received, enquirer and enquiry type and time calls took to answer.
Key Findings/ Conclusion	A total of 839 calls were received during the 12 month period with nearly half of all calls (46%, n=386/839) received over the weekend. Nurses were the most common user of the service (63%, n=527/839), followed by junior doctors (26%, n=220/839) and consultants (2%, n=18/839). The remainder consisted of a variety of staff working within and outside secondary care. Over half of calls were classified as either medicines supply or medicines advice 57% (n=477/839). Remaining calls were requests to dispense discharge prescriptions (18%, n=148/839), or advice on Total Parenteral Nutrition (TPN), therapeutic drug monitoring (TDM), or transferring or borrowing medicines from other departments or hospitals. Over a quarter of calls involved the security of the department or fridge temperature breaches (total 26%, n=214/839). It could be argued that advice on		

	TPN and TDM could be classified as MI requests. Most calls were handled within 30 minutes or less (82%, n=691/839), with nearly half of calls (49%, n=409/839) being resolved within 10 minutes. However, 18% (n=148/839) required more than 30 minutes to resolve. The on-call pharmacy service is provided mainly by Band 6 and 7 pharmacists and a very small number of Band 8a pharmacists.

Four of the studies originate from the UK and Ireland, reflecting the development of hospital on-call pharmacy provision in these countries. [1,18,61.62] Three studies have been published from the US and Australia. [58-60] Overall, the studies were descriptive or retrospective in nature, with data derived from single organisations.

The timeframe used for data analysis by each study varied and ranged from 6 weeks to 10 years, [60,61] although three of the seven were conducted over 12 months. [1,18,59] As previously discussed, the data generated from studies conducted over a longer period of time, i.e. 10 years, may better reflect information about on-call pharmacy services over time and any changes to be observed which may identify trends/patterns. However, depending on the time period of the study it may mean that any historical findings are no longer relevant to current practice, particularly as practices can change.

In five of the seven studies, data was generated about the different types of healthcare professionals who used on-call pharmacy services. Two US studies reported that doctors were the most frequent users, followed by either pharmacists or nurses. [58,59] However, the remaining studies published from the UK and Australia all reported nurses as most likely to contact the on-call pharmacy service, followed by doctors. [1,18,60] The lack of pharmacists as a user of the on-call pharmacy service in the UK and Australia reflects the provision of hospital pharmacy services in these countries.

Three studies stated that the proportion of medication supply enquiries were higher compared with medicines advice. [60-62] These data reflect the researcher's experience that on-call pharmacy services have typically focused on medicines supply rather than advice. The study by Dunn reported that more than half of the calls handled were about medicines supply or advice (57%) but did not differentiate between the two types. [18]

Therapeutic choice or use, and drug dosing appeared to be common enquiry types cited by studies published in the US and UK from the mid-1980s until 2002. [1,58,59] Other MI studies (Section 1.4.2) published since 2002 which provided information about the

types of enquiry categories might be drawn on for comparison for more up to date data. These studies reported that choice of therapy, therapeutic use, drug availability and drug administration were the most common enquiry types of enquiries handled by MI services. This suggests there are some similarities between the types of enquiries handled by on-call pharmacy services and MI centres.

In summary, the published data is limited, derived from single organisations and has been generated using quantitative research methods. Reported results suggest that on-call pharmacy services handled a greater number of medicines supply questions compared to medicines advice. Nurses and doctors were the most frequent users generating questions about the therapeutic choice or use of a medicines and drug dosing.

In the third and final section, seven papers about medicines advice out of hours were retrieved and summarised in Table 6, and critically discussed in the subsequent text.

Table 6. Publications relevant to MI out of hours

Reference (country)	**Auckland H, Belton R. UKMi 24/7: Audit of the quality of medicines information enquiries answered out-of-hours. 33rd UKMi Practice Development Seminar; 2007 Oct 31st; London (England)** [63]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Assessed the quality of MI enquiries handled out of hours by on-call pharmacists using national guidelines. [5] Identified any learning for on-call pharmacists related to answering questions about	Retrospective analysis.	Enquiries answered out of hours during a 6 month period at a single large hospital were included and assessed using national enquiry answering standards by two experienced MI pharmacists. Any common learning	Quality scores for enquiry documentation, analysis, search and answer recorded.

medicines out of hours.		points were recorded during this assessment.	
Key Findings/ Conclusion	A total of 75 enquiries were assessed with mean quality scores as follows: documentation 60% (UKMi Standard 100%), analysis of the enquiry 82% (UKMi Standard 100%), search coverage 54% (UKMi Standard 100%), and answer 87% (UKMi Standard 100%). The authors state that the quality of MI answers provided out of hours by on-call pharmacists is below that required during the day, although only one enquiry was considered to be unsafe.		
Reference (country)	**Emerson A. UKMi 24/7: What are the information needs of health professionals out-of-hours? 33rd UKMi Practice Development Seminar; 2007 Oct 31; London (England) [64]**		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Established whether there was a need to develop the UKMi service to support secondary care health professionals outside normal working hours.	Prospective survey	A questionnaire survey of doctors and nurses working out of hours at a single hospital in the South of England.	Information needs of healthcare professionals working out of hours
Key Findings/ Conclusion	Of 465 staff surveyed (153 doctors, 312 nurses), 84 questionnaires were received (18% response rate). Healthcare professionals estimated that they needed to find MI between 1 – 5 times in an average shift out of hours (87%, n=73). Questions asked by healthcare professionals was most likely to be about adverse effects (62%, n=52), followed by drug administration, intravenous compatibility, drug interactions, and dose. Respondents usually sought information from paper-based resources (41.5%) or their peers (40.2%). The majority did not consider there were barriers to locating information about medicines out of hours (68%, n=57). However, of those that did consider there to be barriers, 83% (n=15) did not know where to look for information and 82% (n=14) found paper-based		

	resources missing from the ward. Knowing what resources were available and how up to date they were was also problematic. Questions involving intravenous medicines were considered more difficult to resolve out of hours (10.7%, n=9). Respondents suggested that they would prefer to be supported though improved links to validated online sources of information (67%, n=56), ready-made answers to frequently asked questions (62%, n=52) and improved access to the MI service (48%, n=40).		
Reference (country)	**Cheeseman M. Improving information governance for pharmacists working out of hours: involvement of a MI service. 34th UKMi Practice Development Seminar; 2008 Sept 18 – 19; Warwick (England) [23]**		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Developed a bespoke toolkit to signpost on-call pharmacists to relevant information sources and ensure that any advice provided, was documented.	Descriptive study.	Evaluation of the toolkit 2 months after its implementation.	Not stated.
Key Findings/ Conclusion	This author described that the toolkit (Emergency Duty Drug & MI (EDDI) pack) was based on national enquiry answering guidelines and quick question guide. It was designed to support the on-call pharmacist to record the minimum amount of information required to be documented when handling an enquiry. It also signposted the pharmacist to available resources and how these can be accessed. In addition, a separate paper record form was designed for each enquiry type most commonly received out of hours. This author states that after 2 months the most common enquiry type was drug administration.		

Reference (country)	Woods F. Extended Hours MI Service (paper for Welsh Chief Pharmacists meeting) [unpublished]; 2008 (Wales) [36]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Provide an out of hours MI enquiry answering service (pilot) and determine the workload, user satisfaction and quality of documentation against national guidelines.	Service evaluation.	Reviewed workload data after 3 months post implementation. A user satisfaction survey sent to enquirers who had used the service.	Number, type, complexity of enquiries; time received; enquirer type; enquiry answering quality; user satisfaction.
Key Findings/ Conclusion	An experienced MI pharmacist was available by radio-pager in one of four MI centres across Wales. During the 3 month period, a total of 37 calls were handled; most were received on a weekday evening (62%, n=23/37). Over half of the enquiries received were from hospital pharmacists (on-call, extended hours or weekend) (n=68%, n=25/37), followed by hospital nurses (14%, n=5/37), community pharmacy (8%, n=3/37), out of hours GP (5%, n=2/37), junior doctor (3%, n=1/37) and poisons unit (3%, n=1/37). The majority of enquiries handled out of hours were assigned as level 2 (83.8%, n=31), followed by level 1 (13.5%, n=5) and level 3 (2.7%, n=1). A sample of on-call pharmacy documented enquiries (n=8) scored an average of 8/20 compared to extended hours MI service enquiries (n=3) which scored an average of 19/20. Enquirers indicated via the user satisfaction survey (response rate 92%, n=22/24) that 76% were aware of the service, 12% had previously used the MI service and 68% thought there was a need for an extended MI service.		

Reference (country)	Cheeseman M. The East Anglia Medicines Information out of hours project – results from a pilot study. 35th UKMi Practice Development Seminar; 2009 Sept 17 – 18; Edinburgh (England) [24]		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Determine the types of MI enquiries handled by on-call pharmacists across the East Anglia region. Identify any pro-active MI that could be provided as a result.	Prospective study (pilot).	The titles of enquiries handled out of hours by hospital pharmacy departments (East Anglia) were collated on a weekly basis during a 3-month period. Data obtained was entered into a Microsoft Excel spreadsheet.	Numbers of enquiries, enquiry type and the of medicines involved.
Key Findings/ Conclusion	All East Anglia MI centres participated in this study (n=11) but only 7.9 services per week submitted data during the 3-month period (average 72%). A total of 195 enquiries were received, with questions involving administration/dosage accounting for two thirds of the enquiries (66%, n=127). The majority of enquiries (93%) involved an injectable medicine. The medicines most commonly involved in enquiries handled by pharmacists out of hours were antimicrobials (n=19), i.e. gentamicin and vancomycin.		
Reference (country)	**Cheeseman M. The on-call pharmacist's bag – is there a different way? Clinical Pharmacist 2010; 2: 98 – 100 (England) [25]**		
Aim & objectives	**Type of study**	**What was the study about?**	**Outcome measure(s)**
Evaluation of an internal website for pharmacists at a single hospital to	Retrospective survey.	Pharmacists (n=30) at a single hospital were asked to complete online survey.	Not stated by this author.

access information out of hours.			
Key Findings/ Conclusion	Nearly two thirds of respondents completed the questionnaire (63%, n=19/30) and of these, 89% (n=17) had used the PRS at least once during the previous 6 months all of whom had found it easy to use. Most (88%, n=15/17) agreed or strongly agreed that information governance had improved considerably with the introduction of the internal website; the remaining two were undecided. Over two fifths (41%, n=7/17) had accessed the PRS outside of normal working hours and all had found the information they were seeking. Of these, five (86%) pharmacists had not needed to come into the hospital because they had been able to find and access information via the PRS. Three pharmacists said this had saved them from claiming for one hour of time worked; three had avoided claiming for two hours.		

Evidence related to medicines advice out of hours is limited, originating from the UK and consisting of 'grey' or unpublished literature. All of this literature has been led by UKMi pharmacists and perhaps reflects the explorative approach being taken to determine how MI services might support those working out of hours. The evidence includes analyses of documented medicines advice enquiries handled by on-call pharmacy services, [24, 63] evaluations of resources to support on-call pharmacists handling medicines advice enquiries, [23, 25] a survey of healthcare professionals MI needs when working out of hours, [64] and an evaluation of a dedicated out of hours MI service. [36]

Auckland et al, concluded that documentation by on-call pharmacists was poorer when compared to national standards. [63] However, the enquiries were assessed by two MI pharmacists, rather than independent assessors, and so there is a possible risk of bias as the reported findings could have been under or overstated. It is also not possible to generalise these findings to other on-call pharmacy services although Woods, as part of her service evaluation, also reported that the quality of documented enquiries by on-call pharmacists compared to those by a dedicated MI pharmacist over a 3 month period was poorer compared to national standards. [36] However, the numbers of enquiries were small and not comparable between the two groups, i.e. three and eight enquiries. It is also not clear who assessed the quality of enquiry documentation as this may have also biased findings.

Work by Cheeseman investigating the types of enquiries fielded by the on-call pharmacy service across 11 hospital Trusts in East Anglia concluded that drug administration/dosage, using UKMi categorisation, was the most common enquiry type handled. [24] These enquiry types were similarly reported in a further evaluation by Cheeseman as part of an evaluation of a bespoke resource to support on-call pharmacists at a single site handling medicines advice enquiries. [23] Findings from a survey of doctors and nurses reported that their MI needs were most commonly about adverse effects, followed by drug administration, intravenous compatibility, drug interactions and dose. [64] There are similarities between these enquiry types and those reported to be handled during normal working hours (choice of therapy, therapeutic use, drug availability and drug administration) as reported in Section 1.4.2. It is not unexpected that medicine advice needs during normal working hours and out of hours should be comparable because patient care is 24 hours, 7 days a week.

Only one paper aimed to determine where healthcare professionals sought information when working out of hours. [64] It is unclear how the survey questions were asked, but nurses and doctors reported that they would access paper-based resources or their peers when seeking MI out of hours; the on-call pharmacy service was not mentioned as a source of information.

Just one study by Woods, has implemented and evaluated a dedicated on-call MI service. [36] This was conducted in Wales over a 3 month period, in addition to existing hospital on-call, extended and weekend pharmacy services. The most common enquirers were the hospital pharmacists, followed by nurses, community pharmacists, GPs, junior doctors and a poisons unit. It is not clear how the presence of this dedicated out of hours MI service was communicated, but it is likely that there was a greater awareness within the hospital pharmacy departments it was there to try and support.

In summary, there is very limited published information about MI service provision or support out of hours.

1.5 Research Aim and Objectives

The literature reviewed provides information about how MI services are provided, including the types of enquirers, enquiries handled, and the routes of communication used. Users are generally satisfied with the service provided by MI centres and the advice received, is used in the management of patient care. In relation to on-call

pharmacy services, there is limited information about their provision emanating from single organisations. This data suggests that doctors and nurses seek medicines advice from on-call pharmacy services. There is a suggestion from the publications that there may be an issue with the consistency and quality of medicines advice enquiry documentation by on-call pharmacists. Whilst there is some limited information about the provision of extended pharmacy services, no data about the opinions and experiences of pharmacists providing out of hours services or those using these services exists.

The overall aim of this study was to investigate the provision of pharmacy services and more specifically medicines advice out of hours, from the perspective of pharmacists and other healthcare professionals.

For the research question to be adequately answered a number of elements needed to be considered and formed the objectives for the study. The objectives of the research were therefore to identify:

1. how NHS England hospital pharmacies provide out of hours services.
2. how NHS England hospital pharmacy out of hours services handle calls for medicines advice from secondary care health professionals.
3. the perceptions of on-call pharmacists about the medicines advice they provide out of hours.
4. how on-call pharmacists, nurses and doctors describe their MI needs out of hours.
5. how on-call pharmacists, nurses and doctors access information when needing medicines advice out of hours.
6. the perceptions of on-call pharmacists, nurses and doctors about the current provision of medicines advice by pharmacy out of hours services.
7. the perceptions of on-call pharmacists about what would affect the documentation of medicines advice provided out of hours by on-call pharmacists.

CHAPTER 2 METHODOLOGY

2.1 Introduction

This chapter presents the philosophical and methodological approach for this research and outlines the rationale for the methods and data analysis used.

2.2 Principles of research, theoretical perspective and methods

The UK Policy Framework for Health and Social Care Research defines research as the attempt to derive generalisable or transferable new knowledge to answer or refine relevant questions with scientifically sound methods. [65] The four basic principles of any research undertaken include ontology/epistemology, theoretical perspective, methodology and the methods/techniques. [66] This section will outline these principles and put this research into context.

Ontology is the study of being and is concerned with 'what is'. [66] At its most basic level, ontology is the researcher's beliefs about the nature of reality: what exists and what is true. There are two opposing ontological beliefs: realism and relativism. The realist approach proposes that there is the existence of one truth and that this not does not change over time. The truth is discovered using objective methods and research findings can be generalised to other scenarios. In contrast relativism proposes that there are multiple truths or versions of reality and that these evolve over time. Qualitative research methods are typically used, and research findings are based on a particular context and cannot necessarily be generalised to other situations. Ontological beliefs dictate a researcher's epistemological stance, i.e. how can reality be known, and there are two main approaches that can be taken which outline the relationship of the researcher with the research: positivism and constructivism.

Positivists believe in an objective reality and that knowledge of this is obtained from direct observation or measurements of phenomenon. Constructivists believes that there are multiple truths and realities and that knowledge is created, or co-created, between a researcher and the participants. Both ontological and epistemological issues tend to merge together and both inform the theoretical perspective of the research. [66]

Initially, this researcher was not conscious that his approach to research was grounded in any theoretical stance or methodology. However, the researcher reflected on his own ontological and epistemological belief. These reflections were supported through the literature review process which showed that most researchers who have undertaken studies into MI and on-call pharmacy service provision have adopted a positivist

stance. These studies sought to identify the facts related to these services and so the methodology chosen for this research was initially informed by the researcher's positivist belief. This researcher initially believed that there was one version of reality and this could be measured by using systematic methods typically employed in the natural sciences. That is, that the research objectives could be best met by attempting to find out what hospital on-call pharmacy services are provided across the NHS in England and how these services handle calls for medicines advice from healthcare professionals. In addition, the researcher would explore the opinions of on-call pharmacists and other healthcare professionals in a particular geographical area about a number of aspects related to the provision, access, needs and documentation of medicines advice out of hours. This approach would provide 'the facts' about how such services are provided and be generalisable across the NHS. Based on the researcher's own experience as a MI and on-call pharmacist, it was his belief that there is likely to be variation with regards to both the provision and use of on-call pharmacy services, and how healthcare professionals seek MI out of hours. However, whilst this researcher may have set out as a positivist, he reflected that during the research process his belief had developed increasingly towards constructivism, accepting that there can be multiple versions of reality. This was supported by his approach of gathering information personally from on-call pharmacists to understand the context within which they work, generating subjective meanings from their experiences and interactions. [67] Further explanation is provided in Section 2.3.

The methods chosen for research are influenced by the methodology, which in turn is influenced by the theoretical perspectives adopted and in turn by the researcher's epistemological stance. [68] The methods that can be used to undertake research can be categorised into quantitative and qualitative. A quantitative research method can be defined as an approach for testing objective theories by examining the relationship among variables. These variables in turn can be measured, typically on instruments, so that numbered data can be analysed using statistical procedures. In contrast, a qualitative research approach is one for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. [67]

In some circumstances, a mixed methods approach can be used. This approach is defined as an inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks. [67] The approach to this research study was to use a combination of quantitative and qualitative research methods because the combination was believed to provide a more complete

understanding of the provision of pharmacy services and medicines advice out of hours. The quantitative method provided factual information about the provision of on-call pharmacy services whereas the qualitative approach provided an opportunity for a more in-depth exploration of the opinions and views of individuals. It also served to triangulate data from each of the methods used. The researcher believed that the use of a survey and semi-structured interviews undertaken sequentially would provide the necessary information to answer the research objectives.

The next two sections discuss the chosen quantitative and qualitative methods, the rationale for their use and how the data generated was analysed.

2.2.1 Quantitative research method and data analysis

One of the most common quantitative research methods used is survey research. Survey research was believed to be the most appropriate methodology to use for the first part of this study because it enables objective information about a population, e.g. the number of hospital on-call pharmacy services, to be studied. In addition, this research method can include cross-sectional and longitudinal studies using structured data collection tools such as questionnaires consisting primarily of closed questions, and the information from a sample, if large enough, can be generalised more widely to a population.

Therefore a survey of Chief Pharmacists was used to address research objectives one and two. Survey research can be undertaken using various modes and methods, such as postal mail, telephone, email and online. Online surveys have several advantages: shorter transmitting time, lower delivery cost, more design options, e.g. routing, and less data entry time. [69] There are disadvantages to online surveys which include losing participants who do not have Internet access and having low response rates that could lead to biased results.[69] However, the researcher did not feel that these were applicable to Chief Pharmacists as a group because of the response rates previously reported. These studies, which surveyed Chief Pharmacists using postal questionnaires, have reported response rates ranging from 22 to 74%. [70-72] The researcher believed that using an online survey would provide comparable response rates, as reported for this target group in more recent studies. [73,74] It was therefore decided that an online survey would be used to ascertain how on-call pharmacy services were provided by hospitals in NHS England.

The online survey questions were initially generated by the researcher based on the presence and absence of information yielded by the literature review. They were also informed by the researcher's own personal experiences from participating in the on-call pharmacy services of more than one acute hospital Trust. These experiences included the way the on-call pharmacy services were provided in these two organisations, the training he personally received, the volume and types of questions he handled and the way in which medicines advice questions were handled and documented. In addition, the researcher's experiences as a MI pharmacist and the way medicines advice questions were expected to be handled during normal working hours also influenced these questions. Some examples of initial questions generated by the researcher are shown in Panel two.

Panel 3. Examples of initial online survey questions

- Does your pharmacy department provide an out of hours pharmacy service?
- For whom is this service funded to provide an on-call service to?
- Who participates in this service?
- Are more complex advice calls handled differently to less complex calls?
- How do on-call pharmacists document advice?

These initial questions were then further developed by the researcher (Panel 3). This was achieved by reflecting on the information that would be provided in response to the questions and by referencing back to the literature to ensure that this data was not available already. Furthermore, very little information existed about the type of staff involved in the provision of on-call pharmacy services, particularly in the UK. Therefore the questions, *"Does your department provide an on-call pharmacy service to secondary care healthcare professionals?",* and *"Please indicate the number of pharmacists in each of the Agenda for Change banding that provide your on-call pharmacy service"*, were developed. Whilst there was a suggestion within the 'grey literature' that there may be an issue with the documentation of enquiries by on-call pharmacists, it did not first describe how such questions were documented. Therefore, the question, *"How is the medicines information advice provided by your on-call pharmacists to secondary healthcare professionals currently documented?"*, was introduced.

Panel 4. Examples of initial online survey questions further developed

- Does your department provide an on-call pharmacy service to secondary care healthcare professionals?
- If response to the above question is NO: Please explain why your department does not provide an on-call pharmacy service to secondary care healthcare professionals.
- Please indicate the number of pharmacists in each of the Agenda for Change banding that provide your on-call pharmacy service (you can tick more than one option)
- How is the medicines information advice provided by your on-call pharmacists to secondary healthcare professionals currently documented?

Once the initial questions were finalised, they were grouped into provisional themes according to the type of data that would be generated. The themes also helped with the sequence of questions within the survey and their routing (Panel 4).

Panel 5. Provisional themes for online survey questions

- Demographics
- Delivery of on-call pharmacy services
- Types of services provided
- Remuneration
- Staffing
- Documentation
- Advice
- Training
- Resources
- Usage
- Evaluation of service
- Promotion of service

The researcher then reviewed these finalised survey questions and their relevance to the research objectives of this study (Appendix 3). Any questions that could not be linked were removed. The answer option(s) that participants would be asked to select in the survey were developed and informed by the nature of the questions asked, e.g. closed questions, which required binary responses such as yes or no; information provided from the literature review; and, the researcher's personal experiences or knowledge. For example, the options provided in response to the question about the number of beds in a Trust was based on researching the size of acute hospital and mental health Trusts and then grouping these into suitable bands. Another example was the options to select in response to a question about the number of calls for

medicines supply or advice handled out of hours. The likely workload handled by on-call pharmacy services was based on the researcher's own experiences and workload information from the literature review. For example, when the researcher worked in an acute hospital Trust (approximately 600 beds) an average of five medicines advice calls and thirty medication supply calls per week were handled. However, when the researcher worked in a large acute hospital Trust (approximately 1000 beds), a similar number of medication supply calls were handled each week but a higher number of medicines advice calls (approximately 12 per week). Similarly, based on the published data summarised in the literature review (Section 1.4.4), there was a wide variation for how many enquiries on-call pharmacy services were reported to handle: between 4 and 58 medicines advice calls, and between 8 and 230 medicines supply calls per week. Based on this information, the options used in the survey were chosen to be able to capture this variation in workload. A final example was the types of healthcare professionals that might use an on-call pharmacy service. The categories used within the survey were taken from those cited in the literature, e.g. doctors, nurses, and aligned to those used by UKMi services but amended to enable greater granularity, e.g. instead of hospital doctor, this was subdivided into senior hospital doctor and junior hospital doctor.

In addition, the justification for including each question within the survey was documented (Appendix 3). The questions were then further refined by removing duplicates or any that overlapped. For example, the question, *"Ideally, where should medicines information advice provided by on-call pharmacists to secondary healthcare professionals be documented?"* was removed because the question, *"How is the MI advice provided by your on-call pharmacists currently documented?"* was already included. The researcher did not believe that the preceding question added any value. Once the questions were finalised, the provisional themes were further refined and finalised (Panel 5).

Panel 6. Final themes for online survey questions

- Organisational demographics (questions 1 – 5)
- Provision of on-call pharmacy service (questions 6 – 11, 38 - 41)
- Documentation of medicines advice questions (questions 12 – 30)
- Training provided to pharmacists to help them answer questions out of hours (questions 31 – 37)

The majority of questions included within the online survey generated quantitative data.

A small number of open questions were included, and participants were able to enter free text responses. These data were analysed manually by the researcher, descriptively coded and then themed where appropriate.

A number of techniques were used in this research to increase response rates to the online survey as described in a systematic review. [69] For example, a survey length time of less than 13 minutes was related to better response rates. [69] In order to achieve this, mainly closed, with minimal use of open questions, were included. All questions were kept simple, unbiased by avoiding words that might lead the Chief Pharmacist to a more positive or negative response, and not vague. Using closed questions would increase the likelihood of factual information being provided by Chief Pharmacists.

Experimental studies have consistently proved the effects of pre-notification and reminders on response rates ranging from a modest to doubling the effect. [69] A postal letter was therefore sent to each Chief Pharmacist about a week before an email containing a link to the online survey. Attaching the online survey to the email was avoided because it has been suggested that this would adversely affect response rates. [69] The initial email was sent on a Sunday evening to ensure that when Chief Pharmacists accessed their email inbox on a Monday morning, it was more likely to be the first email they would see, i.e. top of their inbox. This would ensure that the email invitation was not 'lost' within the Chief Pharmacist's inbox. A reminder postal letter was also sent to Chief Pharmacists a week later. Although the timeframe for completion of the survey was not stated in the postal letter/email or online survey, it was decided that a timeframe of 4 – 6 weeks was needed to maximise the opportunity for Chief Pharmacists to complete the survey. This timeframe was felt to be more than sufficient for Chief Pharmacists to complete the survey and would also account for any annual leave that they may have taken. Furthermore, this timeframe was aligned to other studies that included questionnaires or online surveys. [10, 11, 44, 53, 75]

In addition, the postal letter and emails were personally addressed to each Chief Pharmacist and included the University's logo. Personalisation of invitations and online surveys sponsored by academic and government agencies/departments rather than those sponsored by commercial ones have been found to achieve higher response rates. [69]

With regards to the display or presentation of the online survey, a wide variety of technical issues have been examined in the extensive literature on survey methodology There is a long list of technical issues involved which include: display design; layout;

text format for questions and instructions; backgrounds; logos; graphics; progress indicators; navigational instructions; and, radio buttons, check boxes, drop-down boxes, and full list boxes. These issues were considered in the survey design used for this research. For example, the font used for questions was bold and larger than the text used for the options presented to the respondent. Furthermore, radio and check buttons were used throughout the survey to aid consistency for the respondent. With regards to online survey display designs, there are two main types: screen-by-screen and scrolling questionnaires. [69] Scrolling designs display all questions within one single web page and respondents need to scroll from the head to the bottom of that single webpage to view the whole questionnaire and give answers. A scrolling design requires less computer time and computer resources to contact with the web server because it only requires one single submission of the final responses. In addition, it provides richer context for respondents to respond because all questions are on one page. [69]

Screen-by-screen designs put one or several questions within one screen and respondents press the button of ‘‘next page” in order to proceed. It has been pointed out that the advantages of this design include allowing respondents to skip questions that are not applicable to them. [69] A screen-by-screen design was utilised for the online survey for Chief Pharmacists because it was anticipated by the researcher that a scrolling design would potentially reduce response rates. Furthermore, sequential questions were dependent on the respondents’ answers. For example, if a respondent answered ‘no’ to one question, then the next question could be different if another respondent had responded ‘yes’. There was a high degree of routing used within the online survey to ensure that depending on the response to a question, the next one shown was appropriate. For example, Chief Pharmacists were asked, *“Do you have a standard Trust policy for the documentation of medicines information advice provided out of hours by pharmacists?”* If they answered yes, they would then be presented with the following question, *“What information does the policy state should be documented?”* which required a free-text response. However, if the respondent had answered no, they would be presented with the following alternative question, *“In your opinion, what information should be documented by on-call pharmacists when they provide advice out of hours to healthcare professionals?”* and be presented with a list of answers to choose from.

The researcher also decided to assign a unique identification number (UIN) to each Chief Pharmacist to use when completing the online survey. This would enable the researcher to identify which person had responded and if there were any duplicate responses (some organisations had more than one contact) and allow follow-up with

any Chief Pharmacist who had expressed an interest in participating in the second phase. Although this would mean that the respondents were not anonymous the 'Key' which detailed the contact details of each participant was kept and only known by the researcher. This key was stored on an encrypted and password protected USB drive held by the researcher. This was not considered an issue by the University ethics committee.

The online survey was first piloted as it has been suggested that the best way to assess the quality of an online survey before its actual use is to pilot it with a small group of respondents in the real-life situation and then invite content or methodology experts to review the pilot results. [69] Research validity is defined as the extent to which a concept is accurately measured in a quantitative study [76] There are three major types of validity: construct, criterion and content. Construct validity refers to whether inferences can be drawn about test scores related to the concept being studied. In this research, factual information about the provision of on-call pharmacy services was being sought rather than assessing an individual's knowledge. The researcher concluded that this type of validity was not relevant to this research. Criterion validity involves correlation of any other instrument that measures the same variable. There are few very published studies about on-call pharmacy services and therefore it was not possible to use this type of validity method. Finally, content validity involves the assessment of whether the instrument, e.g. online survey, adequately covers all the content that it should with respect to the variable. In other words, omitting to gather data on issues that are of importance will result in an instrument that lacks content validity. [77] A subset of this type of validity testing is face validity and this was applied to the survey used in this research. [76] Face validity is an assessment of whether the instrument, e.g. online survey, would be expected to collect the information accurately and effectively. [77] This type of validity testing was applied to the survey through its piloting. Reliability relates to the consistency of a measure. [76] A participant completing an instrument, such as an online survey, should have approximately the same response each time it is completed. Although it is not possible to give an exact calculation of reliability, an estimate of reliability can be achieved through different measures. The three attributes of reliability are homogeneity, stability and equivalence. [76] The survey used for this research underwent no formal reliability testing.

In order to potentially avoid reducing the number of Chief Pharmacists' responses that could be included in the final data analysis, the online survey was therefore piloted with a small number of clinical and MI pharmacists. These were chosen to pilot the content, functionality and routing of the online survey and therefore the fact that they were not

the target group for the survey was not an issue. In addition to piloting the online survey and providing comments on its questions and functionality, e.g. routing, participants were also asked specifically to comment on a series of questions (Panel 6). If the answer was 'no' to any of the questions in Panel six, participants were asked to email the researcher directly with their reasons.

Panel 7. Pilot questions related to the online survey

- Did they understand the information sheet/consent form attached to the email?
- Did they understand the consent form at the start of the survey?
- Did the survey work for them? i.e. technical functionality
- Did they understand the questions asked within the survey?

The remainder of this section discusses the types of data generated by the survey and its analysis. Quantitative data can be classified as either categorical or numerical and both were generated from this research. Categorical data can be further sub-classified as nominal or ordinal data and numerical data into discrete or continuous data. The online survey included closed questions that generated categorical data, both ordinal and nominal, and discrete numerical data. There is no obvious ordering of nominal data but there may be a natural order in some cases. For example, nominal data would include yes or no responses to the following online survey question, *"Does your department provide an on-call pharmacy service to secondary care health professionals?"* Ordinal data is one where the variables are natural and ordered. An example would be data generated in response to the online survey question, *"Please rank the following healthcare professionals according to how often they use your on-call pharmacy service (rank 1 - 4, with 1 the greatest users and 4 the lowest users)"*. Only discrete numerical data was generated from this research. Discrete numerical data are observations or responses to questions that can only take certain numerical values. An example would be the responses to the online survey question, *"How many calls for medicines information advice are received during a typical week by the on-call pharmacy service?"* The options for the respondent to choose are < 10, 11 - 20, 21 - 30, 31 - 40, 41 - 50 and > 50. These data were categorised as 'frequencies' and exported from the online survey to the Statistical Package for Social Sciences (SPSS) Version 25. The data was then summarised as the proportion of the total number of 'frequencies' in a category, e.g. number of hospitals providing an on-call pharmacy service (87.1%, n=101/116).

Analysis of the categorical and numerical data generated was subject to cross-tabulation where appropriate to explore the relationships within these data and

statistical tests applied using SPSS. When considering the statistical significance, the null hypothesis must be considered. The null hypothesis is a statement about a population that we try to reject with sample data. For example, that an on-call pharmacist will receive the same number of calls whether they are located at home or as part of a residency programme. Statistical tests are used to evaluate if the observed data could have been obtained if the null hypothesis were true. This probability is called the P value and for this research if this was equal to or smaller than 0.05, the less likely the null hypothesis was true. [78]

Two statistical tests – Pearson's chi-squared (X^2) and the Fisher's exact test – could have potentially been used to analyse the categorical and discrete numerical data generated. The Pearson's X^2 test is used to assess how likely it is that an observed distribution is due to chance. When the null hypothesis is true, X^2 has a chi-squared distribution and named accordingly. The X^2 values are positive and its distribution has one degree of freedom. The number of degrees of freedom using the X^2 test for a two way frequency table is the product (a-1) multiplied by (b-1), where 'a' is the number of rows and 'b' is the number of columns. Therefore, for a 2 x 2 table there would only be one degree of freedom and so the expected value of the chi-squared distribution when the null hypothesis is true is approximately the number of degrees of freedom. [78]

The distribution for the chi-squared test is based on a 'large sample' approximation, that is that 80% of the cells in the table should have expected frequencies greater than 5, and all cells should have expected frequencies greater than 1. If any of the cells have a very small expected frequency, this would contribute significantly to the X^2 value. If the table has too many small expected frequencies then the frequencies in the rows and/or columns should be sensibly combined and the Fisher's exact test, rather than the Pearson's X^2 test, is used instead. [78] In this research, because of the small sample sizes the Fisher's exact test was more commonly used than the Pearson's X^2 test to test the null hypothesis. This evaluated the probability associated with 2 x 2 tables which have the same row and column totals as the observed data, making the assumption that the null hypothesis is true, i.e. the row and column variables are unrelated.

The responses received to each of the survey questions were also exported from SPSS and tabulated using Microsoft Excel to provide a summary document showing the responses to each survey question.

2.2.2 Qualitative research method and data analysis

Several different qualitative research methods can be used. These might include focus groups, observation, semi-structured, structured and in-depth interviews.

Focus groups use a group of individuals to generate data and use a similar structure to face-to-face interviews. Group members are permitted to talk to one another, argue and ask questions, and is especially useful for finding out about shared experiences. [79] Whilst on-call pharmacists, doctors and nurses work alone or in very small numbers as a team out of hours, they would have shared experiences. However, the usefulness of such an approach was not thought by the researcher to be appropriate to this work. Instead, the researcher was interested in the personal perspectives and opinions of the individual pharmacists, nurses and doctors. Had a focus group been used their own peers or other healthcare professionals may have potentially influenced their responses. Even with the most effective focus group facilitation, some individuals may have been more vocal than others, and there may have also been a hierarchical influence within and between professions depending on the constitution of the focus groups. Therefore as it was important for this research to find out the experiences and opinions of these healthcare professionals as individuals without being influenced by others, focus groups were not used.

Observation as a research method can involve organisational settings, behaviour, and interactions. This is particularly useful in studying quality issues as it allows researchers to uncover everyday behaviour rather than only relying on interview accounts. [79] Again, this method did not seem appropriate for this research because it explored the opinions of individuals and how medicines advice issues out of hours were handled rather than necessarily behaviours or interactions of individuals. The literature about the provision of medicines advice outside normal working hours is limited but based on published workload data and personal experience, the number of times on-call pharmacy services are used relative to pharmacy services during normal working hours is much less. Therefore the number of opportunities to observe nurses or doctors seeking information or contacting the on-call pharmacist is likely to have been very low. Furthermore, as some on-call pharmacists are based at home outside normal working hours, it would have been very difficult to observe these healthcare professionals. For these reasons, it would have been very difficult to use observation as a method.

Interviews are an alternative qualitative research method that can be used and can be conducted as semi-structured, structured or in-depth. Structured interviews use a formal schedule of questions which are adhered to and do not allow flexibility. In depth interviews enable the researcher to elicit more detail about an experience, attitude or issue. Semi-structured interviews use a loose structure of open-ended questions about a particular topic or range of topics. These questions explore the experiences and attitudes of the individual interviewed. In order to ensure that detailed information is gathered, interview methods require researchers with the necessary sensitivity and ability to establish rapport with respondents, use topic guides flexibly and follow up questions and responses. [79] For the purposes of this research, semi-structured interviews were felt to be the most appropriate method to use because it allowed the researcher to explore the opinions of on-call pharmacists by using a loose structure of open-ended questions. The researcher did not believe that this flexibility to explore opinions and views would be achieved with structured or in-depth interviews. Although the researcher's personal experience of conducting semi-structured interviews was limited, he developed his understanding of how these should be prepared for, conducted, and potential sources of bias by reading educational material. This included but was not limited to information from the National Institute for Health Research. [80]

Individual face-to-face semi-structured interviews provided the most appropriate method for addressing research objectives 2 through 7, i.e. identifying the perceptions of on-call pharmacists, nurses and doctors and their information seeking behaviour. I felt that individual face-to-face semi-structured interviews provided an opportunity to hear the opinions of those individuals.

The questions used within the interview schedule for on-call pharmacists were influenced by the responses to the online survey (Chapter 4). The data generated provided knowledge of how on-call pharmacy services were provided nationally enabling the development, targeting/focusing and influencing of the questions to be used within the semi-structured interview schedules. The interviews allowed opinions of pharmacists, doctors and nurses to be explored, which were hinted at by some of the responses received in the online survey. For example, the online survey asked whether training was provided specifically around medicines advice when working out of hours and whether this was refreshed. The semi-structured interviews explored this further – because the survey results indicated not much training was delivered and very little refresher training – to find out on-call pharmacists' opinions about this. The online survey also confirmed that nurses and doctors were the most frequent users of the on-call pharmacy service. This reinforced which professional groups were interviewed.

In addition, interview questions for on-call pharmacists, doctors and nurses were developed based on the findings from the literature review (Chapter 1, Section 1.4) and from the researcher's personal experiences as an MI and on-call pharmacist. Initially the researcher listed the research objectives that linked to the interviews of on-call pharmacists, doctors and nurses and brainstormed questions. Where possible, interview questions for doctors and nurses were developed to 'mirror' those asked of on-call pharmacists. The interview questions for on-call pharmacists, doctors and nurses were then finalised by ensuring that each one met the research objectives (Appendix 4 and 5). The interview schedule for on-call pharmacists was piloted with two pharmacists and the questions used with doctors and nurses piloted with a single doctor. The pilot of the interview schedule to be used with doctors and nurses followed interviews conducted with on-call pharmacists. It was for this reason that a single pilot interview was conducted with a doctor only, as the questions mirrored those already used for on-call pharmacists. As a result, the researcher was more familiar with the questions and the interview process and so when the single pilot interview was completed and reviewed, there were no obvious reasons for not continuing to interview doctors and nurses. There were a number of reasons for undertaking the pilot interviews and these included: determining if the questions (and any follow-up) were understood by interviewees and appropriate responses generated; evaluating the researcher's ability to conduct semi-structured interviews, e.g. developing rapport, appropriate use of body language, interview question technique; ensuring that the audio recording equipment functioned, the interview venue was appropriate, and that the interview was transcribed accurately. The latter was determined by verification of the transcript by the interviewee. No coding and thematic analysis of the interview transcripts was undertaken because this was outside the scope of the pilot interviews. It was decided that interviewees would be assigned a UIN and this was used when reviewing results to ensure that interviewees' anonymity was maintained, but their professional role could still be identified. Interviews conducted with on-call pharmacists were given the pre-fix 'OPh' followed by a numerical number, e.g. OPh1; those conducted with doctors given the pre-fix Dr followed by a sequential numerical number, e.g. DR1; and, those conducted with nurses given the pre-fix Nr followed by a sequential numerical number, e.g. NR1.

In order to maximise the likelihood of recruiting on-call pharmacists, doctors and nurses, different methods were used. For pharmacists, Chief Pharmacists had been asked at the end of the survey whether they would like to be participate in this next phase of the research study. Those Chief Pharmacists that had consented to being

approached again for the next phase of the research, were contacted for the email addresses of the on-call pharmacists within their departments. The postal addresses or telephone numbers of on-call pharmacists were not sought from Chief Pharmacists. This was because these routes of communication would have been too time-consuming and complicated, and in the researcher's opinion, not likely to result in improved recruitment rates for pharmacists. On-call pharmacists were contacted with a personally addressed email, to increase the likelihood of recruitment, and provided with information about the study. Positive, negative and no responses were documented onto a 'tracker' including agreed interview dates where applicable.

The researcher did not believe it was appropriate to ask on-call pharmacists to recruit doctors and nurses when they were contacted for advice. This was because it would mean additional work for the on-call pharmacist when they are already handling calls during unsociable hours. Instead, doctors and nurses were recruited when they directly contacted the hospital pharmacy MI service during normal working hours with an enquiry. Nurses and doctors could be recruited irrespective of which route was used to contact the MI service, e.g. telephone, email. The time period of 4 – 8 weeks was used to enable sufficient recruitment of doctors and nurses by MI services based on unpublished workload data and the researcher's own experience as a MI pharmacist. This recruitment method meant that only doctors and nurses who had previously used a MI service during normal working hours were included. In order to minimise the potential risk of bias from using this method of recruitment, the Medical Director (MD), Director of Nursing (DoN) and Research & Development (R&D) departments were contacted individually and asked to display or circulate a recruitment poster for doctors and nurses. This method would help to recruit doctors and nurses who had not previously used the hospital pharmacy MI service during normal working hours.

The recruitment poster was developed to ensure it caught the attention of potential doctors and nurses interested in participating. This was achieved by the use of a border around the edge of a single A4 page and a bold, colourful image of medicines in the centre of the poster. The top of the poster included questions in a large font size to potential participants to 'hook' their attention. Underneath the image at the bottom of the poster, the aim of the research was stated. In addition, an explanation that participants would be required to take part one face-to-face interview, which would take no more than one hour to complete. The word 'one' was emphasised by use of capitals, bold and underline so that potential participants were given an indication of the commitment that they would need to make. The researcher's academic email address was included at the bottom of the poster.

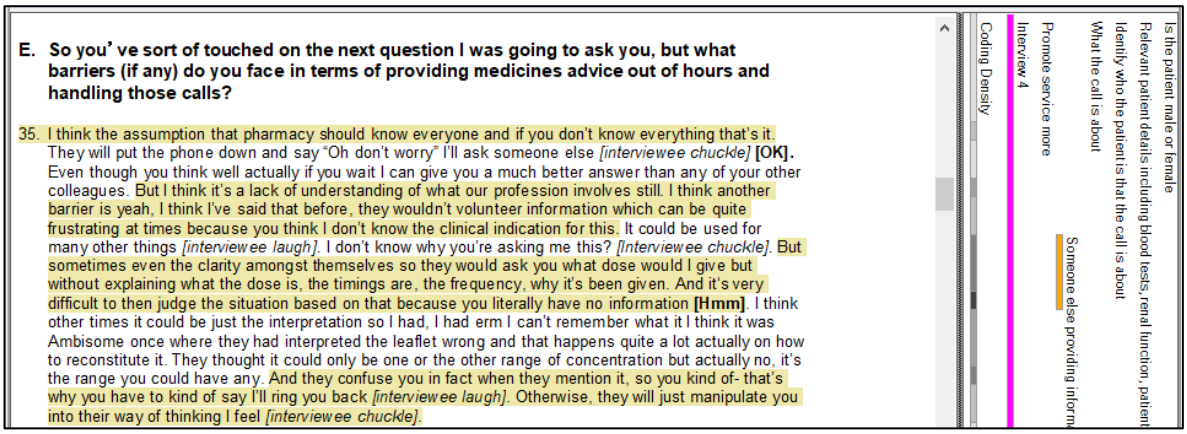
All semi-structured interviews were conducted within the East of England. This was for practical reasons, i.e. locality for conducting interviews was within a reasonable distance of where the researcher worked and lived. Interviews with on-call pharmacists were undertaken at a variety of Trusts in the East of England. However, the majority of interviews with nurses and doctors were conducted at the researcher's base hospital. At this time the researcher had moved to his current role as Deputy Chief Pharmacist in a large teaching Trust and is aware that this may have influenced the departmental MI service to actively recruit nurses and doctors. It was also practically easier for the researcher to interview doctors and nurses at his base organisation, so this skewed the location of interviewees

Qualitative analyses of the data attempted to preserve the textual form of the data gathered, e.g. interview transcripts were recorded verbatim, and to generate analytical categories and explanations. This can be done inductively—that is, obtained gradually from the data—or deductively—that is, with a theoretical framework as background, either at the beginning or part way through the analysis as a way of approaching the data. [79] Within this phase of the research a deductive analysis approach was initially taken to enable ideas and patterns or themes, to be generated from the interviews conducted with on-call pharmacists, doctors and nurses using a theoretical framework. The Framework method sits within a broad family of analysis methods often termed thematic analysis or qualitative content analysis and was developed in the UK during the late 1980s. The Framework method for thematic analysis provides an analytical process to the data which is systematic, comprehensive and transparent although it cannot accommodate highly heterogenous data. It is frequently used for the thematic analysis of semi-structured interview transcripts. [81] A suggested process for thematic analysis includes familiarisation with the data, e.g. transcribing, generating initial codes, searching for themes, e.g. collating codes into potential themes, defining and naming themes, e.g. checking if themes work in relation to the transcript and overall data set and producing the report, e.g. selection of supporting extract examples. [81]

All interviews were personally transcribed verbatim by the researcher from the digital audio recorder to Microsoft Word. Documentation of what the interviewee said used italic plain text, whereas italic bold text within square brackets was used for the interviewer, e.g. *"…patients are allergic to lactose* ***[Right]***." Transcription included all non-verbal communication, e.g. laughter, pauses, sighing, and when it was unclear from the interview transcript the intention of the interviewee's words, e.g. sarcasm. These were shown in the transcripts as non-italic text in square brackets, e.g.

[interviewee laughed]. If clarification was needed within the transcript because something the interviewee said was not obvious, then this was documented by the researcher within the transcript using non-italic, non-bold text in square brackets, e.g. *"…and they* [senior pharmacists] *make a point…"* This process was one of the first steps taken by the researcher to ensure data familiarity. The interview transcripts were then imported from Microsoft Word into NVivo Version 11. Using NVivo 11, each interview transcript was initially subjected to descriptive coding and an example of this is provided (Figure 1).

Figure 1. Example of interview transcript descriptive coding



Descriptive coding summarises in a word or short phrase the basic topic of a passage of qualitative data and is appropriate for analysing interview transcripts. This type of coding leads primarily to a categorised inventory, tabular account, summary of index of the data's contents, i.e. interview transcript. [82] Based on the researcher's approach to descriptive coding and thematic analysis, it was decided not to complete this within NVivo, but rather complete this within Microsoft Excel. The codes documented in NVivo were then exported to Microsoft Excel to enable the systematic process of generating themes according to the interview schedule questions. Initially, the descriptive codes were categorised and then themed where there were similarities. This focused on what was said by interviewees rather than looking for relationships between the text and the way in which things were said. An example of this question-focused analysis is provided (Table 7). If there were any codes identified which were outside the interview schedule but of relevance, these were categorised accordingly, e.g. advantages of working during normal working hours.

Table 7. Question-focused analysis of interview transcripts			
Interview question	**Descriptive coding**	**Category**	**Theme**
What are the types of information or advice about medicines that you need to find when working out of hours?	Safety check of dose calculation.	Safety check of dose.	Medication safety check.
	Reassurance that drug is safe to use in patient.	Reassurance about safety of drug in patient.	
	Ensuring right dose has been prescribed for patient.	Double-check prescribed dose.	
	Advice from pharmacist if nurse has concerns about use of drug in patient and raised these with medical team but overlooked.	Double-check safety of drug in patient.	

One of the risks associated with the Framework method approach is that it can be too focused on process rather than outcome. In fact, when the themes generated from the Framework method approach were reviewed, it did not feel that the richness of the data had been captured. The researcher therefore decided to approach the themes again but without employing a question-focused analysis. The themes previously generated were re-reviewed to ascertain if there was any repetition or commonality amongst them. This involved removing the questions and approaching the analysis by considering the themes irrespective of question or the healthcare professional(s) that may have led to their generation. The majority of themes generated from this second round were different from the initial approach although there were some similarities, e.g. documentation. The transcripts were also re-visited by the researcher to determine if the themes generated from the second round were founded in this data, and this process was repeated several times and any new themes included. Once the researcher felt that the themes accurately reflected the data, the interview transcripts were re-read by the researcher to ensure that this was indeed the case. This process led to a finalised list of themes generated from the data. During this process a significant amount of reflexivity took place during this process and this is outlined in Section 2.3.

2.3 Reflexivity

Reflexivity is a term derived from ethnomethodology used to describe the self-organising character of all interaction so that any actions provides for its own context. [83] The researcher is aware and sensitive to the ways in which he and the research process can shape the collected data, including the role of the researcher's prior assumptions and experience, and the influence this might have on a study's findings. [84]

The researcher has worked in the NHS for nearly 20 years as a hospital pharmacist, across four hospitals in the Southeast of England. During half of this time he has worked as a MI pharmacist and partly, as an on-call pharmacist. He therefore recognises that his experience and assumptions may have had an impact on this research.

When Chief Pharmacists in England were contacted to complete the survey, the researcher's name and university details were included. However, the researcher is aware that quite a few of them may have recognised him as an MI pharmacist working in a regional MI centre. However, although this may have helped with the response rate, it is unclear if this affected their responses to the survey questions. The researcher believes that the types of questions included in the survey were influenced by his previous roles. This may have introduced bias into the types of questions that were asked but he also feels it enabled him to include the types of areas that needed exploring. For example, he knew that documentation of advice provided out of hours was poor but needed evidence to support this as set out in the researcher's personal motivation (Chapter 1, Section 1.1). The survey alluded to this but needed further exploration in the interviews. He is conscious that this may have potentially narrowed his focus on the areas that were explored.

The researcher believed that semi-structured interviews would provide an opportunity to explore areas around medicines advice out of hours with interviewees that the survey did not allow, e.g. information needs, accessing information, barriers, documentation, training, support. Interviews with pharmacists were conducted in hospital pharmacy departments and the researcher is very aware that interviewees knew he was previously a MI pharmacist working in their regional/neighbouring regional centre (the researcher had now moved into a new role outside of hospital pharmacy). For example, some of these individuals were personally trained by the researcher in MI at the regional centre, or colleagues may have told them he used to be a MI pharmacist. This may have affected their responses and in particular their

interpretation of the questions focusing on MI or medicines advice. For example, when asking about MI or medicines advice in the context of out of hours, the researcher thinks that some interviewees answered this question in the purest sense of when medicines advice is provided by a traditional MI service. Some interviewees may have felt more relaxed when being interviewed; conversely some, may have felt more nervous and perceived there was an expectation of a “right” answer to the questions and tried to provide what they thought the researcher wanted to hear. The researcher’s approach was to put interviewees at ease explaining that they should answer questions honestly and that there was no right or wrong answer in an attempt to minimise my influence.

Doctor and nurse interviewees knew that the researcher was a Deputy Chief Pharmacist (the researcher had now moved back into a new role within hospital pharmacy). This was because he contacted them using his work email address or when contacting potential interviewees using his University email address explained that he worked at the hospital to aid flexibility with dates and times for interview. During some of the interviews he also wore his identity badge showing he was the Deputy Chief Pharmacist. Whilst the researcher recognises that he was undertaking research in that context, he had to wear his identification badge whilst in his own hospital due to internal security requirements. This could have been avoided by removing the badge just prior to the interview but he believed this would have had little effect by that point. However, the researcher did not wear his identification badge when conducting interviews outside his organisation.

During the semi-structured interview process, the researcher kept a diary to document any observations about the interviewee which would not have been evident in the audio transcript, e.g. body language, and the environment in which the interview was conducted. He kept a record of his thoughts/comments at the time or immediately after the interview as to how these might have affected the interviewee and/or their responses, and/or their effects on him as the researcher and reflected in this thesis. These reflections were important to consider during the research process and partly informed the reflexivity, pilot and discussion of results within this thesis.

As a pharmacist trained in the natural sciences, the qualitative methods used in this research were unfamiliar to the researcher. The approach initially used, akin to the Framework method, was to code interview transcripts and generate themes. However, it was clear from the themes generated from this process that they were superficial and

did not reflect the richness of the data from the interviews. The researcher reflected on this and decided that he would approach the themes again, this time not restricting himself to a question-focused approach. Initially he struggled to understand how best to undertake this different method. However, in the end he realised that by removing any reference to the questions asked in the interviews and instead only focusing on the themes originally generated, this provided a clearer perspective. The researcher believed that this different approach could better reflect the data generated from the transcripts and enable broader connections to be made. During this process the researcher found it difficult to decide on the themes because he was concerned that he was missing important concepts. It is for this reason that he re-visited the themes again and again, checking back to the original research objectives to ensure that these were being answered. Once themes were finalised, he also re-read interview transcripts to ensure the themes reflected those coming out of the interviews. Eventually, a final set of themes were generated and the researcher felt happier that these better reflected the data within the transcripts. On a personal level, this researcher found this process very challenging because it was something he was not familiar with and doubted whether the process he was following would lead to valid results. This probably reflects the fact this was a new process for the researcher and for this reason, took significantly longer to analyse and theme the data compared to quantitative data analysis.

At the start of this research process, this researcher had some experience of quantitative research methods and understood the value that these could provide. However, he had no experience of qualitative research methods and did not understand the benefits of these. However by undertaking a mixed methods approach, he has come to realise the value of qualitative research methods. In particular, the type of data generated from qualitative research methods provided a depth and richness which was not possible with quantitative methods. As a result, this researcher now appreciates and values both quantitative and qualitative research methods, and particularly how the two can complement and triangulate the findings from each. This is the first time qualitative research methods have been used to understand the provision of medicines advice out of hours.

The final part of this section will discuss in more detail the impact of this researcher, as an expert, on this research. Firstly, this researcher was a MI pharmacist who had worked in this specialty for at least 10 years. It should be acknowledged that this experience has helped shape this research because of his knowledge and

understanding of the area. For example, the researcher had some knowledge of the research that had previously been undertaken focusing on MI provision, with a particular focus in recent years on patient care and outcomes. However, he was not so aware of what research had been published for on-call pharmacy services but based on his previous, limited evaluations had concluded that it was minimal. This knowledge, or assumed understanding by the researcher, of what had been published, contributed to his approach to the literature review. That is, the focus on the provision of both MI and on-call pharmacy services, and the themes for each. In turn, this knowledge of services together with the findings of the literature review helped shape the aim and objectives of this research. Previously undertaken practice-based research and service evaluations which focused on medicines advice out of hours sometimes meant that this researcher's perceptions may have been influenced or pre-conceived. This is inevitable and unavoidable but by undertaking a rigorous research process, it is hoped that any bias may have been minimised. In addition, it was very important that the researcher as an expert, did not influence the findings from his own knowledge or assumptions based on experience. This was particularly relevant to the qualitative, rather than quantitative, data analysis because there was a greater risk of subjectivity. During this process, this researcher was determined not to influence the themes generated from the data but was very aware that this could happen unconsciously. Knowing how on-call pharmacy services operate in practice, and from his own experience, could have led to bias towards the generation of particular themes from the data, substantiating those experiences. However, because this researcher was conscious of this risk, this was one of the reasons why so much time was spent revisiting the themes ensuring that they reflected the interview transcripts as described earlier in this section. In fact, this was evident by the transition from using a process akin to the Framework method to an analysis which concentrated on the themes generated from the data irrespective of the questions asked and responses received.

Finally, one of the most significant developments during this research process was the researcher's own personal reflections about his perception of reality. As described in Section 2.2, he initially was not conscious that his approach to research was grounded in any theoretical stance or methodology. In fact, this researcher was completely unfamiliar with any of the concepts or terminology associated with research paradigms, and particularly qualitative methods. Although he initially came to believe that there was one version of reality, his belief later developed increasingly towards constructivism. He therefore accepted that there can be multiple versions of reality, for example that one pharmacist may perceive a question asked by a nurse or doctor as

‘simple’ whereas another pharmacist may believe the same question to be ‘complex’. The varied perceptions of these pharmacists appear to be grounded in their own knowledge and experiences based on their backgrounds, different training received and exposure to situations.

These concepts were particularly challenging for this researcher to begin with, mainly because of his background in the natural sciences as a pharmacist. However, since undertaking this research he has a much greater appreciation and understanding of research paradigms.

In summary, this reflection has helped the researcher understand the effect and influence he may have had on the research conducted and on individuals involved in this process.

CHAPTER 3 METHOD

3.1 Introduction

The first section of this chapter outlines the method used for the initial part of this research involving an online survey of Chief Pharmacists in England. The second section outlines the method used for the subsequent part of this research, which involved semi-structured interviews with on-call pharmacists, nurses and doctors. The rationale for both methods and their development has previously been described (Chapter 2).

3.2 Online Survey

According to the NHS Health Research Authority decision tool, this first phase of the research was deemed to be an evaluation of an existing service and therefore ethical approval was not sought from the National Research Ethics Service. [85] However, the researcher's base organisation's (a medium sized acute hospital NHS Trust) research office was notified of the study and ethical approval was still sought, and granted by The Behavioural Sciences Ethics Committee, School of Applied Sciences, University of Wolverhampton on 25th July 2012 (Appendix 6).

Ethics approval was gained from the University of Wolverhampton and not the University of Central Lancashire because at the time of data collection the researcher was registered for study with the University of Wolverhampton, before transferring to the University of Central Lancashire.

Piloting of the survey took place with nine pharmacists, three clinical and six MI pharmacists. Purposive sampling was used to identify participants, with the researcher approaching individuals who worked at his base organisation and those located in other hospitals using established professional networks. After initially approaching each individual informally to participate in the pilot, a formal email was then sent (Appendix 7) together with a copy of the information sheet (Appendix 8). A copy of the online survey, hosted on Survey Monkey, is provided in Appendix 9. Participants were contacted in August 2012 and given two weeks to respond.

All nine individuals completed the online survey and seven responded to the questions as outlined in Panel six. Responses to the questions in Panel six were collated and manually entered into a Microsoft Excel spreadsheet (Table 8). Each response was reviewed and actions identified, documented and completed

Table 8. Participant responses to questions asked by the researcher for the pilot study			
Questions	**Responses**		
	Yes	**No**	**Not Answered**
Did you understand the information sheet/consent form attached to this email?	3	0	4
Did you understand the consent form at the start of the survey?	3		4
Did the survey work for you? i.e. technical functionality	2 [a]	1	4
Did you understand the questions asked within the survey?	1	1 [b]	5 [c]

a. *Two respondents gave the following information: Sort of - as part the consent form it states "you can choose to omit any question" as I did the questionnaire I tried to do this but it states certain answers are required; Yes NB. Question 27, gives a box for other-please specify, but there is not a blob for 'other'.*

b. *One respondent commented "I was slightly confused by the description 'secondary care'".*

c. *Although the question was not specifically answered, three respondents provided comments on the survey questions.*

Appendix 10 shows the comments received from participants about the online survey questions and its functionality, and the actions taken as a result. In addition, a number of general comments were received, and the actions taken as a result are shown in Appendix 11. The majority related to technical aspects of the survey, e.g. being able to partially complete the questions and then return at a later time, and consistency of wording within the survey or information sheet. Once any amendments were completed, no further piloting of the survey was undertaken.

Following piloting, the online survey was distributed to all Chief Pharmacists. The contact details for Chief Pharmacists in NHS England were not publicly available in one place but were obtained from a database developed and maintained by the London Pharmacy Education and Training. Access to this data was freely granted to the researcher for the purposes of this study. All Chief Pharmacists of acute hospitals Trusts (n=164) and mental health Trusts (n=54) in NHS England were invited to participate in this study. A contact name and email address were not listed in this database for the Chief Pharmacist at three Trusts. For these, a postal survey was sent addressed to the 'Chief Pharmacist' rather than a named individual. There were two Chief Pharmacists (joint post holders) listed for one acute hospital Trust and one

mental health Trust. For these organisations, both Chief Pharmacists were contacted. Therefore, in total 220 Chief Pharmacists were contacted.

Initially a personalised letter (Appendix 12) with information sheet (Appendix 8) was posted (Monday 29th October 2012) to all Chief Pharmacists explaining the purpose of the study, with a link to the online survey hosted on Survey Monkey (Appendix 13). A personalised email containing the same information was then sent to every Chief Pharmacist on Sunday 4th November 2012. A week later (Monday 12th November 2012) a reminder letter (Appendix 12) was posted to all non-respondents. In addition, a reminder email was sent again to each non-respondent (16th November 2012). The survey was closed on Sunday 9th December approximately 6 weeks after the first letter was sent to Chief Pharmacists.

Responses received were exported to SPSS Version 25. The data was then tabulated using Microsoft Excel to provide a summary document showing the responses to each survey question. Cross-tabulation, Pearson's Chi-Square and the Fisher's exact test using SPSS to determine statistical significance was also applied. Thematic analysis was used when 'other' was selected in response to survey questions. Further information about the quantitative and qualitative analysis undertaken has previously been described (Chapter 2, Section 2.2).

3.3 Semi-structured interviews

Like the first phase, this next part of the research was deemed a service evaluation according to the NHS Health Research Authority decision tool, and therefore ethical approval was not sought from the National Research Ethics Service. [85] Ethical approval was sought and granted on 11th November 2013 by The Behavioural Sciences Ethics Committee, School of Applied Sciences, University of Wolverhampton (Appendix 14).

The researcher approached a Chief Pharmacist in the East of England on 16th January 2014 seeking permission via email to pilot the interview schedule with on-call pharmacists working in that Trust (Appendix 15). This Chief Pharmacist had previously agreed to be contacted about this phase of research as described in Section 3.2. A reminder email was sent on 4th February 2014, followed by a telephone call on 28th February 2014. Subsequently, the Chief Pharmacist gave permission for the pilot to be conducted with on-call pharmacists at the Trust. The contact details of two individuals were provided by the Chief Pharmacist and the 4th April 2014 agreed as the date of the interviews.

The researcher contacted both individuals by email to ensure they were willing to participate in the interview. A copy of the information sheet (Appendix 16) was also provided. Interviews were conducted with each on-call pharmacist within the pharmacy department at the Trust on the same day, separated by a small break. Prior to the interview, each interviewee was asked to complete a consent form (Appendix 17). The questions used during the semi-structured interviews are shown in Panel seven.

Panel 8. Interview schedule used in on-call pharmacist pilot interviews

1. What do you think are the medicines information needs of doctors and nurses' when working out of hours? How does this differ to normal working hours?
2. How do you go about answering questions for medicines advice when working out of hours? How does this compare to the same question being asked during normal working hours? What barriers (if any) do you face?
3. What do you think about the way in which calls for medicines advice are handled out of hours by the pharmacy service? How does this compare to normal working hours?
4. Is there anything that you would change about the way pharmacy departments provide medicines advice out of hours? What impact do you think 7 day working will have on the on-call pharmacy service?
5. What do you document when you handle calls for medicines advice out of hours? How would this compare to normal working hours
6. What affects what you document? Does this differ to normal working hours?
7. If you did document medicines advice, what would affect what you use to document, e.g. paper- or electronic-based form.

The interview schedule used for doctors and nurses was piloted initially with the first doctor interviewed on 15th May 2015, at their base hospital. A copy of the information sheet was provided (Appendix 18) and prior to the interview, the doctor was asked to complete a consent form (Appendix 17). Information about how doctors and nurses were recruited is provided in Chapter 2, Section 2.2.2. The interview schedule used can be found in Panel eight.

Panel 9. Interview schedule used in doctor pilot interview

1. What are the types of information or advice about medicines that you need to find when working out of hours?

(If the interviewee replies 'don't know' or struggles to answer this question, I would prompt with: for example, have you ever needed some information/advice when you've been asked to prescribe a medicine for a patient?

2. How does this compare to normal working hours?
3. How do you access information on medicines when working out of hours?
4. What sources would you typically use to find information on medicines out of hours?
5. What barriers (if any) do you face when trying to access information on medicines out of hours?
6. How does this (question 3, 3a and 3b) compare during normal working hours?
7. Tell me what support does the pharmacy department provide you with during out of hours when you have questions related to medicines?
    a. Is there anything that you would change?
    b. How does this compare to normal working hrs?
8. Do you have anything else you would like to tell me?

All pilot interviews conducted with on-call pharmacists, doctors and nurses were audio recorded using a digital recorder. A reflective diary was completed by the researcher after each interview (Appendix 19). Each interview was transcribed into Microsoft Word by the researcher as soon as possible. Any identifying information provided by participants during the interview was anonymised. A copy of the transcript was returned to each participant by email for verification of accuracy. Interviewees were assigned a unique identification number (UIN). The 'Key' which detailed the contact details of each participant for each UIN was kept by and only known by the researcher. This key was stored on an encrypted and password protected USB drive held by the researcher.

Interviews with on-call pharmacists took approximately one hour to complete (1 hour 11 min and 1 hour 7 min), and the interview with a doctor took just over half an hour to complete (30 mins 6 seconds). All interviewees verified the accuracy of the interview transcript and confirmed that the digital recording of the interview worked in practice and that the researcher accurately transcribed the audio recording. Thematic analysis of the transcript was not formally undertaken but responses given to questions were reviewed to determine if they provided information that met the research objectives.

A reflective diary kept by the researcher at the time of the interviews noted that a good rapport was quickly established with all interviewees. During the interviews the researcher mirrored the interviewee's body language; no unusual body language/actions by the interviewees were noted during the interviews. The researcher attempted not to interrupt interviewees but was aware that this may have occurred on occasion with on-call pharmacists, and an example from a pilot interview transcript is provided below:

[Researcher] OK, so in terms of normal working hours do they ask you for medicines advice questions which are not - do they ask you anything else apart from calculations and administration?
[Interviewee] What out of hours or-?
[Researcher] During normal working hours.
[Interviewee] Erm…
[Researcher] Because what you've told me is that out of hours-
[Interviewee] Yeah, for example mainly the junior doctors they want information cos they're not familiar - for example how to set up an aminophylline infusion ***[Hmm]*** *how much to give so again, erm you have to look this one up* ***[Hmm]****. Mainly drug-related.*

It was also acknowledged by the researcher that the phrasing of on-call pharmacist interview questions could have been improved. Two examples from the interviews showing poorly phrased questions are provided below:

[Researcher] OK. That's really good. Erm we're nearly there. Erm again we're… [Interviewer laugh] we're obviously touching on questions that keep coming…but what affects what you document?

[Researcher] So it sounds like during normal working hours it's acceptable just to talk to the nurse or the doctor because it's quicker, you said easier, but out of hours they may be…doctors –

The researcher reflected that these poorly phrased questions were likely to have occurred because he was nervous during these on-call pharmacist pilot interviews.

In relation to the pilot interview conducted with a doctor, there was unfortunately no office available. Instead, the pilot interview was undertaken at the back of a hospital staff restaurant. This was not an ideal environment for ensuring good quality sound recording. The researcher noted that he was also nervous during this interview and

reflected that he had been nodding encouragingly when the interviewee was speaking in response to questions.

In addition to the reflective diaries kept at the time of all three interviews, the researcher reviewed each interview transcript once completed. A number of observations were made: all interview transcripts were typed verbatim using different text colours to indicate when the researcher or interviewee was speaking, pausing, or making an audible sound, e.g. laughing, sighing. It was noted that during the first interview with the on-call pharmacist, question seven was asked earlier than planned in the schedule. This was because the interviewee made reference to the documentation of medicines advice earlier on and therefore it was appropriate to ask this question at this point. During the second on-call pharmacist interview the researcher did not ask some questions within the interview schedule. This was because the interviewee provided this information when previous questions were asked. At the time, the researcher believed that the interviewee would feel they were repeating information if the interview schedule questions were followed. However, on reflection asking the questions may have yielded additional information that was not volunteered by the interviewee in response to previous questions. The researcher also used the pilot on-call pharmacist interviews to ask some additional (not probing) questions to determine what further information may have been provided by the interviewee. However, it was acknowledged by the researcher that these provided no additional value and future questioning should focus on the interview schedule questions with subsequent and appropriate probing.

Based on these reflections, and feedback from his supervisor on the interview transcripts/audio in response to these, the researcher decided to make some minor amendments to the interview questions (Table 9). However, although these were not significant enough to delay undertaking further interviews with on-call pharmacists it was decided by the researcher not to include these two pilot interviews in the final data set.

Table 9. Interview schedule changes required following pilot	
Pilot interview schedule	**Amended interview schedule**
1.What do you think are the medicines information needs of doctors and nurses' when working out of hours? How does this differ to normal working hours?	1.What do you think are the medicines information needs of doctors and nurses' when working out of hours?
2.How do you go about answering questions for medicines advice when working out of hours? How does this compare to the same question being asked during normal working hours? What barriers (if any) do you face?	2.How does this differ to normal working hours?
3.What do you think about the way in which calls for medicines advice are handled out of hours by the pharmacy service? How does this compare to normal working hours?	3.How do you go about answering questions for medicines advice when working out of hours?
4.Is there anything that you would change about the way pharmacy department provides medicines advice out of hours? What impact do you think 7 day working will have on the on-call pharmacy service?	4.How does this compare to the same question being asked during normal working hours?
5.What do you document when you handle calls for medicines advice out of hours? How would this compare to normal working hours (may be a difference if MI or clinical pharmacist during normal working hours)	5.What barriers (if any) do you face?
6.What affects what you document? Does this differ to normal working hours?	6.What do you think about the way in which calls for medicines advice are handled out of hours by the pharmacy service?

Pilot interview schedule	Amended interview schedule
7.If you did document medicines advice, what would affect what you use to document, e.g. paper- or electronic-based form.	7.How does this compare to normal working hours?
	8.Is there anything that you would change about the way pharmacy departments provide medicines advice out of hours?
	9.What impact do you think 7 day working will have on on-call pharmacy services?
	10.What do you document when you handle calls for medicines advice out of hours?
	11.What affects what you document?
	12.What affects what you use to document medicines advice calls? i.e. paper, electronic
	13.How would this compare to normal working hours?
	14.What are your views on the training that on-call pharmacists receive specifically to help them handle medicines advice calls?
	15.Do you have anything else you would like to tell me?

Although the researcher had noted that he had made encouraging nods in response to the interviewee comments during the interview, there were no significant issues or concerns observed following the interview conducted with a doctor. Based on these reflections on the interview transcript/audio, the researcher decided that these was not significant enough to delay undertaking further interviews with doctors and nurses. Furthermore, no changes were required to the interview schedule. It was for this reason that the data from the pilot doctor interview was included in the final data set.

Following the pilot with on-call pharmacists, a letter was posted on 5th June to all Chief Pharmacists (or individual nominated by the Chief Pharmacist) of the 12 East of England Trusts who had consented previously to participate in further study (Section 3.2). In parallel, this letter was emailed to the same Chief Pharmacists on 9th June in order to increase the response rate (Appendix 20). The Chief Pharmacist who was contacted for the pilot interviews of on-call pharmacists was included. A reminder letter was posted on 22nd June and the same letter emailed on 23rd June, to those Chief Pharmacists who had not responded.

The letter/email detailed the next phase of the study and asked them to provide the names and email addresses to the researcher of pharmacists who participated on the on-call rota. An information sheet about the study was also included (Appendix 16). Chief Pharmacists at this time were also informed that the researcher would be contacting the MI pharmacist within their department in due course to help support the next phase of research.

The researcher then contacted each individual on-call pharmacist by email providing them with information about the study (Appendix 21). Positive, negative and no responses were documented onto a 'tracker' including agreed interview dates where applicable. Interviews were conducted with on-call pharmacists (Appendix 22) at a mutually convenient time for both the interviewee and researcher. Interviews took place at the individuals' place of work, usually in an office within their department. The same method used for the pilot on-call pharmacist interviews as described earlier was followed.

In the case of interviews conducted with doctors and nurses, it was decided to approach the same Trusts in the East of England where on-call pharmacist interviews took place. This was because the researcher wanted to ensure that the doctors and nurses interviewed had the same Trust experiences and therefore would be able to more easily triangulate any findings. A letter was posted to the MD, DoN and R&D departments of each Trust (Appendix 23) on 9th January 2015. This also included a request to display and/or circulate a poster within their organisation (Appendix 24) to help with the recruitment of doctors and nurses.

Although as previously described, this research was deemed to be a service evaluation according to the NHS Health Research Authority decision tool, half of the Trusts that responded (n=2/4) took a different view. These Trusts requested a submission via the Integrated Research Application System (IRAS) because they deemed this study to be

research. For both of these Trusts, the researcher completed and made an IRAS submission together with a Site Specific Information form and associated documentation, e.g. information sheet, consent forms, curriculum vitae.

In addition to contacting the MD, DoN and R&D departments, the researcher contacted these Trusts' pharmacy MI services via email, where one existed (87.5.8%, n=7/8) (Appendix 25). The MI services were asked if they would be willing to help recruit doctors and nurses from within their Trust when they contacted them with an enquiry during normal working hours. MI services were advised that recruitment would be over a 4 to 8 week period depending on the number of doctors and nurses recruited.

A 'script' containing information to be read out to the nurse/doctor was provided for MI services to use. In addition, a template for MI services to document the contact details of doctors and nurses willing to be contacted was provided (Appendix 26). Contact details included the individual's full name, job role, contact email and telephone number. This proforma was then submitted via secure email (nhs.net to nhs.net) to the researcher on a weekly basis. Doctors and nurses who contacted the researcher directly or via the pharmacy department's MI service expressing an interest to participate in the study, were then contacted by email by the researcher (Appendix 27). Further details of the study were provided, including an information sheet for doctors and nurses (Appendix 18 and 28). Positive, negative and no responses were documented onto a 'tracker' including agreed interview dates where applicable. It was made clear to the participant at that stage that they may not be contacted for an interview (due to data saturation). Those interviews that were conducted with doctors and nurses were done so at a mutually convenient time for both the interviewee and researcher (Appendix 29).

Each interview was transcribed into Microsoft Word by the researcher as soon as possible. Any identifying information provided by participants during the interview was removed to maintain anonymity. A copy of the transcript was returned to the participant by email for verification of accuracy. In addition, each doctor/nurse was asked if they would like a summary of the results after the study was completed.

All interview transcripts were imported from Microsoft Word into NVivo Version 11. Each interview transcript was then descriptively coded following the process previously described (Chapter 2, Section 2.2.2).

CHAPTER 4 RESULTS (ONLINE SURVEY)

4.1 Introduction

This chapter outlines the results from the online survey and is reproduced in the section orders as per the survey, namely: demographics; on-call pharmacy service provision; documentation and training, with sub-classification where appropriate.

4.2 Response rate

Initially, a response rate of 55.0% (n=120/218) was achieved after two reminders. However, two Chief Pharmacists each completed the survey twice. Each Chief Pharmacist was contacted and once it was determined which response they wished to submit the other response was excluded. Two other Chief Pharmacists consented to the study but did not enter any responses.

A total of 116 completed responses were included for the analysis (53.2%). NHS acute hospitals represented 76.7% (n=89/116) of the responses with mental health Trusts accounting for the remainder (23.3%, n=27/116). No significant differences were seen in response rates between acute and mental health Trusts (54.3% v 50.0%).

4.3 Organisational demographics

The number of responses according to Trust size, by bed number, is shown in Table 10.

Table 10. Size and type of organisation

Number of beds	Acute Hospital Trust	Mental Health Trust	Total (n)
< 300	10 (8.6%)	13 (11.2%)	116
300 – 500	15 (12.9%)	8 (6.9%)	
501 – 700	19 (16.4%)	3 (2.6%)	
701 – 900	14 (12.1%)	3 (2.6%)	
901 – 1200	18 (15.5%)	0 (0%)	
> 1200	13 (11.2%)	0 (0%)	

4.4 Provision of on-call pharmacy service

Most hospitals provided an on-call pharmacy service (87.1%, n=101/116); of these, acute hospitals were the main providers (86.1%, n=87/101). There was a statistically significant correlation between the type of NHS organisation, i.e. acute hospital or mental health Trust, and whether an on-call pharmacy service was provided (Pearson's Chi-Square, $X^2 = 38.765$, df = 1, p = <0.005). Nearly half of mental health Trusts (48.1%, n=13/27) did not provide an on-call pharmacy service. A theme generated by an analysis of the reasons provided by respondents was that mental health Trusts that did not provide an on-call pharmacy service had a service level agreement (SLA) with another provider, e.g. a neighbouring acute hospital handled the calls for medication supply or advice.

The most common model of on-call services was for pharmacists to be at home (94.1%, n=95/101), with just 10% (n=10/101) of Trusts operating a residency programme (note total values exceed 100% as four Trusts provided both models). Of those Trusts that operated a residency programme, 80% (n=8/10) had more than 900 beds.

The majority of Trusts (80%, n=76/95) did not routinely have an on-call MI pharmacist available; seven Trusts (7.4%) had a dedicated on-call MI pharmacist that answered all calls for medicines advice. A further 12.6% (n=12/95) of Trusts had a MI pharmacist available out of hours but only to support the on-call pharmacist with questions for medicines advice if necessary. There was no correlation between the availability of an on-call MI pharmacist or the type of NHS organisation ($X^2 = 0.110$, df = 1, p = 0.740).

4.4.1 Staffing

The job banding of those pharmacists involved in the provision of on-call services is shown in Table 11. Pharmacists were more likely to be Band 6, 7 or 8a, with approximately equal numbers of those bands involved. The higher the grade beyond 8a saw fewer pharmacists participating.

Table 11. Job Banding of pharmacists providing on-call services	
Agenda for Change banding [a]	**Number (%) [b] (n=101)**
Band 6	89 (21.9%)
Band 7	93 (22.9%)
Band 8a	87 (21.4%)
Band 8b	69 (17.0%)
Band 8c	35 (8.6%)
Band 8d	23 (5.7%)
Band 9	10 (2.5%)

a. *Agenda for Change is the pay system used within the NHS for all staff (except doctors and dentists). Staff are placed in pay bands (Band 1 to Band 9) on the basis of their knowledge, responsibility, skills and effort needed for the job. Newly qualified pharmacists usually start at Band 6, and typically Chief Pharmacists are Band 8d or 9.*

b. *Respondents (n=101) were asked to indicate the Agenda for Change banding of those pharmacists providing the on-call pharmacy service and so could select more than option.*

4.4.2 Workload

The majority of acute hospital Trusts provided both medication and medicines advice out of hours (79.2%, n=80/101) compared to only 11.9% (n=12/101) of mental health Trusts. Medicines advice only (no medication supply) was provided by a small number of acute hospital (5.9%, n=6/101) and mental health Trusts (2.0%, n=2/101). Only one acute hospital Trust provided medication supply out of hours (no medicines advice).

The number of calls in a typical week for the supply of medication compared to those for medicines advice is shown in Table 12. Nearly two-thirds of Trusts (65.9%, n=56/85) received less than 20 calls per week for the supply of medication compared to 83.1% (n=74/89) for medicines advice. A fifth of Trusts (17.6%, n=15/85) handled more than 50 calls per week for the supply of medication compared to only a small number of Trusts (4.5%, n=4/89) handling the same number of calls per week for medicines advice.

Table 12. Comparison of the number of calls for supply of medicines and medicines advice received during a typical week by the on-call pharmacy service		
Number of calls per week	**Calls for supply of medication (n=85)**	**Calls for medicines advice (n=89)**
< 10	30 (35.3%)	45 (50.6%)
11-20	26 (30.5%)	29 (32.6%)
21-30	10 (11.8%)	4 (4.5%)
31-40	2 (2.4%)	5 (5.6%)
41-50	2 (2.4%)	2 (2.2%)
> 50	15 (17.6%)	4 (4.5%)

Identification of any relationships within the data were explored and these are outlined in the remainder of this section. Firstly, the number of medicines advice calls received during a typical week by the on-call pharmacy service was compared to the size of the organisation (Table 13).

Table 13. Comparison of the number of medicines advice calls received during a typical week by the on-call pharmacy service according to Trust size			
Size of Trust (by bed number)	**Number of medicines advice calls per week**		**Total (n)**
	≤ 20	**> 20**	
< 300	11 (12.4%)	0 (0.0%)	89
300 – 500	15 (16.9%)	2 (2.2%)	
501 – 700	19 (21.3%)	1 (1.1%)	
701 – 900	13 (14.6%)	3 (3.4%)	
901 – 1200	11 (12.4%)	3 (3.4%)	
> 1200	5 (5.6%)	6 (6.7%)	

A statistically significant correlation between the volume of calls for medicines advice and the increasing size of the organisation was identified (Pearson's Chi-Square, X^2 = 16.238, df = 1, p = 0.000).

The number of medicines supply calls received during a typical week by the on-call pharmacy service was then compared to the size of the organisation (Table 14).

Table 14. Comparison of the number of medicines supply calls received during a typical week by the on-call pharmacy service according to Trust size			
Size of NHS hospital Trust	**Number of medicines supply calls per week**		**Total (n)**
	≤ 20	**> 20**	
< 300	12 (13.2%)	0 (0.0%)	91
300 – 500	11 (12.1%)	4 (4.4%)	
501 – 700	17 (18.7%)	2 (2.2%)	
701 – 900	11 (12.1%)	4 (4.4%)	
901 – 1200	6 (6.6%)	11 (12.1%)	
> 1200	3 (3.3%)	10 (11.0%)	

Similarly, a statistically significant correlation was identified between the volume of calls for medicines supply and the increasing size of the organisation (Pearson's Chi-Square, $X^2 = 8.646$, df = 1, p = 0.005).

The relationship between medicines advice calls handled and the location of the on-call pharmacist was also investigated (Table 15).

Table 15. Location of the on-call pharmacist when MI advice calls received and the number per week		
Location	**Number of calls per week [a] (n=92)**	
	≤ 20	**> 20**
Residency	3 (3.3%)	5 (5.4%)
Home	72 (78.3%)	12 (13.0%)

a. *Respondents (n=92) could select more than option*

Resident pharmacists handled a significantly higher number of calls compared to those located at home (Fishers exact test, $X^2 = 11.272$, df = 1, p = 0.005).

The relationship between the number of medication supply calls handled in a typical week and the location of the on-call pharmacist was examined. A greater number of Trusts, where the on-call pharmacist was located at home, handled less than 20 calls per week (63.8%, n= 60/94) compared to more than 20 calls per week (26.6%, n=25/94). Trusts with resident pharmacists were more likely to receive a higher number of calls per week: 8.5% (n=8/94) managed more than 20 calls per week compared with

1.1% (n=1/94) which handled less than 20 calls per week. A statistically significant correlation between the number of medicines supply calls received and the location of the on-call pharmacist was identified (Fishers exact test, $X^2 = 13.334$, df = 1, p = 0.001). This suggests that resident pharmacists were more likely to handle a higher number of calls compared to those located at home.

According to Chief Pharmacists' opinion, the type of healthcare professional that contacted the on-call pharmacy service was recorded (91.8%, n=89/97). Chief Pharmacists were asked to rank them according to how often they thought they used the on-call pharmacy service (Table 16). Nurses/midwives were ranked as the most frequent users; junior doctors were ranked second, followed by senior doctors and then allied healthcare professionals.

Table 16. Frequency that healthcare professionals use the on-call pharmacy service
(ranked 1 - 4, with 1 the most frequent users and 4 the lowest users)

Healthcare Professional	Ranking			
	1	**2**	**3**	**4**
Nurses/midwifes (n=87)	69 (79.3%)	12 (13.8%)	2 (2.3%)	4 (4.6%)
Junior doctors, e.g. FY1, FY2 (n=87)	12 (13.8%)	63 (72.4%)	11 (12.6%)	1 (1.1%)
Senior doctors, e.g. consultant, registrar (n=82)	0 (0.0%)	9 (11.0%)	72 (87.8%)	1 (1.2%)
Allied healthcare professionals, e.g. dieticians (n=83)	6 (7.2%)	0 (0.0%)	0 (0.0%)	77 (92.8%)

4.4.3 Service accessibility and promotion

Various methods were available to contact on-call pharmacists with mobile phones (73.3%, n=74/101), bleep/radiopager (68.3%, n=69/101) and landline phone (41.6%, n=42/101), being the three most used routes. Text (5.9%, n=6/101) and email (3.0%, n=3/101) were infrequently employed. A few respondents (10.9%, n=11/101) selected 'other' and a thematic analysis of these responses found that on-call pharmacists were also contacted via the hospital switchboard.

The relationship between the different types of communication routes used according to the location of the on-call pharmacist was explored. All routes of communication were more likely to be used to contact on-call pharmacists located at home rather than those in a residency programme. There was no statistically significant correlation found between the location of the on-call pharmacist and being contacted by mobile or landline phone ($X^2 = 1.377$, df = 1, p = 0.241).

Most Trusts advertised their on-call pharmacy service (82.2%, n=83/101). This was either by advertising the services provided by the on-call pharmacy service, e.g. medicines advice, medication supply (74.4%, n=61/82), or by advertising the contact telephone number(s) for the on-call pharmacist (42.7%, n=35/82). Only a very small number of Trusts advertised the contact name(s) of the on-call pharmacists (4.9%, n=4/82). Nearly a fifth of Chief Pharmacists (29.3%, n=24/82) did not choose one of the options provided and instead gave a written response. Thematic analysis of these responses found that Trusts advertised how to contact the on-call pharmacist, e.g. via switchboard, and when the on-call pharmacy service should be contacted by healthcare professionals.

If a Trust advertised their on-call pharmacy service, Chief Pharmacists were asked to select the methods used for promotion. Table 17 shows the methods used by pharmacy departments to promote their on-call service.

Table 17. Routes used by pharmacy departments to promote their on-call service

Method	**Number of Trusts (%) (n=83) [a]**
Internet	4 (4.8%)
Intranet	69 (83.1%)
Sticker on hard copies of the BNF circulated throughout the organisation	11 (13.3%)
Notices on the wards/clinical areas	30 (36.1%)
Other (please specify) [b]	39 (47.0%)

a. *Respondents (n=83) could select more than option.*

b. *This included the on-call pharmacy service promoted in Trust policies, via training for doctors and nurses and via signposting, e.g. in junior doctor handbooks/training packs, bulletins, MI service, on the wards, pharmacy staff.*

4.5 Documentation of calls

The documentation of the number of calls received by on-call pharmacists was high for both supply of medication (94.6%, n=88/93) and for medicines advice (91.8%, n=89/97). The medicines advice provided by on-call pharmacists was documented all, or some of the time by nearly half of respondents (49.5%, n= 47/95). One Chief Pharmacist stated that medicines advice was never documented.

Just under half of Trusts (41.1%, n=39/95) had a standard policy for the documentation of medicines advice, with more policies in place at acute hospitals (79.5%, n=31/39). Chief Pharmacists were asked what information the policy stated should be documented. Based on a thematic analysis of responses, Panel nine lists the information that is expected to be documented out of hours, as per Chief Pharmacists' Trust policies.

Panel 10. Information expected to be documented by on-call pharmacists according to their Trust policies

- Time the enquiry was received.
- Urgency of the answer required.
- Date and time of the enquiry received.
- Enquirer's contact details (including name and role) and location.
- Patient's details (where appropriate).
- Enquirer's question.
- Resources used to answer the enquiry.
- Answer provided to the enquirer.
- Name of the pharmacist handling the call.
- Time taken to answer the enquiry and respond to the enquirer.
- Follow-up needed during normal working hours further to the enquiry.

For those Trusts that did not have a policy, Chief Pharmacists were presented with a list of information options that might be included, and responses shown for each is shown in Table 18.

Table 18. Chief Pharmacists' opinions (where no policy existed) on what should be documented by on-call pharmacists when providing medicines advice	
	Number (%) (n=56) [a]
Time of call	54 (96.4%)
Enquirer's name	56 (100.0%)
Enquirer's job role	52 (92.9%)
Enquirer's contact details	50 (89.3%)
Enquirer's question	55 (98.2%)
Resources searched	41 (73.2%)
Information found from resources accessed	35 (62.5%)
Medicines information advice provided	54 (96.4%)
Other [b]	15 (26.8%)

a. *Respondents (n=56) could select more than one type of information that should be documented by on-call pharmacists.*

b. *This included date/day that the enquiry was received, the amount of time it took the on-call pharmacist to answer the enquiry and the reason for the urgency of the enquiry.*

Two thirds (66.7%, n=62/93) of Chief Pharmacists stated that advice was documented using paper-based forms, although 29.0% (n=27/93) used an electronic-based form or database system, e.g. Microsoft Access. More than half (57.9%, n=55/95) of Trusts' on-call pharmacists had access to a bespoke database (MiDatabank) within the organisation out of hours. Just over half of these (52.7%, 29/55) were able to access the database remotely when outside the organisation. However, only a small number (4.3%, n=4/93) used the bespoke database (MiDatabank) irrespective of location to record medicines advice provided out of hours directly onto this database.

All on-call pharmacists had access to information resources to enable them to answer requests for medicines advice. Chief Pharmacists were asked if their information resources had been reviewed against a recommended list for out of hours provided by UKMi. [4] In almost two thirds of Trusts (63.8%, n=60/94) this had been done, although in 14.9% (n=14/94) of Trusts it had not. One in five Chief Pharmacists did not know if their information resources had been reviewed against this list (21.3%, n=20/94).

4.6 Training provided to pharmacists to help them answer medicine questions out of hours

Specific training for on-call pharmacists to help them provide medicines advice out of hours was provided by 81.1% (n=77/95) of Trusts. Although small numbers, all Trusts with a residency programme provided training (100.0%, n=9/9) compared to 79.8% (n=71/89) of Trusts which operated a home-based on-call service (note that one Trust that provided a residency did not answer this question); both MI (79.2%, n=61/77) and other pharmacist staff (70.1%, n=54/77) delivered this training. Of those Trusts that did not provide training, two thirds were NHS acute hospitals (66.7%, n=12/18) compared to 33.3% (n=6/18) from mental health Trusts.

Training was primarily delivered as one-to-one sessions (n=98.7%, 76/77), with group sessions (28.6%, n=22/77) the next most common method employed. A small number delivered training using e-learning (6.5%, n=5/77). Two Chief Pharmacists selected 'other': the first referred to use of a portfolio assessment; the second that training is a *"progression of learning based on past or current examples with answers to queries that are challenging shared with all on-call pharmacy staff"*. An explanation for how this is undertaken in practice was not provided by the respondent.

Chief Pharmacists were asked what training was provided (Table 19). In addition, the table includes Chief Pharmacists' opinions on what training should be provided where they did not provide specific training.

Table 19. Provision of training to pharmacists before they begin on-call		
Training	**Training provided by Trusts**	**Training that should be provided**
	Number (%) (n=77) [a]	**Number (%) (n=18) [a]**
No additional training should be provided to that received as part of the pharmacist's 'normal working hours' role	N/A as question not asked	8 (44.4%)
Communication skills	25 (32.5%)	6 (33.3%)
Use of MI Resources/Databases	71 (92.2%)	11 (61.1%)
Critical evaluation/interpretation of information/data	25 (32.5%)	6 (33.3%)
Use of I.T.	54 (70.1%)	6 (33.3%)
Documentation of enquiries	53 (68.9%)	7 (38.9%)
Use of MiDatabank (MI electronic enquiry answering database)	50 (64.9%)	5 (27.8%)
Questioning skills	33 (42.9%)	5 (27.8%)
Mock 'on-call' scenarios	33 (42.9%)	3 (16.7%)
Other (please specify)	16 (20.8%)	3 (16.7%)

[a.] *Respondents could select more than option.*

An analysis of responses, when 'Other' was selected for Trusts that provided training, generated two themes. These were: completion by the pharmacist of training in the MI service before they begin on-call specifically to aid handling of medicines advice calls out of hours; and, shadowing/buddying of a senior colleague by the on-call pharmacist initially to help them provide MI advice out of hours.

A summary of the three responses, when 'Other' was selected for those Trusts that did not provide training, outlined that all pharmacists are expected to answer MI enquiries whether they are undertaking an on-call role or not.

Looking beyond initial training, Chief Pharmacists were asked to specify any on-going training provided: nearly half (48.1%, n=37/77) of Trusts never gave any refresher training. A small number provided refresher training every three (n=1), six (n=2) or

twelve months (n=7). Thirty Chief Pharmacists selected the option ‘Other’ and these responses were analysed. Themes generated were: refresher training was provided as required; on-going training needs were identified by reflective discussion of on-call events with peers; training was provided as part of the on-call pharmacist’s rotation into the MI service or identified through staff appraisal.

On-call pharmacists trained by MI staff (57.4%, n=35/61) were more likely to have their training refreshed compared to training provided by other pharmacy staff but this did not reach statistical significance.

4.7 Participation in the next phase of the study

Most Chief Pharmacists (75.3%, n=73/97) agreed to be contacted about the next phase of research involving interviews with on-call pharmacists and secondary care healthcare professionals. Of these, over half of the Trusts in the East of England had agreed to be contacted (54.5%, n=12/22).

Chapter 5 RESULTS (SEMI-STRUCTURED INTERVIEWS)

5.1 Introduction

This chapter first outlines the respective recruitment of the three professional groups before discussing the themes generated from the semi-structured interviews.

5.2 Recruitment

5.2.1 On-call Pharmacists

Eight of the twelve Trusts provided the names and email address of pharmacists who participated on the on-call rota. All on-call pharmacists (n=107) were contacted and invited to participate in semi-structured interviews: just under a third responded (29.9%, n=32/107). Responses received from on-call pharmacists and the number contacted to arrange a suitable date, time and location at their base organisation for the semi-structured interview to be conducted are shown in Appendix 30. A total of eight interviews were conducted with on-call pharmacists working in Acute Hospital Trusts between 10th July 2014 and 5th September 2014; no interviews were conducted with those working in a mental health Trust. It was expected that data saturation would be reached at this point, i.e. no new codes, themes or ideas were generated.

5.2.2 Doctors and Nurses

The MD, DoN and R&D departments of the eight Trusts who had agreed to provide names and emails of on-call pharmacists were contacted. Four Trusts agreed to participate. Most of the pharmacy MI services of those Trusts that agreed to participate helped recruit doctors and nurses (75%, n=3/4). One pharmacy MI service declined to participate which meant that for this Trust, the only method for recruiting doctors and nurses was via the poster. From the expressions of interest generated (n=19), seven semi-structured interviews were conducted (Appendix 31) with doctors and nurses working in acute hospital trusts between 15th May and 3rd December 2015. Again, none of the interviews were conducted with those working in a mental health Trust. A total of three interviews were conducted with doctors and four with nurses.

5.3 Themes

A total of 19 themes were generated from the interviews conducted with on-call pharmacists, doctors and nurses which were grouped into 5 meta themes. These are shown below in Table 20 and discussed in the following sections.

Table 20. Themes generated from semi-structured interviews	
Meta Themes	**Themes**
1. An individual's knowledge and experience	a. Affected an individual doctor's or nurse's MI needs. b. Affected on-call pharmacist's perception of the enquiry. c. Affected how on-call pharmacists approached and documented enquiries. d. Affected by training or lack of structured training, and/or learning on the job for on-call pharmacists.
2. Information accessibility	a. Access to information sources by pharmacists. b. Accessing or utilising colleagues as sources of information out of hours by pharmacists, doctors and nurses. c. Doctors and nurses access information sources electronically. d. IT impact on the ability of on-call pharmacists and doctors to access information. e. Access to information known by the enquirer but not necessarily shared with on-call pharmacist.
3. Use of Service	a. Hospital Pharmacy Service and MI Service use in 'normal hours'. b. Drug administration. c. Medication safety check. d. On-call pharmacist unapproachability by nurses.

Table 20. Themes generated from semi-structured interviews	
Meta Themes	**Themes**
4. Awareness of service	a. Knowledge of on-call pharmacy service, access, provision and workload by doctors and nurses. b. Lack of promotion according to on-call pharmacists.
5. Documentation by the on-call pharmacist	a. Affected by time enquiry received. b. Affected by remuneration. c. Affected by IT issues. d. Affected by their concerns.

5.3.1 An individual's knowledge and experience

An individual's knowledge and experience was something that primarily on-call pharmacists spoke about, with subsequently three out of the four associated themes being specific to this professional group. Only one theme was attributed to doctors and nurses and involved their personal needs of MI, and was exemplified by the following quotes:

"…the doctors wanted a patient on a syringe driver with Buscopan in it ***[Hmm]****. And I've never seen anything like this so I contacted the pharmacy…."* **NR3**

"…but sometimes you kind of think, can you give that via a PEG? Can you give that via a NG? That would be the sort of things I would anticipate." **DR3**

During interviews with on-call pharmacists, specific examples were provided from their interactions with doctors and nurses that reinforced the theme about these healthcare professionals' MI needs:

"*I had a doctor who bleeped me and* [Microbiology] *had… recommended co-trimoxazole 120mg per kg in 3 – 4, 2 – 4 divided doses. And the doctor was just like how am I supposed to calculate? How am I supposed to know how many doses to give?"* **OPh7**

"…they [nurses] *had erm levetiracetam on critical care and wanted to know if the ampoules could go down the NG tube but actually you know, there's a syrup so we'd use that."* **OPh6**

Specific to pharmacist interviews was an individual's perception regarding their own knowledge and experience of handling enquiries. Some examples in particular highlighted when on-call pharmacists handled questions outside their area of competence:

"You know there could be calls coming from a specialty that you've never worked in before so you've kind of got no basis on what to go with some of the advice and things they ask." **OPh8**

"…out of hours you're their only port of call so you suddenly have to answer questions about something you have no idea what it is. And I think that's probably what makes it harder, it's the fact it's a specialist question not just because it's a unique question. It's the fact it's a specialist question and you don't know much about that specialty." **OPh4**

Pharmacists' knowledge and experience also affected how they approached and documented enquiries. In the context of approaching an enquiry, this included the on-call pharmacist asking additional questions to obtain sufficient background information from the enquirer (which interviewees perceived of value) and using resources and locating relevant information within these:

"I think that whether you ask those supplementary questions that gets the actual question erm does a little bit depend on, on experience." **OPh5**

"…you just try and get a bit more information because usually there's not that much information they give but unless you know you get the idea. So you, you'd ask a few more patient details, erm you know the urgency of…you try and get more information out of them that you know that the nature of the enquiry." **OPh2**

"For example erm I've been asked to supply… [a drug] *…. and has two different uses for prevention of osteoporosis* ***[Hmm]*** *and oncology use. So for this one I had to investigate further again as I say, the, what is it used for? How often do you want to give it? Erm…what are they prescribing it for? How often? Patient weight? Patient eGFR? Liver function and everything in order for me to make a decision…"* **OPh1**

"I think it's relevant to how much you know. I think if something I know off the top of my head and I don't really need to utilise more than one source for it and even that I'm confused about it, then I think I would regard that as quite simple." **OPh4**

The next set of quotes illustrate the documentation of an enquiry (the second part of this theme) by the on-call pharmacist:

"There are some pharmacists here who have been working 30 years and probably know everything like that [interviewee chuckle] *and can give their answers whereas some people wanna you know, cover themselves more and say I said this and this is where I got it from* ***[Hmm]*** *and things like that. I guess with out of hours you could get a Band 6 pharmacist whose been, you know qualified 6 months, or you could get a you know 8b pharmacist, whose you know clinical expertise, is quite experienced and things like that."* **OPh3**

"I think I tend to write quite a lot of detail but I think that's because I'm new and I just want to make sure that I've covered everything. Looking back at some of the records when I'm searching things some of the pharmacists don't put as much but that's probably more that they are more confident in what they've done. They'll put the answer is this whereas I will put I've looked here this has said this, so therefore I've said ***[Right, yeah]*** *that."* **OPh7**

The final theme identified from on-call pharmacists centred on training or lack of; any training currently provided appeared to be limited to the operational aspects of the role and is supported by findings from the first part of this research (Chapter 4, Section 4.6). Examples articulated by interviewees included being shown how to use the laptop and which information resources are available and their associated passwords:

"…when I moved here the erm the training was really focused on this is the form you have to fill in, erm this is the on-call laptop, this is how you access the laptop, this is the password. Not, not anything. It was very operational rather than advice for actually answering enquiries." **OPh5**

"I think that the thing is for the actual on-call training we just got trained on how to use the on-call laptop. We didn't really get any training on how to answer enquiries 'cos the assumption would be that we'd have MI training but some of the pharmacists- I was

*lucky because I had gone through MI before I'd done any on-calls **[Hmm]** but I don't think that's the case for all the pharmacists. So, yeah we don't get much training about being on-call other than the logistics of using the laptop and how to claim payments **[Hmm]** and that sort of things but yeah, not that much training on how to deal with an enquiry."* **OPh7**

Rather than any structured training, there was a high degree of learning on the job by individual on-call pharmacists:

"Erm we have a residents' password to log on to MiDatabank so that those who haven't rotated through MI are able to access things in a read only format. But case of being shown that that you'll be shown that by one of the residents how to access it." **OPh8**

"…from my own experience erm and I've done on-calls in 3 different trusts I've never had any formal training on how to you know, answer calls, what to ask… if you're newly qualified and you're just starting out it…it is good to have you know a set of questions there or things you need to ask or just you know, unless you then have to learn by default you know, erm you, you take a few you, ask a few questions, you get a few answers and then you say oh you ring back I should have asked this, I should have asked this…" **OPh2**

In addition, in some cases experiential learning involved access to a colleague or 'buddy' to support their training:

"Well there wasn't any training [interviewee chuckle] *is the honest answer. Our erm, our first, my first on-call shift was having another pharmacist on as a second person to go to if I needed any help. And a few minutes of here's the laptop, here's how you turn it on, the password, you know here's some resources."* **OPh3**

*"…I did my junior pharmacist job in a large DGH teaching Trust and their training…was that for your first on-call you had a backup pharmacist…and that pharmacist was just as on-call as you were… you were kind of expected to ring them for all but the most ridiculous enquiries so that they could check that what you were doing was OK **[Yeah]…**but other than the informal advice given by that pharmacist who was your mentor, whatever you want to call it for that one week period, didn't have any particular training."* **OPh5**

Some on-call pharmacists suggested there is a role for MI services in their training so they can handle medicines advice questions out of hours:

"I mean it would be great if somebody UKMi or came up with some kind of, which they have I suppose, the MI training, training book. But erm I suppose what we need is some kind of standardised manual. I'm all for standardised [interviewee/interviewer chuckle] *making sure everyone's got the same information they can't argue… I think everybody probably on a regular basis probably should inclu- definitely including myself should have refreshers on MI answering* ***[Hmm]…"*** **OPh6**

5.3.2 Information accessibility

Information accessibility was a meta theme generated from interviews: two of the five themes were specific to on-call pharmacists, one related to on-call pharmacists and doctors, one generated from doctors and nurses, and one that was attributable to all three professional groups.

On-call pharmacists highlighted access to information sources as a potential barrier by them when working out of hours. Pharmacists contrasted the access that they had to drug and clinical information during normal working hours with the lack of, or limited access to this same information when working out of hours:

"… 'cos we don't have access to MiDatabank when we're on-call unless we come in and obviously a lot of the enquiries and probably a lot of the information is on there. A lot of the time when I've got problems on the ward most of the time they've already looked into and found an answer for a different patient and you can just apply the information to ***[Hmm]****, to your patient. Obviously you haven't got that… you can't go and look at the drug chart, you can't go and look at the notes to have a look to see what's going on yourself…but obviously if you're on the ward you'd been able to go and look at the notes and be like oh so they've got this condition that this would mean that would be inappropriate* ***[Hmm]****"* **OPh7**

During normal working hours, pharmacists also outlined the benefits of being able to access the patient as a source of information in addition to drug and clinical information, which they believed they could not do in an out of hours situation:

*"If it's on my ward you might, very likely you know the patient so you've got a bit of background information anyway and I might just go to the patient notes **[Hmm]** rather than sort of you know, at least you've got it there because if someone reads it out during the night erm it's always a little bit more difficult than actually when you can have it in front of you and you look at it in writing **[Hmm]."*** **OPh2**

…that electronic stuff you can do if you get the IT to work [at home] *but sort of looking at paper notes and you know, looking at the patient against the nursing note. How sick are they? You know, it's very easy to read about how sick someone is but until you've actually seen them it's, you can tell just by looking at someone if they're properly, you know, properly in danger, properly sick."* **OPh5**

Pharmacists also highlighted that during normal working hours, colleagues or the MI service are readily available as information resources:

"Erm so a lot of the erm medicines information requests will go through the ward pharmacists erm we've got quite a lot of access to resources on the ward. Erm and then it tends to be pharmacists that refer to the medicines information team for the ward's benefit." **OPh8**

*"Well normally if I get asked a question obviously I, I'd look into it if I have any further questions I'd go find the doctor or nurse to find out I'd go look at the notes if I needed to look at the drug chart erm and then either answer it myself if I feel I can answer it with the resources we've got on the ward or again either come down to MI or discuss with MI **[Hmm]** or discuss with another pharmacist if I, if it was like antibiotics, I'd speak to the antimicrobial pharmacist or such 'cos obviously everyone's here so you know in your head you're thinking if I'm not sure of the answer I know I can go and ask such a such a person because they know more than I do in that specialist area."* **OPh7**

The second theme specific to on-call pharmacists related to 'access' which centred on their experiences that information known by the enquirer was not always shared with them; this created problems when providing medicines advice. On-call pharmacists felt this was due to a lack of understanding by the healthcare professional about the reasons why they might need this information:

"…out of hours you're relying on someone else and sometimes they don't understand that you might need extra information for pharmacy input. They don't understand what

you're talking about [interviewee chuckle]*, so they don't understand why a pharmacy might need to know renal function - that's nothing to do with us apparently – or, why we might need kidney erm liver impairment or anything like that they don't understand."* **OPh4**

"And you haven't got access- You're relying on what the person's telling you, you can't go and look at the drug chart, you can't go and look at the notes to have a look to see what's going on yourself because quite often there's information that they don't thinks relevant that they haven't told you and you haven't necessarily thought to ask." **OPh7**

The third theme, which all professional groups highlighted, was access or utilisation of colleagues from their own professional group as sources of information when working out of hours. Examples from pharmacist interview transcripts show how either senior colleagues or specialist pharmacists could be contacted out of hours:

"…it was reassuring to know that you could ring anyone and they [senior pharmacists] *make a point of it and tell everyone that you can ring us which I think is very reassuring to be perfectly fair…."* **OPh4**

"…if one of us on-call pharmacists run into problems you ring someone. If it's an oncology patient you'd ring the oncology pharmacist and they wouldn't mind depending on what time it is. You know obviously [interviewee laugh] *I think up until 11 I think we're all quite happy to be contacted by the on-call pharmacist…"* **OPh2**

Similarly, doctors and nurses also contacted their respective colleagues out of hours:

"You might talk to colleagues. Erm so you might bounce some ideas off erm the other consultants." **DR2**

"…I haven't personally done it but erm some of the nurses phone IDA or ITU 'cos those nurses are mostly, not mostly, more experienced in giving [short pause] *like, different IV medication than us so we ask them for an opinion erm but I haven't personally done it."* **NR3**

This was supported by a perception by on-call pharmacists that nurses and doctors used their colleagues as a source of information out of hours:

"When the nurses are confused regarding an administration part, they can ask other colleagues because there's quite a few around but I think out of hours there's just a couple of them so I think they just, don't know and that's kind of understandable if you don't have anyone to ask then that's fine. And I think this is the same for the doctors, especially if they're junior doctors and they have no-one to ask…" **OPh4**

Doctors and nurses (but not pharmacists) spoke about accessing information electronically out of hours when searching for MI, primarily restricted to hospital-based sources, before or instead of contacting the on-call pharmacy service. There was a lack of knowledge about the on-call pharmacy service by doctors and nurses. It is unknown whether these electronic resources were searched before, or instead of contacting the on-call pharmacist:

"Erm so I've got BNF app on my phone ***[OK]****, erm* [short pause] *sometimes I will consult the iv administration guide on the hospital's administration guide. Erm* [short pause] *there's also erm like a best practice website called UpToDate* ***[Oh yes]*** *…that has quite* [short pause] *good erm sometimes dosing information, frequency of dosing, sort of indications for particular medicines to use in particular conditions depending on what you're treating."* **DR1**

"Erm the monographs online, pharmacy documents on [Trust Intranet] *if I happen to be lucky enough to be working near a computer… occasionally I have been known to stick things into Google and hope it comes up with an answer of some description but again, it's taking is that a reliable source."* **NR4**

For the final theme, doctors and pharmacists identified IT, mainly related to hardware or connectivity, as a barrier to accessing information. For on-call pharmacists, hardware issues mainly related to laptop use and particularly in relation to handling calls when off-site:

"…you have got the laptop, you've got to make sure that the person handing it over to you charged, charged it 'cos we've had that issue where somebody's gone into [town] *and needed to use the resource but it's been flat* ***[Hmm]…*** *so I think as long as you've got access to some IT I think you're pretty much OK. "* **OPh6**

"Internet access erm out and about. So obviously you can, you can plug the Internet over your phone and stick in a computer. First of all you have to have a relative modern phone, you have your phone up, you have to set the laptop up erm and it's fine if you've done all that in advance but if you've got someone on the other end of the phone and wants something quickly and you have to configure your phone and the computer, erm it's a bit of a nightmare. So that, that really doesn't help. So that's difficult having good IT access because so many resources now are online…" **OPh5**

Whereas for doctors' hardware and hospital intranet search functionality were the main IT issues, which affected their ability to find MI:

"The problem with [hospital intranet] *is it's a bloody nightmare to try and navigate through it and you can't find anything* ***[Hmm]****. You know you put in antidote or something and it'll all come up with rubbish and it's not a great search engine with that respect* ***[Hmm]****. So unless you can navigate through it and you know exactly where something is* [hospital intranet]*, is a big black hole."* **DR2**

"…it takes a long to log in ***[Hmm]*** *and if you're not logged in you can't print things out. 'Cos to do a printout you have to be logged in under you so if I'm trying to print out an information sheet for a patient I need to be logged in as me. So you have to log in wait for it to load and I do have a laptop with BYOD access from home but the Wi-Fi signal in the hospital is so variable so I could take my laptop but it's going to take me just as long* ***[Hmm]****."* **DR3**

5.3.3 Use of Service

The third meta theme generated from interviews was the use of service. Two of the four themes were generated from interviews with all three professional groups; one from nurses and pharmacists; and, one theme from nurses only.

The first theme noted was that all groups interviewed spoke about using the hospital pharmacy and MI service during normal working hours. Pharmacists gave examples of utilising MI in situations where a response was needed to a complex question and/or the pharmacist did not feel able to handle the enquiry due to time pressures:

"And obviously the questions that go through MI do tend to be more complicated. I mean not always necessarily you do get some simple ones but if the pharmacist is on,

on the ward then they would answer the simple enquiries. It tends to be the more complicated ones or ones from clinics that go through medicines information." **OPh7**

"So things that I would refer…would probably be if a nurse says to me how do we give this and I'm in the middle of doing something in the middle of the ward, and I'd say I dunno just ring the MI centre. If I had a complex urgent question which I didn't have time to deal with now, I'd definitely refer that." **OPh5**

"Erm sometimes it can be due to the time that you've got available on the ward erm and to look into things erm just if you're not sure and what a second opinion. Sometimes medicines information or the specialist pharmacist erm…yeah, somethings that's just- I can't think of an example- but a little a bit more obscure ***[Hmm].*** *Some sort of unlicensed thing crops up sometimes."* **OPh8**

Doctors and nurses made reference to hospital pharmacy and MI services as information sources for medicines advice. This included the pharmacist's role as a member of the multidisciplinary team:

"…I just think it's nice to get to know who your pharmacists are erm and they're part of the team. You know in some of the hospital the pharmacists are on the ward round ***[Hmm]****. You know they're part and parcel of the ward round* ***[Hmm]*** *not just floating around on the ward, they're actually with your, with you and rest of the team doing the ward round* ***[Hmm]*** *very much a joint thing."* **DR2**

The MI service was cited as an option if the pharmacist working as part of the multidisciplinary team was unable to provide a response:

"Erm there's a pharmacist specific to our clinic who I can phone and ask about and they can lead you to phone medicines information if they can't answer your query. Erm I don't contact them enormously but I know exactly who I would contact and they would very quickly respond and they come up to the office or clinic and I've always really good support from a specific pharmacist for my area erm and they are the first port of call if it's not specific Medicines Information I think you're wanting to phone ***[Hmm]****."* **NR2**

Doctors and nurses identified drug administration as one of the main types of medicines advice questions sought during out of hours:

"Err if you're going to put things in a syringe driver or anything like that and you felt that something unusually has been prescribed erm and you're concerned about the compatibility of the drugs because it's something you then, you definitely need to seek advice and make sure get the most appropriate person and that'll be the pharmacist really who is on-call before you administer the drugs." **NR1**

*"Very occasionally we'll get a, "Can you give this i/v? Can you give this via a PEG? **[Hmm]** Can you give this sub-cut? What's it mixable with sub-cut?... but sometimes you kind of think, can you give that via a PEG? Can you give that via a NG?"* **DR3**

On-call pharmacists also gave examples of drug administration enquiries they had handled:

*"We have patients with stroke or patients with erm **[Hmm]** unable to swallow so then again we have to look for them for this conversion from liquid to-sorry from tablets to liquid."* **OPh1**

"Nurses would be like how do I administer? What do I use? How do I make the dose up? Erm, how do I get the minimum volume in if it's too small or large?" **OPh4**

Nurses spoke of 'medication safety checks' as another one of the main types of medicines advice questions out of hours. This involved nurses clarifying or confirming that a treatment intention was 'safe' with on-call pharmacists. For example, this could include the choice, dose, route, frequency, or whether it interacts with other medicines:

*"So for example Ferinject I'm trying to prescribe in preparation for them coming in a couple days' time **[Yes]** sometimes I would like someone else to check my maths."* **NR4**

"Erm because it could be a new drug that's been prescribed and you're not familiar with it and you'd like the reassurance of somebody from pharmacy erm that a) the drug is safe to use. It's OK to use for that specific patient." **NR1**

Specific examples supporting this theme were provided by on-call pharmacists:

"One of the calls was just to confirm that the dose was OK. ***[OK]*** *Erm you know, they've not seen this before and they just wanted to double-check that, that was alright to happen."* **OPh6**

"And a few of the, the IV administrations that tends to be the nurses double-checking that what the doctor's put actually what they're supposed to do." **OPh7**

"…the nurses ones seem to be a little less, a little more simpler, more simple is not the best term really but just things like I've got this type of insulin, is this correct?" **OPh3**

Although nurses did ask for advice from on-call pharmacists they also detailed their anxiety in contacting them as they felt they were unapproachable. Nurses described their thoughts when they considered contacting the on-call pharmacy service:

"…I dread calling them ***[Right]****. I know it has to be done and I know it's a long monologue from my side* ***[Yeah]*** *to convince them that we've done everything we should…"* **NR3**

5.3.4 Awareness of service

The fourth meta theme centred on the awareness of the service. The first of the two associated themes were generated from interviews with doctors and nurses, and the second from on-call pharmacists. The first theme was that there was a lack of knowledge about on-call pharmacy services by doctors and nurses. This included provision and accessibility of the on-call pharmacy service, and the workload handled:

"…I know they're there. If I, if I did think oh goodness, I don't know what to do here, I could phone them [medium pause]*. I suppose I don't know how their on-call service works or who's going to be at the end of the phone and what their service provision is. Kind of on-call – and I think there's a difference between on-call during reasonable hours' kind of 9 in the morn- or 8 in the morning til 9 o'clock at night and a difference to 2 o'clock in the morning."* **DR3**

"So my understanding of on-call pharmacist is that've you got one pharmacist on-call for the hospital ***[Hmm]*** *and again going back to that whole workload and if they're covering all these other beds and- Then I'd want to be pretty certain that I needed an*

answer there and then rather than just phoning up to say I'm a bit uncertain about the iron dose for 3 days' time ***[Hmm]****. That would be the only reason why. It's not because I don't think of them, value or respect them, it's just considering everyone's workload really."* **NR4**

The second theme was that pharmacists felt that the on-call pharmacy service needed to be better promoted, particularly as they believed healthcare professionals were unaware of what could be provided:

"…maybe we should erm promote it a little bit more look that out of hours we're not just there to supply stuff erm we're also there and available to give advice rather than having the patient sit and wait there until the next morning." **OPh2**

"…I don't think they're aware that there's an on-call pharmacist because I've heard [doctor's name] *say I didn't know pharmacists were on-call. So that's clearly saying something they're not like junior doctors they're consultants even registrars, it's quite shocking really. I think the only ones that know are the ones that come across us. Actually, it's most nurses that refer doctors to us."* **OPh4**

5.3.5 Documentation

The fifth and final meta theme was documentation generated from interviews with on-call pharmacists. There is crossover between the previously reported theme 'an individual's knowledge and experience affected how on-call pharmacists approached and documented enquiries' in Section 5.3.1, and this meta theme of documentation.

Documentation was affected by the time a call was received and the following are examples provided by on-call pharmacists that support this theme:

"Depends what time of the day the call is. If it's up to midnight then yeah, I generally tend to leave the laptop on [interviewee chuckle] *but if it's after that and I'm asleep then it'll* [documentation of enquiry] *be the next day."* **OPh4**

"Possibly not [document enquiry] *in that kind of time in the morning because I might want to do when I'm a bit more awake make sure – obviously when you're a bit asleep and you're documenting it straight onto the database once its submitted you can't, can't change it so I probably would tend to write it up on a piece of paper what I've said and then when I'm more awake in the morning and probably put it on the database because*

obviously you don't want to risk making a mistake and putting incorrect information on there…So yeah, I guess if it was, if it was early in the morning and I'd already gone to bed and had to get up then I'd probably more likely just to scrawl it down on a piece of paper and document it fully later." **OPh7**

Documentation was also affected by remuneration, either as a financial payment for the time taken to handle the enquiry or time off in lieu:

"…you would document every call you get even if it's just you know for stock, [out of hours] *we need you know we've run out of aspirin or whatever you know… you would put that down because here it's like erm if you take a phone call and it takes you 5 minutes or it take you an hour erm this is the time you then can claim back as TOIL. So hence you would put literally every call down no matter what nature it was."* **OPh2**

"Yeah, we have to put on there [on-call log database]*. It's all linked in with all the hours we claim so if we don't put it on the database, it didn't happen and we can't claim for it* [interviewee laugh]*."* **OPh7**

IT issues also had a bearing on documentation, particularly the use of a laptop or being able to document enquiries electronically at the time:

"Erm I'm mean the on-call laptop has got the database too so in theory you could do it there and then but at you know 11 o'clock or 1 o'clock in the morning I would not make that, er , er I wouldn't because it takes 15 minutes for the laptop to, to fire up I wouldn't do it then you'd rather do at work when you've got it on your screen and you can do it then and it's quicker." **OPh2**

"At the moment we only have access to [MI enquiry answering database] *on one computer in the dispensary. We don't have access to it once we go- We have access to all of the erm Trust's intranet from the flats on site but don't have access to* [MI enquiry answering database] *when we're there. So, if they're calls that you take after midnight then that wouldn't be feasible to record at the time. Potentially put it in the next morning back on site."* **OPh8**

The fourth theme was that documentation by the on-call pharmacist was affected by their concerns. These concerns included the enquirer's understanding about the

medicines advice provided and so there was a strong desire by the on-call pharmacist to record and justify their advice:

"I think occasionally if it's something complicated and I'm not entirely sure the doctors understood it or there's other people who will need to understand why we've done what we've done then I would write in the patient's notes and document in there have the discussion with junior doctor or consultant or whoever I've spoken …out of hours you can't physically see what they've done so you've got to rely more on the doctors listening properly and doing what you tell them [interviewee chuckle]." **OPh7**

"So what sometimes happens is that you give an answer repeatedly and the person doesn't seem to get it and then decide that they're bored and wants to go and then, they want to document in some sort of record – nursing record or medical record – what you've said. I think it's important that I have my own documentation of what I've said so that if action is taken based on what they thought was my advice but wasn't my advice and something bad happens it's very clear from my point of view the advice I did give." **OPh5**

CHAPTER 6 DISCUSSION

This chapter discusses the results from both phases of the research (online survey and semi-structured interviews) focused on the provision and use of the on-call pharmacy service; information accessibility; documentation; and, training. Limitations associated with this research are then discussed, followed by implications for practice.

The first section discusses the provision and use of the on-call pharmacy service. This research has determined that on-call pharmacy services are almost universally provided by English hospital Trusts through non-residency (home-based) pharmacists. The most common model of on-call services was for pharmacists to be at home, with just 10% of Trusts operating a residency programme. This finding is similar to those reported previously by Cotter et al in 1994 and McCleod et al in 2014. [86, 87] This suggests that on-call pharmacy services have remained unchanged over a long period time and unless 7-day hospital clinical pharmacy services are implemented as recommended by NHS England with sufficient staffing, this picture is unlikely to change. [34] Most Trusts that operated a residency programme had more than 900 beds, representing larger hospitals. This is in line with previously reported results in which there was a trend towards hospitals with a resident pharmacist being found in larger hospitals compared to those without a non-resident on-call pharmacist. [87] The implications are that on-call pharmacists working in larger hospitals as part of a residency programme will have better access to the patient and clinical information because they are on-site and could result in the medicines advice provided being better tailored to the individual patient involved in the enquiry.

Nearly all provided medicines advice, although acute hospital Trusts did so more than mental health Trusts. This maybe in part due to the decreasing number of ‘inpatient’ beds seen in mental health Trusts as patients are now managed more in the community. [88,89] It is also likely that for this reason nearly half of mental health Trusts did not provide an on-call pharmacy service and instead held a SLA with another provider. In the researcher’s opinion, this may represent a more cost-effective option for mental health Trusts, particularly as the volume of calls decreased with the size of the organisation. However, this means that acute hospital Trust on-call pharmacists may have to handle medicines advice enquiries involving mental health conditions and associated medicines. Due to a lack of evidence, it is not known whether the knowledge of psychotropic medicines and associated mental health conditions by acute hospital Trust pharmacists is comparable to those working in a mental health

Trust and whether this would have any impact on the quality of medicines advice provision.

On-call pharmacy services were provided predominantly by staff on lower Agenda for Change banding, typically these will be junior staff with limited years' experience working as a pharmacist. Those pharmacists on higher banding (beyond Band 8a) were less likely to undertake on-call. This means that on-call pharmacy services lack senior pharmacists and is similar to that reported by Dunn in NHS Tayside (Scotland) where only Bands 6 – 8a pharmacists were involved in on-call pharmacy provision.[18] The provision of pharmacy on-call services does seem at odds with other hospital clinical services. For example, those provided by medicine and physiotherapy, where all grades of staff, except the most senior, i.e. consultant and superintendent physiotherapist III, are expected to participate. [90,91] Whilst there is no restriction on the length of time a hospital pharmacist can work at each of these Bands, typically individuals will have worked 3 – 4 years before working as a Band 8a pharmacist. It is this researcher's opinion that this could imply that the knowledge, skills and experience of pharmacists providing on-call services are comparably less than the pharmacy workforce during normal working hours. This could mean that medicines advice enquiries handled by on-call pharmacists are not of the same quality as those managed by dedicated MI staff. Research evidence from the medical literature has shown that greater clinical experience is associated with better diagnostic ability and less risk-averse decisions.[92,93] It therefore seems reasonable to suggest that pharmacists with greater clinical experience will provide higher-quality answers.

In general, on-call pharmacy services handled a higher number of enquiries about medicines supply compared to medicines advice and is consistent with other reported data from UK studies.[1,61,62] This reflects the traditional model of on-call pharmacy services, which have centred on medicines supply rather than advice. [94] Data did show that on-call pharmacists located at home handled more calls for medicines advice compared to those part of a residency programme. It is not entirely clear why there was a difference in the type of calls handled and due to the small numbers, no relationships within the data were found by the researcher. However, as on-call pharmacy services with residency programmes are located in larger hospitals and typically provide specialised services within the NHS, [95] one might have expected these to handle a higher number of medicines advice calls because of the associated complex medicines used.

Although the majority of hospital pharmacy departments advertised their on-call pharmacy services, pharmacists interviewed believed that healthcare professionals were unaware of what could be provided, and greater promotion was needed. This was corroborated by interviews with doctors and nurses who were unaware of the on-call pharmacy service, its provision, accessibility and workload handled. The accessibility of on-call pharmacy services is supported by a previous study which reported that junior doctors had suggested that greater access to pharmacists out of hours would be helpful, especially as they felt they could be difficult to find. [96] This suggests that the current methods used by hospital pharmacy departments, as identified by the online survey, to promote their on-call service are not working. In practice doctors and nurses, the most frequent users of the service consistent with other works, [1,18,58-60] may not know how to access the on-call pharmacy service or understand what services it provides. This may lead to these healthcare professionals seeking MI from alternative sources. Although doctors and nurses accessed information sources electronically or used colleagues, a limitation of the interviews was that they did not identify if these were instead of or before contacting the on-call pharmacist. However, when the MI service is unavailable, previous studies have reported that enquirers confirmed that they would seek advice themselves which included the Internet, calling the manufacturer, contacting a colleague, looking in books, using other MI resources or contacting specialists, e.g. consultants. [12,13] It therefore seems reasonable to conclude that doctors and nurses are seeking MI from alternative sources out of hours if they are not contacting the on-call pharmacy service. Based on the interviews, each professional group did not appear to describe using each other as a source of information out hours, i.e. nurse contacting a doctor, which has been reported during normal working hours. [97] There is a potential risk that doctors and nurses use their own colleagues as a source of medicines advice during or outside normal working hours which could potentially lead to incorrect information which may then be used in the management of specific patients. This is supported by evidence that showed doctors' and nurses' information seeking and evaluation skills could be improved. [98-100]

When on-call pharmacists were contacted, this was most often by phone and bleep/radiopager, although this is likely to change over the next few years as recent announcements by the Department of Health and Social Care have said bleeps/radiopagers will no longer be used in the NHS. [101-103] Mobile phones, and in particular secure instant messaging, are increasingly being used by healthcare professionals to communicate with colleagues and a recent study conducted at a single UK hospital, explored the experiences of pharmacy staff using WhatsApp when working out of hours. [104] This method of communication could change the way on-call

pharmacists are accessed in the future although without improvement to mobile phone networks, connectivity issues may remain an issue. [105]

Of concern was the perceived unapproachability of on-call pharmacists by nurses. Words and phrases such as “dread” and “don’t like to bother” came up during interviews. This may result in nurses deciding not to contact the on-call pharmacist because of their anxiety, and so potentially lead them to make decisions based on alternative information sources, as previously discussed. In contrast, doctors did not reveal perceived unapproachability as an issue and positive working relationships have been reported in the literature between pharmacists and nurses, and with doctors. [106-109] In addition, both doctors and nurses highlighted the role of the pharmacist as a source of medicines advice, as part of the multidisciplinary team, and the MI service during normal working hours. These findings are supported by previous studies that reported doctors and nurses are users of MI services during normal working hours. [37-39, 42, 43] Therefore the anxiety of nurses to contact the on-call pharmacist may be linked to other factors specific to out of hours. This could include a lack of understanding about the on-call pharmacy service, as previously discussed. Alternatively, pharmacists perceived that information known by the enquirer (nurse) was not always shared with them. On-call pharmacists felt that this was due to a lack of understanding by the nurse about the reasons why this information may be needed. Therefore the on-call pharmacist believed if they asked additional questions in order to help inform their response to a question, the enquirer did not understand why this information was being asked. This miscommunication and misunderstanding between nurses and pharmacists may explain why these professional groups had differing viewpoints. It therefore seems that better communication about the service and when people should utilise it needs to be addressed.

This finding appears to link to the individual’s knowledge and experience which affected their MI needs. The first, which was sought by doctors and nurses, was drug administration. This was reinforced by pharmacists based on the calls handled out of hours. Although prescribing is the most common patient-level intervention within the NHS, [110] a vast number of drug administration occurs and so it is not unexpected that this may be an area for MI. This is supported by recent UK publications, found in the grey literature, which have also reported drug administration as a frequent enquiry type for on-call pharmacy services. [23,24,64] It has also been cited in previous studies as one of the most common enquiry type handled by MI services. [12, 37,39,41-43] Therefore drug administration is an information need for doctors and nurses irrespective of the time of day. It is not known from this research what generates drug administration enquiries: it

could be related to an absence of information or a lack of awareness about the resources available to support healthcare professionals, as reported by Lilley et al, in which nearly 80% of paediatric nurses were unaware of the national injectable medicines guide. [111] However, enquiries could also be generated by nurses seeking clarification about information they have accessed. This was the second type of medicines advice sought out of hours by nurses, i.e. 'medication safety check'. On-call pharmacists described enquiries which supported this theme and involved nurses clarifying or confirming that a treatment intention was 'safe'. Examples included the choice, dose, route, frequency, or whether it interacts with other medicines. Seeking information to confirm the safety aspects of a medicine has previously been identified as an action by doctors and nurses when contacting MI and clinical pharmacy services during normal working hours.[10, 11, 97, 112] Therefore this is an information need irrespective of the time of day.

The ability of on-call pharmacists to handle 'medication safety check' questions links to the second part of this discussion which focuses on information accessibility. It was clear from interviews that pharmacists working during normal working hours had greater access to drug and clinical information and particularly, better access to the patient and patient information compared to out of hours. A recent study published by Lewis et al which explored the experiences and opinions of hospital pharmacists working 24/7 shifts reported that by being present on-site, pharmacists had access to greater resources and patients themselves, enabling them to respond to queries from the wider team in a more timely manner when compared to the on-call pharmacy service. [113] Therefore on-call pharmacists may find it difficult to provide a tailored and timely response to such questions without access to clinical information about the patient. Since these interviews were conducted, digital transformation has become a high priority for the NHS, not only including the rollout of electronic prescribing and medicines administration (EPMA) systems but also improved connectivity between different parts of the health system to enable better access to information, [32, 37] Based on the researcher's own experience, EPMA systems can be accessed remotely and this may help to improve access to clinical information about the patient by on-call pharmacists.

In general, Chief Pharmacists perceived that on-call pharmacists had good access to information resources although a third of respondents either had not reviewed these against a recommended list for out of hours use provided by UKMi or did not know. [4] It is not known how this recommended resource list has been promoted by individual MI centres within their pharmacy departments. However, national standards not only state

that staff working in MI services during normal working hours should be able to access recommended resources but also that that appropriate resources are accessible out of hours. [4] Despite the perceptions of Chief Pharmacists and recommendations within national standards, access to information sources was cited by on-call pharmacists during interviews as a potential barrier. In particular, on-call pharmacists described IT issues impacting on their ability to access information which mainly centred around use of laptops. These issues included the setup time required before the laptop could be used to access information; the laptop not being fully charged when handed over by another on-call pharmacist; and, Internet access. All of these may affect the ability of the on-call pharmacist to access information in a timely manner which could result in a delayed response to the enquirer. This could lead to dissatisfaction by doctors and nurses about the on-call pharmacy service although there are no studies which have assessed user satisfaction. Alternatively, it is the researcher's opinion that these issues could result in the on-call pharmacist feeling pressurised to provide a response without first accessing information. This could lead to incomplete or incorrect information being provided although there is no information to support this theory. Alternative hardware, in particular mobile phone technology as discussed earlier, could be harnessed which would avoid the setup time needed for laptops and therefore improve the timeliness of accessing information, but not necessarily improve Internet access.

Data derived from interviews with pharmacists revealed they routinely used MI services in office hours, particularly when a response to a complex question was needed, or when they felt unable to handle the enquiry due to time pressures. However, outside of normal working hours, this study has shown that only 20% of on-call pharmacy services had access to a MI pharmacist. This means that the majority of on-call pharmacists handle all enquiries, irrespective of complexity, with no access to a MI pharmacist. Although interviews with on-call pharmacists showed that questions outside their area of competence were handled, it was also reported that pharmacy colleagues were contacted as a source of information when dealing with questions. These colleagues included specialist pharmacists or senior colleagues, depending on the nature of the question. This has been similarly reported by other healthcare professionals providing hospital on-call services, who are also able to access senior colleagues for support. [114,115] Communication with a healthcare professional's own colleagues has been observed in other studies within the hospital environment (communities of practice) [116,117], and specifically using colleagues as a source of information out of hours has been reported previously. [64] When handling medicines advice questions, a senior colleague may not necessarily be best placed to advise the on-call pharmacist although this is dependent on the enquiry and the senior

pharmacist's own knowledge and experience. However, a specialist pharmacist may be a more appropriate choice if the question relates to their clinical specialty, e.g. specialist oncology pharmacist if a question involved a cancer medicine.

The third section of this discussion focuses on issues around documentation of on-call activities as articulated by pharmacists during interviews. Documentation of activities is an important aspect of clinical care. [118,119] and regularly highlighted as a contributing factor to near misses and errors associated with the handling of MI enquiries during normal working hours. [120-123] Outside of MI, a systematic review of 54 studies about medication administration errors found inadequate documentation as one of the causative factors. [124] Chief Pharmacists reported that the recording of the number of calls was high and on-call pharmacists explained that remuneration (financial payment or as time) they received was based on the documentation of calls handled out of hours. In other words, for every medicines advice call handled out of hours, the on-call pharmacist received an 'on-call payment' or time off in lieu if it was documented. However, the details of the enquiry, e.g. enquirer, question, resources used, advice provided, were not completed all the time according to Chief Pharmacists. One reason for this may be attributable to a lack of organisational procedure particularly as less than half of Trusts had a standard policy for the documentation of medicines advice. Pharmacy departments lacking policy on documentation was unexpected given there are national,[4] and professional standards for data capture to demonstrate the impact of hospital pharmacy services on patient outcomes. [125] Regardless of whether a policy existed, there was broad agreement by Chief Pharmacists on what should be documented. Where policy was lacking Chief Pharmacists placed little value on documenting which resources had been used and the information found within these, both of which are included within national standards. [4] Although it was not a theme generated from interviews, some on-call pharmacists commented that they documented the resources used but did not record the information found. On-call pharmacists admitted that they did not know the reason for this although some suggested it was because of the structure of the document they were expected to use to record enquiries. This is concerning, as the basis of an answer stems from the resources used and can act as an audit trail if there is a need to return to the advice provided. For example, a very small number of on-call pharmacists were able to access past enquiries recorded by colleagues out of hours. Without this information, individuals may be less confident about using previously answered enquiries which may lead to duplication of work. Although not explicitly stated during interviews with on-call pharmacists, some responses inferred that Chief Pharmacists' expectations may have influenced individual's actions within departments and these senior leaders have

previously been reported to influence colleagues within a department. [126] Additionally, individual pharmacists during interviews gave other reasons, which generated themes, as to why documentation may not be as expected. These included the time an enquiry was received, IT issues and concerns by the on-call pharmacist about the enquirer's understanding. These three themes will now be discussed in more detail.

Firstly, the time an enquiry was received: if a call was received late in the night or early in the morning, then the pharmacist was more likely to delay the recording of the enquiry. National guidelines for handling medicines advice enquiries during normal working hours recommend that the documentation of the question, research and answer to be given should take place before the response is communicated. [4] Some on-call pharmacists did make reference to receiving the call, finding the relevant information and then calling the enquirer back. However, in practice the time of the call may mean that documentation is not completed or is done so retrospectively. Not documenting information at the time of the call may mean that recall of the enquiry may be inaccurate. Secondly, with respect to IT issues, pharmacists often described using a laptop when working out of hours and depending on the time of the call received, frequently commented that it may not be switched on in order to document the enquiry. Not having the ability to electronically document the call at the time it is received increases the likelihood that it will be recorded on paper. During interviews on-call pharmacists referred to their 'scribbles' on paper and reported that their writing was illegible. This makes it difficult, if not impossible, to use this information as a repository for on-call pharmacists to access in the future when searching for previous similar enquiries. A national report has previously recommended that computer technology should enable on-call pharmacy services to be provided off-site and out of hours.[127] A bespoke enquiry answering database (MiDatabank) is used by MI pharmacists to document medicines advice during normal working hours,[48] but its uptake out of hours is very low according to Chief Pharmacists. Although no themes were generated from interviews conducted with on-call pharmacists, comments were made which suggested that MiDatabank was perceived to be only for use by the MI service and not more widely. This may be dependent on how the MI pharmacist has promoted this within their department and could be influenced by whether they also participate in the on-call pharmacy service and perceive this to be beneficial. However, there may also be something about the platform used for MiDatabank, i.e. computer desktop programme, which when combined with the IT issues raised by on-call pharmacists, particularly those related to laptops, and the time calls are received, does not make it conducive for use out of hours. Despite these issues, another computer desktop programme (On Call Manager) has been specifically designed for the handling of on-call pharmacist calls

and is now used in at least five acute hospital Trusts. [128] An evaluation of On Call Manager or comparison with MiDatabank does not appear to have been completed to determine which is better for documenting on-call pharmacist enquiries. However, some limited evidence from 2018, found in the grey literature, reported that on-call pharmacists did not use MiDatabank to document enquiries, instead preferring to choose this alternative software. [129] A formal comparison of the two databases would be helpful to determine the ideal IT solution for documenting medicines advice calls out of hours. Alternative software, as described by Dunn, is available and consists of an app for installation on mobile devices. This enables the on-call pharmacist to document enquiries at the time of the call using the app which also includes functionality to search previously recorded questions. [18] In theory, this would overcome some of the IT issues raised by on-call pharmacists in this research such as not needing to wait for a laptop to setup. However, it does not appear to have been widely promoted outside NHS Tayside and it is known if the use of this mobile app would introduce new challenges for on-call pharmacists such as data entry, for example.

The third and final theme which affected documentation was concerns by on-call pharmacists about the enquirer's understanding, particularly that of nurses. During interviews, on-call pharmacists described situations in which if they perceived a nurse not to understand the advice or appeared to intentionally not follow the advice provided, then this would increase the likelihood of the enquiry being documented. Misunderstanding, or intentionally not following the medicines advice received from on-call pharmacists were not themes generated during interviews with nurses or doctors. It has been reported that healthcare professionals do not always follow the medicines advice provided by MI services for clinical reasons, [10,11, 44] and whilst there is no data available for on-call pharmacy services, it would seem reasonable to conclude that this may occur out of hours. Furthermore, a systematic review by Keers et al, about the causes of medication administration errors concluded that the causes of 'violations' may lie in staff relationships, amongst others, [124] and so the rapport created between the nurse and pharmacist could be a factor affecting whether medicines advice is followed out of hours. Therefore concerns by on-call pharmacists manifested as self-protectionism from potential litigation.

Training provided to pharmacists to help them answer medicines advice questions out of hours was also investigated in this research. According to the majority of Chief Pharmacists, on-call pharmacists received specific training to help them provide medicines advice out of hours and was more likely to be provided by those Trusts with

a residency programme, all of whom were University Teaching Hospitals and have significant involvement in education. [130] Where training was offered, this was provided by both MI and other pharmacy staff, and mainly delivered using one to one face-to-face sessions. These methods reflect those already used to deliver training to trainees undertaking rotations in a MI service, and there is some literature, of limited quality, which has attempted to evaluate these in that context. [7,131-133] However, although these training methods have been adopted for teaching MI skills to on-call pharmacists, who may not be rotating into the service, these have not been evaluated in that context. Therefore it is not known whether these methods are the most appropriate for delivering training to on-call pharmacists for handing medicines advice calls.

The skillset required for on-call pharmacists to work efficiently and safely has not been established. However, according to Chief Pharmacists the training content provided by hospital pharmacy departments to on-call pharmacists primarily consisted of operational issues whereas non-operational training to support the handling of MI enquiries out of hours such as questioning skills, mock on-call scenarios, critical evaluation/interpretation of information/data and communication skills were less likely to be included. On-call pharmacists confirmed during interviews that training was limited to operational issues and examples given included how to use the laptop, the information sources available and their associated passwords. This research did not seek to understand why training related to operational issues was more likely to be delivered but it is possible that operational issues are perceived by senior pharmacy managers as being essential for providing an on-call pharmacy service, whereas non-operational training may be viewed as something that is acquired during a rotation in the MI centre and/or developed through experiential learning. This training may indeed be developed whilst newly qualified (Band 6) pharmacists undertake rotations into MI however, not all Trusts may be able to operate a rotational pharmacist programme because of the size of the organisation, recruitment difficulties or may not perceive this as a priority. [134] Furthermore, junior pharmacists (Band 7) or more senior pharmacists (Band 8a and above) may have either rotated some time ago, not at all or they may have joined from a different organisation. Therefore there are likely to be differences in knowledge between pharmacists providing the on-call pharmacy service, and this was supported by interviews conducted with pharmacists which confirmed that an individual's knowledge and experience is affected by the training or lack of structured training and/or learning on the job that is received. In turn, the knowledge and experience of the on-call pharmacist affected how medicines advice enquiries were

approached according to interviews, and so this may lead to variation between individual on-call pharmacists, and on-call pharmacy services.

Although Chief Pharmacists stated that both non-MI pharmacy and MI staff were involved in the training of on-call pharmacists, the interviews suggested that there could be a greater role for the latter, although no specific themes were generated. However, within the literature and in practice, there have been developments to improve the structure and content of training specifically for on-call pharmacists to handle medicines advice enquiries. These have included simulation-based training as a way of enhancing the preparedness of pharmacists undertaking on-call, [135] and an e-learning platform (Medicines Learning Portal) developed during the past few years to develop clinical problem-solving skills for pharmacists. [136] In September 2016, a specific module for on-call pharmacists was developed and launched for the Medicines Learning Portal. This included a checklist for pharmacists which describes the duties and role of the on-call pharmacist, seven clinical problem scenarios to complete, and a list of websites that can used. This was written by MI pharmacists with input from a regional group of Chief Pharmacists, the Royal Pharmaceutical Society's Hospital Expert Advisory Group, an on-call pharmacist and this researcher. Although an evaluation of the Medicines Learning Portal has shown it to be popular resource and has had a positive effect on junior pharmacists' learning, [109] its impact on handling of medicines advice enquiries by on-call pharmacists is not known.

It appears that whilst some Trusts did give initial training there was little in the way of refresher courses for handling medicines advice calls. This was an unexpected finding given that new information sources become available on a regular basis, or the way in which they can be accessed can change, e.g. book, website, app. This could mean that if on-call pharmacists are not made aware of these changes and/or trained on how to use them they will either be unaware of the resource, unable to use it with confidence or use it inefficiently/incorrectly which may affect the handling of enquiries out of hours. [137] It could be argued that pharmacists may become familiar with such changes as a result of their role during normal working hours. However, it is this researcher's opinion that whilst this may be true for rotational pharmacists (Band 6 and 7), this is less likely for more senior pharmacists as they may spend minimal time in the MI centre. One example of change is the enquiry answering database (MiDatabank) used by MI services to document questions. Over half of Chief Pharmacists in the survey stated their on-call pharmacists were able to access MiDatabank out of hours within the organisation to search for previous enquiries. This access would provide the on-call pharmacist with information about the question previously asked, the sources

searched, information found, and the answer provided by the MI service. This could help reduce duplication of effort or the time needed to respond to a question received out of hours by the on-call pharmacist. In September 2014, UKMi services were given the opportunity to upload and share anonymised enquiries with other participating centres via MiDatabank. [48] Although this is being used in practice by UKMi services, it is not known whether this functionality is being accessed by on-call pharmacists. However, if refresher training is not provided this may mean that on-call pharmacists are unaware of this resource which could further increase the likelihood of finding relevant information. Despite this, issues related to the suitability of MiDatabank for use out of hours as discussed earlier, may still affect its uptake.

6.1 Limitations

This section discusses the limitations of this research and consists of two parts: those associated with the online survey, and then with the semi-structured interviews.

6.1.1 Online Survey

Firstly, the response rate to the online survey was just over 50% and although this was comparable to other published studies involving Chief Pharmacists, [70-74] the data cannot be said to be truly representative; therefore, these findings need to be interpreted with caution. However, the proportion of acute hospital (76.7%) and mental health Trusts (23.3%) that responded were aligned with the national organisational demographic across the NHS in England (75.2% and 24.7%, respectively). Therefore, the data is representative of the Trust types across NHS England.

Secondly, two Trusts had completed the online survey twice and the decision for which response was to be included within the dataset was made by the Chief Pharmacist after they had been contacted by the researcher for clarification. The rationale for their decision was not requested by the researcher although the survey which had been more fully completed was always offered as the preferred response by the Chief Pharmacist. On reflection it would have been preferable for a more robust decision-making process to have been used to determine which response to include within the results. The reasons for which response was included could then be clearly justified. However, it is unlikely that the data from just two Trusts would significantly affect the reliability or validity of the results.

Finally, there were some limitations associated with the survey design. These included the appropriateness of the Chief Pharmacist as a point of contact for each Trust, not

knowing what information they had based their responses on and use of the term 'typical week'. Each of these will now be discussed in more detail. Whilst Chief Pharmacists were contacted as a consistent point of contact across all NHS hospital pharmacy departments in England, they may not have always been the best person to answer all of the questions posed within the online survey. This is because some questions related to the everyday operational, rather than managerial aspects of the service. It should also be noted that Chief Pharmacists may have delegated the completion of the survey to more appropriate staff without the researcher's knowledge. However, it is the researcher's opinion that there was no suitable alternative to the Chief Pharmacist as a single point of contact to be used in each of the Trusts. Attempting to ask different individuals within the pharmacy teams to complete various sections of the online survey would not have been practical and could have potentially led to inconsistency within responses or lower response rates. It is not known what information the Chief Pharmacist used when responding to workload questions about the number of calls or types of healthcare professionals that contacted the on-call pharmacy service, They may have referred to documented data within their department before responding or based it instead on their opinion, although they were provided with this option within the online survey if that was the case. However, because there was very little published information about on-call pharmacy services it was not known what information was documented by hospital pharmacies across England. Therefore the researcher did not specify on what information the Chief Pharmacist should base their response.

Throughout the online survey questions related to workload about medicines supply and advice calls used the term 'typical week' but this was not defined by the researcher. The term 'typical week' was used to define seven days (Monday to Friday) and the word 'typical' referred to the volume and type of work handled. This may have potentially been misinterpreted; a 'typical week' in an organisation as perceived by one Chief Pharmacist may have been different to another hospital.

6.1.2 Semi-structured interviews

The limitations associated with the semi-structured interviews, as part of this research, are now discussed.

Although a reasonable number of interviews were conducted with pharmacists, a relatively smaller number were undertaken with doctors (n=3) and nurses (n=4).

Although none of the interviewees were recruited from mental health Trusts, the vast majority of Trusts that provided on-call pharmacy services were acute hospitals. Therefore, these are more likely to represent the views of pharmacists, doctors and nurses. The first phase of this research concluded that nurses were the most frequent users of on-call pharmacy services, followed by junior doctors. As two of the doctors interviewed were consultants and one a junior doctor, it might be argued that the interviewees were not entirely representative of on-call pharmacy service users. Furthermore, none of the doctors and nurses were recruited via the poster; all expressed an interest to participate via the hospital pharmacy MI service. There is therefore a potential risk of bias from only including doctors and nurses recruited in this manner because they were already aware of the hospital pharmacy MI service and this may have affected some of their responses to the interview questions.

The researcher believes that interviews conducted with on-call pharmacists had reached data saturation as no new ideas or themes were generated. However, because of the recruitment difficulties described above, and challenges arranging interviews at times that were convenient for doctors and nurses within their busy schedules, data saturation may not have been reached for these two groups. However, some of the themes generated from interviews with doctors and nurses also occurred with pharmacists or supported by the existing literature thereby triangulating these findings.

During interviews with on-call pharmacists and some doctors and nurses, the researcher was aware that individuals knew he was also a practising pharmacist. Although doctors and nurses working within the same organisation as the researcher were complimentary about the pharmacy service, the effect of this awareness on their responses to questions in general is unknown.

In response to the first interview question, “What do you think are the medicines information needs of doctors and nurses’ when working out of hours?” the researcher is aware that some pharmacists answered this question in the context of MI services. In some of the interviews this had to be clarified by the researcher and was not something that had arisen as an issue during the pilot interviews. However, when reviewing responses across all pharmacist interview transcripts, similarities were identified and themes generated.

6.2 Implications for Practice

Whilst hospital pharmacy departments continue to develop seven day services, this research has identified a number of considerations about the use and provision of on-call pharmacy services, including medicines advice. These include an awareness and understanding of the on-call pharmacy service by doctors and nurses; access to information and support out of hours for doctors, nurses and on-call pharmacists; documentation of enquiries handled by on-call pharmacists including benchmarking; and, training for on-call pharmacists to handle medicines advice questions. These are now each discussed in more detail.

Firstly, UKMi together with Chief Pharmacist networks could develop material which can be used and adapted locally by all hospital pharmacy departments to improve the awareness and understanding by doctors and nurses of what services hospital pharmacies provide out of hours. This might include how the on-call pharmacy service is accessed, types of services provided, its staffing and workload. The current way that on-call pharmacy services are promoted varies between Trusts, but the perception of doctors and nurses is that it is a source of supply rather than also as a source of medicines advice. In particular, nurses perceive the service to be unapproachable. Therefore, Chief Pharmacists with their MI services should consider how best locally to use this material to promote the service as the current ways used, e.g. Intranet most commonly, do not appear to be conveying this message effectively. Together, they should ensure that the awareness and understanding of the on-call pharmacy service by doctors and nurses locally is improved.

Secondly, there are a number of implications for doctors, nurses and pharmacists working out of hours with regards to information and support. National policy makers could develop clear guidelines on what information on-call pharmacists should be able to access remotely within an EPMA system, in order to provide medicines advice for patient care. In addition, UKMi working with Chief Pharmacist networks could review the existing recommended list of information resources that should be available and accessible to on-call pharmacists to ensure that it reflects the types of enquiries likely to be handled. This should extend to doctors and nurses, so that Chief Pharmacists working with their MI services can consider how it can support local access to electronic MI resources when working out of hours. In particular, this should include a review of the resources available to doctors, nurses and on-call pharmacists about drug administration, and their promotion. Finally, national policy makers should ensure that on-call pharmacists have access to specialist pharmacy colleagues as standardised practice.

Thirdly, there is variation in the way that enquiries handled by on-call pharmacists are documented. UKMi could work with Chief Pharmacist networks to develop guidelines for what information should be documented by all on-call pharmacists when handling medicines advice calls. There is a need for an IT product which can support the documentation of enquiries handled by on-call pharmacists in real time. The expectation of what is documented needs to be realistic and achievable – considering the factors that affect documentation out of hours - but also sufficient to enable benchmarking of workload data. As hospital pharmacy services develop seven day clinical pharmacy services as part of their HPTPs, data about the provision of, and the workload managed by on-call pharmacy services could be monitored and benchmarked nationally. This could be used to monitor the development of extended pharmacy services.

Finally, there are implications for the training of on-call pharmacists to handle medicines advice enquiries. National pharmacy policy makers could consider structured training for all pharmacists before they begin on-call. This training should be repeated on a regular basis to ensure knowledge is kept current. UKMi could develop or build on existing training material to develop MI skills for on-call pharmacists; not all pharmacists maybe able to complete a MI rotation before participating in the on-call rota. However, further research is required to determine the most effective method for delivering this training.

In summary, national standards should be developed which include the following aspects of on-call pharmacy services: provision, information accessibility, documentation and training.

6.3 Considerations for future research

Based on the implications for practice described in the previous section, there are some considerations for future research.

Firstly, this research did not seek to understand why nearly half of mental health Trusts did not provide an on-call pharmacy service. Further research could explore this area, particularly as no interviews were conducted with pharmacists, doctors or nurses from mental health Trusts. This would align with the recent focus on unwarranted variations across mental health (and community health) services. [139]

Differences in the proportion of medicines supply and medicines advice calls were observed between Trusts that operated a resident pharmacy programme and those that did not. Further research could explore the reasons for these differences, which may help inform other recommendations, such as the best way for hospital pharmacies to promote their on-call pharmacy services to ensure that doctors and nurses are aware of what is provided.

There is some very limited published information about the quality of enquiries documented by on-call pharmacists as previously discussed. However, the quality of on-call pharmacy services is an area that could be further explored particularly in relation to medicines advice enquiries in comparison with that provided by clinical pharmacy and MI services during normal working hours, but also between the different Agenda for Change banding of pharmacists. The role of IT to help support documentation of enquiries handled out of hours is also an area for research.

Determining what knowledge and experience is required for on-call pharmacists, and the optimal methods that should be used to deliver this training so they can handle medicines advice questions could be explored further. Whilst there is a role for MI services, it is unclear what this should be.

Further in-depth research is needed to better understand the types of enquiries handled by on-call pharmacy services, triangulated with the information being sought by nurses and doctors out of hours. This links to suggestions for further exploring documentation and IT.

Finally, research which assesses the impact of on-call pharmacy services on patient care/patient outcome should be considered.

CHAPTER 7 CONCLUSION

This research is the first to provide an insight into the national landscape of on-call pharmacy services, particularly exploring the opinions of those involved in providing and those who use the service.

The documentation of medicines advice calls by on-call pharmacists varied within and between Trusts, compounded by a lack of policy standardisation nationally, according to a survey of Chief Pharmacists. The factors which affected the documentation of medicines advice questions by on-call pharmacists were identified from interviews with on-call pharmacists and included, amongst others, IT issues. Despite an IT-based recording system used by hospital MI services during normal working hours, questions handled by on-call pharmacists were still documented on paper. This IT system is desktop-based and the use of a laptop, provided by many departments for on-call pharmacists to use, was frequently cited during interviews as an issue for documentation. These issues included the laptop not being charged when handed over by another on-call pharmacist and the setup time it took before it could be used. Therefore an IT product which supports documentation of queries by on-call pharmacists in real time is needed. Variation in the documentation of medicines advice questions handled out of hours makes it difficult to benchmark on-call pharmacy services and identify trends or medicines-related issues experienced by doctors and nurses working out of hours. The latter makes it difficult to identify what support might be provided for these healthcare professionals working out of hours although interviews with doctors and nurses found that drug administration and ‘medication safety check’ were two question types frequently sought.

On-call pharmacy services across England were provided predominantly by less senior staff with limited years’ experience working as a pharmacist. Although MI services were involved in the training of on-call pharmacists, interviews conducted with the latter identified there was a greater role for MI staff in their training to handle medicines advice calls out of hours. The training provided to on-call pharmacists mainly consisted of operational issues whereas non-operational training to support the handling of MI enquiries out of hours was less likely to be included. Additionally, refresher courses were rarely provided. This may lead to differences in the knowledge between pharmacists and therefore the way in which enquiries are handled, a finding supported by this research. National pharmacy policy makers could consider structured training, repeated on a regular basis, for all pharmacists before they begin on-call although further research is needed to determine the most effective method for delivering this training.

Although Chief Pharmacists stated that their on-call pharmacy services are generally well advertised, doctors and nurses interviewed in this research continued to be unaware of its provision, workload handled and how to access. This maybe compounded by the variation between individual on-call pharmacists and between different hospital pharmacy departments, affected by the lack of national standardisation for documentation and training. Nurses also raised concerns during interviews about the unapproachability of the on-call pharmacist. All of these factors, in the researcher's opinion, may have also led to on-call pharmacy services handling less medicines advice calls compared to medicines supply.

This research has also determined that there is a difference in access to information for pharmacists out of hours compared to during normal working hours. Chief Pharmacists surveyed perceived that on-call pharmacists had good access to information resources. However, when interviewed, on-call pharmacists cited access to information resources as a potential barrier and this was linked to IT issues including Internet access. In addition, pharmacists perceived that access to drug and clinical information out of hours, particularly the patient and patient information, was not as good as during normal working hours. One implication of this was that there was a reliance by the on-call pharmacist on the nurse or doctor to provide information. This sometimes led to concerns by the pharmacist about whether they were being provided with all relevant information related to the question being asked by the doctor or nurse.

In summary, this research has significantly contributed to the limited published information about on-call pharmacy services. This is the first time a mixed methods approach has been used to explore the views of pharmacists involved in the provision of on-call pharmacy services, and of doctors and nurses who most frequently use the service. The combination of quantitative and qualitative methods has enabled a richness of data not seen before in this area. There is a clear role here for MI services to show leadership and greater involvement supporting medicines advice provision by on-call pharmacy services. In particular, the need for national standards for on-call pharmacy services.

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APPENDIX 1 Search strategy for MI provision (last updated December 2018)

Theme	Bibliographic database	Search terms	Hits	Subject to abstract review	Rejected	Relevant	Duplicates	Included
MI services	Scopus	"drug information service" AND hospital [Limited to English Language, articles, reviews, conference papers, short surveys and erratums]	1947	31	18	13	27	23
	Scopus	("drug information" OR" medicines information") AND "service" AND NOT "patient" [Limited to English Language, 2000 – date]	1035	5	2	3		
	Embase	(exp *DRUG INFORMATION/ OR exp *MEDICAL INFORMATION/) AND exp *HOSPITAL PHARMACY/	150	21	6	15		
	Embase	exp *HEALTH CARE PERSONNEL/ AND exp HOSPITAL/ AND exp *MEDICAL INFORMATION	50	4	4	0		
	Embase	(exp * INFORMATION SERVICE/ OR exp INFORMATION CENTER/) AND exp *DRUG INFORMATION/ AND [Limited to English Language, Human]	105	21	12	9		
	Medline	exp *DRUG INFORMATION SERVICES/ AND exp *PHARMACY SERVICE, HOSPITAL	335	2	1	1		
	Medline	exp *DRUG INFORMATION SERVICES/ NOT exp ADVERSE DRUG REACTION REPORTING SYSTEMS/ [Limited to English, Human]	1864	9	5	3		
	Medline	(Drug information.af OR medicines information.af) AND exp *DRUG INFORMATION SERVICES/ Limited to English Language, Human and 2000 to current]	620	16	6	10		

af = all fields

APPENDIX 2 Search strategy for on-call pharmacy services (last updated December 2018)

Theme	Bibliographic database	Search terms	Hits	Subject to abstract review	Rejected	Relevant	Duplicates	Included
On-call pharmacy services	Scopus	(((ALL (medicines information)) OR (ALL (drug information)) OR (ALL (advice))) AND ((ALL (on call)) OR (ALL (on-call)) OR (ALL (emergency)))) AND (ALL (pharmacist))	113	103	102	1	0	14
	Scopus	(ALL (healthcare)) AND (((ALL (medicines information)) OR (ALL (drug information)) OR (ALL (advice))) AND ((ALL (on call)) OR (ALL (on-call)) OR (ALL (emergency))))	883	11	10	1	1	
	Embase	PHARMACIST/ AND EMERGENCY HEALTH SERVICE/ AND exp DRUG INFORMATION/	9	11	3	0	0	
	Embase	PHARMACIST/ AND (out AND of AND hours).af	55	15	11	3	0	
	Embase	PHARMACIST/ AND (on AND call).af	85	18	4	14	8	
	Embase	(PHARMACIST/ AND EMERGENCY HEALTH SERVICE/) AND exp DRUG INFORMATION/	9	9	9	0	0	
	Medline	(exp *"PHARMACISTS"/ AND exp AFTER-HOURS CARE/)	1	1	1	1	1	

af = all fields

Theme	Bibliographic database	Search terms	Hits	Subject to abstract review	Rejected	Relevant	Duplicates	Included
On-call pharmacy services	Medline	(exp *"PHARMACISTS"/ AND exp "NIGHT CARE"/)	1	1	1	0	0	
	Medline	(exp *"PHARMACISTS"/ AND (out of hours).af)	20	20	20	0	0	
	Medline	"**exp *PHARMACISTS/ AND (on call).af**"	83	1	0	1	1	
	Medline	exp PHARMACISTS/ AND exp EMERGENCY MEDICAL SERVICES/	239	1	0	1	1	
	Medline	exp DRUG INFORMATION SERVICES AND (on call).af	48	2	2	0	0	
	UKMi PDS	All poster presentations listed within conference proceedings available electronically from 2005 http://www.ukmi.nhs.uk/activities/manpowerTraining/default.asp?pageRef=14	291	8	2	4	0	
	NeLM*	pharm* emerg* duty hospital	1	1	0	1	1	
	NeLM*	pharm* duty hospital	1	1	1	0	0	
	NeLM*	pharm* call hospital	4	3	1	3	3	
	NeLM*	pharm* out hour*	2	2	2	0	0	
	NeLM*	pharm* on call	2	2	1	1	1	

** Website no longer exists and was last searched in 2010; af = all fields.*

One additional source of evidence was identified via personal communication, in addition to the 14 hits for 'on-call pharmacy services'.

APPENDIX 3 Online survey question development

No.	Question	Answer Options	Linked objective	Justification	Notes
A	**Please enter your unique code**	Contained in the email I send to the Chief Pharmacist	N/A	Each respondent will be assigned a unique code that the respondent enters at the beginning. This key would be kept by researcher securely and separate to the study.	
1	What type of Trust do you work for?	Acute hospital trust, mental health trust (only one option)	1	Enable separation of data for acute hospital and mental health trusts.	GO to 2
2	How many beds are in your Trust?	Free text box	1	Provides data about size of hospital. If local population data needed, this can be obtained from Trust websites. Delivery of service may be linked with size of Trust/local population.	GO to 3
3	Does your department provide an on-call pharmacy service to secondary care healthcare professionals?	Yes, No	1	Pivotal to the survey	Yes GO to 5, No GO to 4
4	If response to Question 3 is NO: Please explain why your department does not provide an on-call pharmacy service to secondary care healthcare professionals.	Free text	1	Pivotal to the survey	GO TO 44
5	Please indicate the number of pharmacists in each of the Agenda for Change banding that provide your on-call pharmacy service (you can tick more than one option)	List of bands: 6, 7, 8A, 8B, 8C, 8D, 9 with a tick box next to each banding	1	Identify the different experiences of staff providing this service	GO to 6
6	What route(s) are available to secondary care healthcare professionals for them to contact your on-call pharmacists? (You can select more than one option)	Landline, mobile phone (calls), mobile phone (text), email, bleep/radio-pager, other (please specify)	1, 2, 5	Contributes to understanding of accessibility by HCPs who may use or not use the service and their perceptions	Go to 7

No.	Question	Answer Options	Linked objective	Justification	Notes
7	Do you advertise your on-call pharmacy service to secondary care healthcare professionals?	Yes, No (only one option)	1	Contributes to awareness of HCPs who may use or not use the service and their perceptions	Yes GO to 8, No GO to 10
8	If response is YES to Question 7: How is your on-call pharmacy service advertised/promoted to secondary care healthcare professionals? (You can select more than one option)	Via the: Internet, intranet, sticker on BNF, notices on wards/clinical areas, other (please specify) (can choose more than one option)	1, 6	Feeds into objective Identify the perceptions of secondary care healthcare professionals about the current provision of medicines advice by pharmacy out of hours services.	GO to 9
9	What aspects of the on-call pharmacy service do you advertise to secondary care healthcare professionals? (You can select more than one option)	Contact name(s) of on-call pharmacists, contact telephone number(s) for on-call pharmacists, services provided by on-call pharmacy service, other (please specify)	1, 6	Feeds into objective Identify the perceptions of secondary care healthcare professionals about the current provision of medicines advice by pharmacy out of hours services.	GO to 10
10	When not in the pharmacy department, where are your on-call pharmacists typically located?	Home, hospital residency (only one option)	1	The number/type of enquiries may differ depending on whether on-call pharmacists are on site/offsite (i.e. accessibility) and also level of documentation may be dependent on this.	GO TO 11
11	What service(s) are provided by your on-call pharmacists?	(A) Supply of medicines, e.g. in-patients, discharge; (B) Medicines Information advice, © Both (only one option)	1	Pivotal to the survey	A = GO TO 12 B = GO TO 13 C = GO TO 13
12	As a department, do you record the total number of calls received by on-call pharmacists for the supply of medicines?	Yes, No (choose one option)	1	Need to ask this before I can then ask questions about recording/numbers of calls involving advice. This will help identify the proportion of calls which involve advice.	Yes = GO to 14, No = GO to 16

No.	Question	Answer Options	Linked objective	Justification	Notes
13	As a department, do you record the total number of calls received by on-call pharmacists for the supply of medicines?	Yes, No (choose one option)	1	Need to ask this before I can then ask questions about recording/numbers of calls involving advice. This will help identify the proportion of calls which involve advice.	Yes = GO to 15, No = GO to 17
14	How many calls about the supply of medicines, e.g. in-patient supply, discharge supply, are received during a typical week by the on-call pharmacy service?	< 10, 11 - 20, 21 - 30, 31 - 40, 41 - 50, > 50	1	Need to ask this before I can then ask questions about recording/numbers of calls involving advice. This will help identify the proportion of calls which involve advice.	GO TO 44
15	As a department, how many calls about the supply of medicines, e.g. in-patient supply, discharge supply, are received during a typical week by the on-call pharmacy service?	< 10, 11 - 20, 21 - 30, 31 - 40, 41 - 50, > 50	1	Need to ask this before I can then ask questions about recording/numbers of calls involving advice. This will help identify the proportion of calls which involve advice.	GO to 18
16	As a department, how many calls about the supply of medicines (e.g. in-patient supply, discharge supply), in your opinion, are received during a typical week by the on-call pharmacy service?	< 10, 11 - 20, 21 - 30, 31 - 40, 41 - 50, > 50	1	Need to ask this before I can then ask questions about recording/numbers of calls involving advice (although subjective). This will help identify the proportion of calls which involve advice.	GO TO 44
17	As a department, how many calls about the supply of medicines (e.g. in-patient supply, discharge supply), in your opinion, are received during a typical week by the on-call pharmacy service?	< 10, 11 - 20, 21 - 30, 31 - 40, 41 - 50, > 50	1	Need to ask this before I can then ask questions about recording/numbers of calls involving advice (although subjective). This will help identify the proportion of calls which involve advice.	GO to 18
18	As a department, do you keep a record of the total number of calls received by the on-call pharmacy service for medicines information advice?	Yes, No (choose one option)	1, 2	Need to ask this before I can then ask questions about the numbers of calls involving advice.	Yes = GO to 19, NO = GO to 20

No.	Question	Answer Options	Linked objective	Justification	Notes
19	How many calls for medicines information advice are received during a typical week by the on-call pharmacy service?	< 10, 11 - 20, 21 - 30, 31 - 40, 41 - 50, > 50	1, 2	Will help find out the proportion of calls involving advice from the total number of calls. Will also help inform objective 7 and 8 of study later on.	GO to 21
20	In your opinion, how many calls for medicines information advice are received during a typical week by the on-call pharmacy service?	< 10, 11 - 20, 21 - 30, 31 - 40, 41 - 50, > 50	1, 2	Will help find out the proportion of calls involving advice from the total number of calls (although subjective). Will also help inform objective 7 and 8 of study later on.	GO to 21
21	Do you record the different types of secondary healthcare professionals that contact your on-call pharmacy service for medicines information advice?	Yes, No (choose one option)	1, 2, 5	Need to ask this before I can then ask the next question (i.e. based on data or opinion)	Yes = GO to 22, No = GO to 23
22	Please rank the following secondary care healthcare professionals in order of the frequency in which they use your on-call pharmacy service	Senior hospital doctors, e.g. consultant, registrar; Junior hospital doctors, e.g. FY1, FY2; Hospital nurses/midwifes; Allied healthcare professionals, e.g. dieticians; Other (please specify) (can choose more than one option)	5	Based on available data, this will provide information about which secondary care healthcare professionals use their service for advice. This can be validated by methods used later on in the study (objective 7 and 8 of study).	GO to 24
23	In your opinion, please rank the following secondary care healthcare professionals in order of the frequency in which they use your on-call pharmacy service	Senior hospital doctors, e.g. consultant, registrar; Junior hospital doctors, e.g. FY1, FY2; Hospital nurses/midwifes; Allied healthcare professionals, e.g. dieticians; Other (please specify) (can choose more than one option)	5	Subjective but gives an idea of who the chief pharmacists think use their service for advice. This can be validated by methods used later on in the study (objective 7 and 8 of study).	GO to 24

No.	Question	Answer Options	Linked objective	Justification	Notes
24	Which of the following statements apply to your on-call pharmacy service:	(A) A medicines information pharmacist is available for SUPPORT to on-call pharmacists when dealing with questions from secondary healthcare professionals for medicines information advice, (B) A on-call medicines information pharmacist ANSWERS ALL calls for medicines information advice from secondary care healthcare professionals; information advice, (C) A on-call medicines information pharmacist ANSWERS CERTAIN calls for medicines information advice from secondary care healthcare professionals; (D) A medicines information pharmacist is NOT available outside of normal working hours.	1,2	Would like to find out if a MI pharmacist is available for support to on-call pharmacists OR whether some hospitals use the MI pharmacist to answer ALL or CERTAIN medicines information advice questions	A, B or D = GO TO 26, C = GO TO 25
25	Please can you describe the types of calls for medicines information advice that your on-call medicines information pharmacist answers.	Free text	1, 2	If a MI pharmacist answers CERTAIN medicines information advice questions out of hours, it would be useful to find out what "certain" means.	GO TO 26
26	Do you have a standard Trust policy for the documentation of advice provided out of hours?	Yes, No (only one option)	2	Will provide some idea at this stage of the way in which enquiries for advice OOH are handled and therefore help to inform objective 8 of the project.	YES = GO to 27, NO = GO to 28
27	Please list the information that the hospital policy states should be documented by on-call pharmacists when they handle calls for medicines information:	Free text	2		GO TO 29

No.	Question	Answer Options	Linked objective	Justification	Notes
28	In your opinion, what information do you think should be documented by on-call pharmacists when they provide advice out of hours to secondary care healthcare professionals?	Time of call, Enquirer's name, Enquirer's job role, Enquirer's contact details, Enquirer's question, Resources searched by the on-call pharmacist, Information found in the resources by the on-call pharmacist, Medicines information advice provided by the on-call pharmacist, Other (please specify) (can choose more than one option)	2	Will provide some idea of what chief pharmacists think should be documented by on-call pharmacists when they provide MI advice out of hours. This will help later stages of the study.	GO to 29
29	Which of the following statements apply to your on-call pharmacy service:	(A) Medicines information advice is documented by on-call pharmacists ALL the time; (B) Medicines information advice is documented by on-call pharmacists SOME of the time; (C) Medicines information advice is NEVER documented by on-call pharmacists.	2	Documentation of advice important to find out as this will also help inform other objectives of the study later on.	A = GO to 30, B = GO to 30, C = GO to 31
30	How is the medicines information advice provided by your on-call pharmacists to secondary healthcare professionals currently documented?	(A) A paper-based form, (B) MI department electronic enquiry answering database, (C) Non-MI department electronic-based form/database	2	Documentation of advice important to find out as this will also help inform other objectives of the study later on.	GO TO 32
31	Do your on-call pharmacists receive training specifically to handle questions for medicines information advice?	Yes, No, Don't know (choose one option)	1		YES = GO to 32, NO = 33
32	What type(s) of training is provided to on-call pharmacists specifically to help them provide medicines information advice out of hours?	No specific training should be provided to that received as part of the pharmacist's normal role, Communication skills, Use of MI Resources/Databases, Critical evaluation/interpretation of information/data, Use of I.T., Documentation of enquiries, Use of MiDatabank, questioning skills training, Mock 'on-call' scenarios, Other (please specify) (can choose more than one option)	1	If different grades/experience of staff are involved in the provision of advice OOH, this will help provide information about the training they receive	GO to 34

No.	Question	Answer Options	Linked objective	Justification	Notes
33	In your opinion, what type(s) of training should be provided to on-call pharmacists specifically to help them provide medicines information advice out of hours?	No specific training should be provided to that received as part of the pharmacist's normal role, Communication skills, Use of MI Resources/Databases, Critical evaluation/interpretation of information/data, Use of I.T., Documentation of enquiries, Use of MiDatabank, questioning skills training, Mock 'on-call' scenarios, Other (please specify) (can choose more than one option)	1	If different grades/experience of staff are involved in the provision of advice OOH, this will help provide information about the training they receive	GO to 38
34	Who delivers this training to on-call pharmacists?	MI department, Other pharmacy staff, Non-Pharmacy staff, Non-Trust staff	1	Useful to find out if MI are directly involved in the training of pharmacists providing advice OOH	GO to 35
35	How is this training delivered to on-call pharmacists?	1:1 training session, group training session, e-training	1	Useful to compare how different pharmacies deliver this training	GO to 36
36	At what stage is this training delivered to on-call pharmacists?	On induction of normal working hours role, on induction of joining the on-call rota, don't know	1	Some hospitals may give just one-off training and then no further training, MI is changing all the time. Should be updated regularly.	GO to 37
37	How often is this training for on-call pharmacists repeated?	Every 12 months, every 6 months, every 3 months, Not at all	1	Some hospitals may give just one-off training and then no further training, MI is changing all the time. Should be updated regularly.	GO to 38
38	Do your on-call pharmacists have access to information resources when dealing with questions for medicines information advice?	Yes, No (only one option)	1, 2	A standard list of resources that on-call pharmacists should have access to has been published by UKMi. This is to try and standardise access to information sources.	Yes = GO to 39, No = 40
39	Have these information resources been reviewed against the recommended list for out of hours access provided on the UKMi website?	Yes, No, Don't know (choose one option)	1, 2		GO to 40

No.	Question	Answer Options	Linked objective	Justification	Notes
40	Can your on-call pharmacists access MiDatabank (or MI enquiry answering database) remotely, i.e. outside of the pharmacy department?	Yes, No (only one option)	1, 2	MiDatabank is a useful resource during normal working hours. I believe it can also be useful OOH.	YES = 41, NO = GO TO 42
41	If response is YES: Can your on-call pharmacists access MiDatabank (or MI enquiry answering database) remotely, i.e. outside of the pharmacy department?	Yes, No (only one option)	1, 2	MiDatabank is a useful resource during normal working hours. Some centres can access remotely.	GO TO 42
42	Would you like me to send you the results of this service evaluation?	Yes, No	N/A	My hospital R&D Office suggested that I should offer this as an incentive for them answering the questionnaire. From the KEY I can work out which email address to send this to.	GO TO 42
43	In the future, I would like to interview on-call pharmacists and secondary care healthcare professionals from various different hospitals. Would be happy for me to contact you about this in due course?	Yes, No	N/A	From the KEY I can work out which chief pharmacist I can contact	GO TO END
END	**END**	**END**	**END**	**END**	**END**

APPENDIX 4 On-call pharmacist interview schedule development

On-call Pharmacist Interview question	Research objective
What do you think are the medicines information needs of doctors and nurses' when working out of hours? How does this differ to normal working hours?	2,3,4
How do you go about answering questions for medicines advice when working out of hours? How does this compare to the same question being asked during normal working hours? What barriers (if any) do you face?	2,3,7
What do you think about the way in which calls for medicines advice are handled out of hours by the pharmacy service? How does this compare to normal working hours?	2,3,6
Is there anything that you would change about the way pharmacy department provides medicines advice out of hours? What impact do you think 7 day working will have on the on-call pharmacy service?	6
What do you document when you handle calls for medicines advice out of hours? How would this compare to normal working hours	7
What affects what you document? Does this differ to normal working hours?	7
If you did document medicines advice, what would affect what you use to document, e.g. paper- or electronic-based form.	7

APPENDIX 5 Doctor and nurse interview schedule development

Doctor/Nurse Interview question	Research objective
1. What are the types of information or advice about medicines that you need to find when working out of hours? (If the interviewee replies 'don't know' or struggles to answer this question, I would prompt with, **Doctor:** For example, have you ever needed some information/advice when you've been asked to prescribe a medicine for a patient? **Nurse:** For example, have you ever needed some information/advice when you have had to administer a medicine that a doctor has prescribed for a patient?	2,4
2. How does this compare to normal working hours?	2,4
3. How do you access information on medicines when working out of hours?	5
3a. What sources would you typically use to find information on medicines out of hours?	2,5
3b. What barriers (if any) do you face when trying to access information on medicines out of hours?	2,5
4. How does this (question 3, 3a and 3b) compare during normal working hours?	2,5
5. Tell me what support does the pharmacy department provide you with during out of hours when you have questions related to medicines? a. Is there anything that you would change? b. How does this compare to normal working hrs?	6
6. Do you have anything else you would like to tell me?	None

APPENDIX 6 University ethics approval (Online survey)

The extract below has been taken from the University of Wolverhampton Behavioural Sciences Ethics Committee meeting minutes at which this research proposal was considered:

SCHOOL OF APPLIED SCIENCES

Behavioural Sciences Ethics Committee (BSEC)

Minutes of the Behavioural Sciences Ethics Committee Meeting

Wednesday 25th July 2012 at 2pm in MC124

Present: Dr J Chen-Wilson, Prof K Manktelow (Chair), Dr N Morris, Dr P Rutter & Mrs J Williams (BSEC Administrator)

1. Apologies: Dr C Brown, Dr D Chadwick and Dr W Nicholls

4.4 Mr M Cheeseman (Dr P Rutter)

RES20A, "*How can UK Medicines Information (UKM) better support healthcare professionals providing a 24/7 NHS service in England?"*

1. Appendix A, On-Line Survey (1) Q12 – This is rather vague, and could be better worded. Does it relate to the out of hours service? The investigator is advised to use "provide name and the services you offer" or a similar description; and (2) Q13 – Again, this could be better phrased. Suggest "where are your pharmacists based?" or similar.

Supervisor to monitor

APPENDIX 7 Email invitation to participate in the online survey pilot

Dear [insert individual's name],

I am carrying out a study as part of my PhD research project at the University of Wolverhampton. This study is being supervised by Professor Paul Rutter and Professor Ray Fitzpatrick.

The objectives of this first phase are to identify the way in which hospital pharmacies in NHS England provide out of hours services and how calls for medicines advice are handled during this time.

As discussed, I am inviting you to pilot an online survey that Chief Pharmacists will be asked to complete. It should take participants no more than 10 minutes to complete.

If you are willing to participate in this pilot, I would be grateful if you could try completing the survey more than once, selecting different answers to questions so that I may find out:

- Did you understand the information sheet/consent form attached to this email?
- Did you understand the consent form at the start of the survey?
- Did the survey work for you? i.e. technical functionality
- Did you understand the questions asked within the survey?

If your answer is 'no' to any of the above questions, please email me directly with your reasons.

The information you provide will only be identifiable by the investigator and my supervisors. No data you provide will be identifiable in any reports or publications. No data that you input into the survey will be used as part of the final dataset.

You will be asked at the beginning of the survey to enter your Unique Identifier Number (UIN) which is [insert a UIN for the pilot, e.g. P100].

The survey can be found at https://www.surveymonkey.com/s/QGYVB5X. I would be extremely grateful if you did not share or discuss the contents of this survey with anyone else at this stage.

Finally, I would be grateful if you could complete this by 29th August 2012.

If you require any further information, please do not hesitate to contact me.

APPENDIX 8 Information sheet for online survey

How can UK Medicines Information (UKMI) better support healthcare professionals providing a 24/7 NHS service in England?

Dear [insert Chief Pharmacist's name]

I would like to invite you to take part in a study which I am carrying out as part of my PhD research project at the University of Wolverhampton. This study is being supervised by Professor Paul Rutter and Professor Ray Fitzpatrick.

The objectives of this first phase are to identify the way in which hospital pharmacies in NHS England provide out of hours services and how calls for medicines advice are handled during this time.

Participating in this study will involve you completing an online survey which should take no more than 10 minutes to complete.

The information you provide will only be identifiable by me, the investigator, and my supervisors. No data you provide will be identifiable in any reports or publications. The information sheet provided at the beginning of the online survey gives more details about the study.

You will be asked at the beginning of the survey to enter your Unique Identifier Number (UIN) which is [insert UIN for the Chief Pharmacist].

If you would like me to email you a copy of the results, please indicate this when asked at the end of this survey.

The survey can be found at [insert hyperlink to survey] or you can copy this link and paste into your web browser. You will be asked to read an information sheet and give your consent before participating in this study.

If you require any further information, please do not hesitate to contact either myself or my supervisors via email or telephone. Contact details are also provided in the information sheet.

Many thanks for your time.

Yours sincerely,

APPENDIX 9 Online survey pilot

STUDY INFORMATION AND CONSENT

REASONS FOR CONDUCTING THE STUDY

I am carrying out this service evaluation as part of my PhD research project at the University of Wolverhampton. The aims are to find out how hospital pharmacies in NHS England provide out of hours services and how calls from secondary care health professionals for medicines information advice are handled during this time.

WHY HAVE I BEEN CHOSEN?

I am seeking the opinions of acute hospital and mental health trust chief pharmacists in NHS England.

DO I HAVE TO BE INVOLVED?

No – it is your decision whether you want to be involved in the study. Before completing the survey you will be asked to answer questions on consent (below). Even after agreeing to complete the survey you can choose to omit any question. You can also end your participation in the survey at any time without giving a reason.

BENEFITS OF TAKING PART OR BENEFITS OF THE STUDY

There are no intended personal benefits. The information obtained will however, help to contribute to understanding how UK medicines information (UKMi) services can better support healthcare professionals providing a 24/7 NHS service in England.

WHAT WILL HAPPEN IF I DECIDE TO TAKE PART?

If you decide to take part you will be asked to complete the survey, which should take no more than 10 minutes.

WHAT WILL HAPPEN IF I DECIDE NOT TO TAKE PART?

I would like to thank you for taking the time to read this information. Please could you complete the tick box within the consent section (below) indicating that you do not want to participate.

WHAT WILL HAPPEN TO THE COMMENTS I PROVIDE AND CONFIDENTIALITY?

The data submitted will be confidential. Data will be held on the 'SurveyMonkey' server with access by the investigator. Data may be additionally analysed using other commercially available software. Any data transferred onto other software will be password protected and only accessed by the investigator. All electronic data will be destroyed after the study has been completed. Information provided may be used in reports, although these will be anonymous.

RESULTS OF THE STUDY

The results will be included in a final thesis submitted as part of the investigator's PhD to the University of Wolverhampton. The results may be made available for a peer reviewed journal or conference. No individual results will be made available.

WHAT SHOULD I DO NOW IF I WANT TO TAKE PART?

If you would like to take part in the study, please complete the section on consent below and begin the survey.

CONTACT FOR FURTHER INFORMATION

If you have any questions about this study before deciding to take part, please contact the investigator Mark Cheeseman, either by telephone (01473 704431) or email mark.cheeseman@wlv.ac.uk

1. Consent to Participate

◯ I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and I confirm I have read and understood the information sheet. By ticking this box I am agreeing to take part in this research and understand that my comments will be used in this research anonymously.

◯ I do not wish to participate in this study.

2. Please enter your unique code (see email containing link to this survey)

3. What type of organisation do you work for?

◯ Acute Hospital Trust

◯ Mental Health Trust

4. How many beds are in your Trust?

5. Does your department provide an on-call pharmacy service to secondary care health professionals?

◯ Yes

◯ No

6. Please explain why your department does not provide an on-call pharmacy service to secondary care health professionals.

7. Thank you for taking the time to complete this survey.

Would you like me to send you the results of this service evaluation?

◯ Yes

◯ No

8. Please indicate which pharmacists according to Agenda for Change banding provide your on-call pharmacy service (You can select more than one option):

☐ Band 6

☐ Band 7

☐ Band 8a

☐ Band 8b

☐ Band 8c

☐ Band 8d

☐ Band 9

9. What route(s) are available to healthcare professionals for them to contact your on-call pharmacists? (You can select more than one option)

- [ ] Phone - Landline
- [ ] Phone - Mobile
- [ ] Text - Mobile
- [ ] Email
- [ ] Bleep/radio-pager
- [ ] Other (please specify)

10. Do you advertise your on-call pharmacy service to healthcare professionals?

- ◯ Yes
- ◯ No

11. How is your on-call pharmacy service advertised/promoted? (You can select more than one option)

- [ ] Internet
- [ ] Intranet
- [ ] Sticker on hard copies of the BNF circulated throughout the organisation
- [ ] Notices on the wards/clinical areas
- [ ] Other (please specify)

12. What do you advertise? (You can select more than one option)

- [ ] Contact name(s) of the on-call pharmacists
- [ ] Contact telephone number(s) for the on-call pharmacists
- [ ] Services provided by the on-call pharmacy service

Other (please specify)

13. Are your on-call pharmacists based at:

- ◯ Home
- ◯ Hospital residency

14. What service(s) are provided by your on-call pharmacists?

- ◯ Supply of medicines, e.g. in-patient supply, discharge supply
- ◯ Medicines information advice
- ◯ Both

15. As a department, do you record the total number of calls received by on-call pharmacists for the supply of medicines?

- ◯ Yes
- ◯ No

16. As a department, do you record the total number of calls received by on-call pharmacists for the supply of medicines?

- ◯ Yes
- ◯ No

17. How many calls about the supply of medicines, e.g. in-patient supply, discharge supply, are received during a typical week by the on-call pharmacy service?

- ◯ < 10
- ◯ 11 - 20
- ◯ 21 - 30
- ◯ 31 - 40
- ◯ 41 - 50
- ◯ > 50

18. Thank you for taking the time to complete this survey.

Would you like me to send you the results of this service evaluation?

- ◯ Yes
- ◯ No

19. In the future, I would like to interview on-call pharmacists and secondary care health professionals from various different organisations. Would you be happy for me to contact you about this in due course?

- ◯ Yes
- ◯ No

20. How many calls about the supply of medicines, e.g. in-patient supply, discharge supply, are received during a typical week by the on-call pharmacy service?

- ◯ < 10
- ◯ 11 - 20
- ◯ 21 - 30
- ◯ 31 - 40
- ◯ 41 - 50
- ◯ > 50

21. In your opinion, how many calls about the supply of medicines, e.g. in-patient supply, discharge supply, are received during a typical week by the on-call pharmacy service?

- ◯ < 10
- ◯ 11 - 20
- ◯ 21 - 30
- ◯ 31 - 40
- ◯ 41 - 50
- ◯ > 50

22. Thank you for taking the time to complete this survey.

Would you like me to send you the results of this service evaluation?

- ◯ Yes
- ◯ No

23. In the future, I would like to interview on-call pharmacists and secondary care health professionals from various different organisations. Would you be happy for me to contact you about this in due course?

- ◯ Yes
- ◯ No

24. In your opinion, how many calls about the supply of medicines, e.g. in-patient supply, discharge supply, are received during a typical week by the on-call pharmacy service?

- ◯ < 10
- ◯ 11 - 20
- ◯ 21 - 30
- ◯ 31 - 40
- ◯ 41 - 50
- ◯ > 50

25. As a department, do you keep a record of the total number of calls received by the on-call pharmacy service for medicines information advice?

- ◯ Yes
- ◯ No

26. How many calls for medicines information advice are received during a typical week by the on-call pharmacy service?

- ◯ < 10
- ◯ 11 - 20
- ◯ 21 - 30
- ◯ 31 - 40
- ◯ 41 - 50
- ◯ > 50

27. In your opinion, how many calls for medicines information advice are received during a typical week by the on-call pharmacy service?

- ◯ < 10
- ◯ 11 - 20
- ◯ 21 - 30
- ◯ 31 - 40
- ◯ 41 - 50
- ◯ > 50

28. Do you record the types of healthcare professionals that contact your on-call pharmacy service for medicines information advice?

- ◯ Yes
- ◯ No

29. Please state which healthcare professionals use your on-call pharmacy service (rank 1 - 4, with 1 the greatest users and 4 the lowest users):

	1	2	3	4
Senior hospital doctors, e.g. consultant, registrar	◯	◯	◯	◯
Junior hospital doctors, e.g. FY1, FY2	◯	◯	◯	◯
Hospital nurses/midwifes	◯	◯	◯	◯
Allied healthcare professionals, e.g. dieticians	◯	◯	◯	◯

30. In your opinion, please state which healthcare professionals use your on-call pharmacy service (rank 1 - 4, with 1 the greatest users and 4 the lowest users):

	1	2	3	4
Senior hospital doctors, e.g. consultant, registrar	◯	◯	◯	◯
Junior hospital doctors, e.g. FY1, FY2	◯	◯	◯	◯
Hospital nurses/midwifes	◯	◯	◯	◯
Allied healthcare professionals, e.g. dieticians	◯	◯	◯	◯

31. Which of the following statements apply to your on-call pharmacy service:

◯ A medicines information pharmacist is available out of hours to SUPPORT on-call pharmacists when dealing with questions from healthcare professionals for medicines information advice

◯ An on-call medicines information pharmacist ANSWERS ALL calls out of hours for medicines information advice from healthcare professionals

◯ An on-call medicines information pharmacist ANSWERS CERTAIN calls out of hours for medicines information advice from healthcare professionals

◯ A medicines information pharmacist is NOT available outside of normal working hours.

32. Please describe the types of questions the on-call medicines information pharmacist would answer:

33. Do you have a standard Trust policy for the documentation of medicines information advice provided out of hours by pharmacists?

◯ Yes

◯ No

34. What information does the policy state should be documented?

35. In your opinion, what information should be documented by on-call pharmacists when they provide advice out of hours to healthcare professionals? (You can select more than one option)

- [ ] Time of call
- [ ] Enquirer's name
- [ ] Enquirer's job role
- [ ] Enquirer's contact details
- [ ] Enquirer's question
- [ ] Resources searched by the on-call pharmacist
- [ ] Information found in the resources by the on-call pharmacist
- [ ] Medicines information advice provided by the on-call pharmacist

Other (please specify)

36. Which of the following statements apply to your on-call pharmacy service:

- ◯ Medicines information advice is documented by on-call pharmacists ALL the time
- ◯ Medicines information advice is documented by on-call pharmacists SOME of the time
- ◯ Medicines information advice is NEVER documented by on-call pharmacists.

37. How is the medicines information advice provided by your on-call pharmacists currently documented?

- ◯ A paper-based form
- ◯ MI department electronic enquiry answering database
- ◯ Non-MI department electronic-based form/database

38. What training is provided to pharmacists before they begin on-call specifically to help them provide medicines information advice out of hours? (You can select more than one option)

- [ ] No specific training is provided
- [ ] Communication skills
- [ ] Use of MI Resources/Databases
- [ ] Critical evaluation/interpretation of information/data
- [ ] Use of I.T.
- [ ] Documentation of enquiries
- [ ] Use of MiDatabank (MI electronic enquiry answering database)
- [ ] Questioning skills
- [ ] Mock 'on-call' scenarios

Other (please specify)

39. In your opinion, what training should be provided to pharmacists before they begin on-call specifically to help them provide medicines information advice out of hours? (You can select more than one option)

- [ ] No additional training should be provided to that received as part of the pharmacist's 'normal working hours' role
- [ ] Communication skills
- [ ] Use of MI Resources/Databases
- [ ] Critical evaluation/interpretation of information/data
- [ ] Use of I.T.
- [ ] Documentation of enquiries
- [ ] Use of MiDatabank (MI electronic enquiry answering database)
- [ ] Questioning skills
- [ ] Mock 'on-call' scenarios

Other (please specify)

40. Who delivers this training? (You can select more than one option)

- [ ] Medicines information staff
- [ ] Other pharmacy staff
- [ ] Non-pharmacy staff
- [ ] Non-Trust staff

Other (please specify)

41. How is this training delivered? (You can select more than one option)

- [ ] 1:1 training session
- [ ] Group training session
- [ ] E-learning

Other (please specify)

42. How often is 'refresher training' provided? (You can select more than one option)

- ◯ Not at all
- ◯ Every 3 months
- ◯ Every 6 months
- ◯ Every 12 months

Other (please specify)

43. Do your on-call pharmacists have access to information resources when dealing with questions for medicines information advice?

- ◯ Yes
- ◯ No
- ◯ Don't know

44. Have the information resources been reviewed against the recommended list for out of hours access provided on the UKMi website?

- ◯ Yes
- ◯ No
- ◯ Don't know

45. Can your on-call pharmacists access MiDatabank (or MI enquiry answering database) within the organisation out of hours?

- ◯ Yes
- ◯ No

46. Can your on-call pharmacists access MiDatabank (or MI enquiry answering database) outside of the organisation, i.e. remotely, out of hours?

- ◯ Yes
- ◯ No

47. Please use the box below if you have any additional comments that might be relevant to this survey.

48. Thank you for taking the time to complete this survey.

Would you like me to send you the results of this service evaluation?

- ◯ Yes
- ◯ No

49. In the future, I would like to interview on-call pharmacists and secondary care health professionals from various different organisations. Would you be happy for me to contact you about this in due course?

- ◯ Yes
- ◯ No

APPENDIX 10 Comments received about the pilot online survey questions and actions taken

UIN	Comment	Action taken
P100	Q9 has a tick box for 'others' and a text box for comments – if you tick others and do not enter comments you are prompted to do so.	No action needed. If other is ticked, then yes comments are needed.
	Q10, Q21, Q23, Q24 Also have text boxes with 'others' above the box but if no comments are entered you are not prompted to do so. Should Q10, 21, 23 and 24 have a tick box for others?	A tick box for 'others' added to Q10, 21, 23 and 24.
P400	Q17 In the question how many calls in an average week questions would it be better for the user to input a figure into this box.	No amendment required.
	Q18 Please state which healthcare professionals use your on-call pharmacy service (rank 1 - 4, with 1 the greatest users and 4 the lowest users): I wanted to give a value for users who never use the service should there be a zero value. (in some trusts the OOH service for advice may only advertised to doctors therefore only they use it and nobody else)	No further action needed as this is not a forced question.
P700	2nd page - big box to enter my unique code - might make participants think they need to put in something else	Cannot restrict box to 3 numerical characters. Have amended question to "Please enter your unique 3-digit code (see letter/email containing link to this survey)
	Q18 - you ask, 'In your opinion which healthcare professional use the service?' Is it possible that some places may collect this data and so know the answers more accurately?	User has not understood that this option is only for those who do not know this data. No action needed.
	Question 20 - if they have such a policy - would it be helpful for you to see a copy - is it worth asking them to send you one?	No action needed at this stage. Maybe something to ask later on in study.
	Q22 asks how often MI advice given by on call pharmacists is documented - if you say never the next question still asks you how it is documented	Investigated - this routes to the next correct question. I do not know why the piloter experienced this.
	Q23 - is it possible that advice is recorded on paper at the time and then transferred to an electronic system subsequently?	Question amended to find out where the advice is documented at the time of a call
	Q25 - you can pick 'No specific training is provided' and other options for what training is provided. There's no tick box for other - just the box for the detail	Tick box for other amended. Options have to remain.
P800	Q7 Asks about how can you contact on call pharmacist. Possible that you might get the wrong info. For example, you have to go via a landline to get the switchboard operator but after that the operator has various ways of contacting them. what do you want to know??	Amended question to include 'directly or via hospital switchboard/bedsite team'
	Q10 Is there any merit in splitting this question to reflect if the on-call service provides inpatient supply and outpatient supply or in patient only??	Beyond the scope of this research. No further action needed.

UIN	Comment	Action taken
P800	Q18 When you rank users on a scale of 1 -4 you are able to not rank a group and proceed. by default, does this mean the group does not use the service?? chance that person completing the survey will make an accidental omission.	No further action needed.
	Q25 You can select "no specific training is provided" then proceed to select what training is provided. you could collect inaccurate data here?	Options have to remain like this. No further action needed.
	Q32 Please describe type of question the on call meds info pharmacist would answer would a Chief Pharmacist know this? as it is free text would whoever is completing just give a few examples and move on. could you miss some data capture here??	Limitation of survey. No further action needed.
P900	Q4 How accurate an answer do you need? Could you do this as tick boxes with options in ranges 1-500, 500-1000, 1000+, 3000+	Added a similar scale based on data found from a search of different hospitals via Google
	Q16 I did not realise that I was ranking in order until it would not let me rank two categories as 3. (i.e. survey will only allow you to rank one category with 1 number) Was this intentional? Does this need to be explained for bears of small brain, like myself.	No further action needed.
	Q17 Is a compulsory question. Information summary at beginning of survey states that if you do not want to answer a question you do not have to give one. However, if you try and avoid Q 17 survey demands an answer in red. You may want to make it clear in your information summary that some questions are compulsory.	Information sheet reworded as agreed with supervisor.
	Q19, Q22, Q23 give you the option to answer by typing in a text box headed other. There is no tick box for other. If you type text in the text box and do not tick anything. Survey does not think you have answered the question and for some of these because they are compulsory, it demands an answer in red. Again, this may be intentional and only a problem when coming up against bears of small brain like myself. I think Q7 is formatted correctly with both a tick box for other and a text box for associated comment.	Amended.

APPENDIX 11 General comments received about the pilot online survey and actions taken

UIN	Comment	Action taken
P100	At the end you ask if people will be willing to participate in future interviews, but you do not take any contact details – is this because you will know who replies have come from? Does this mean that the survey is not anonymised? Would people be put off by this?	I have contact details in the KEY if I need to go back to the Trust. Would assume that Chief Pharmacist knows if he/she has delegated responsibility.
P100	I didn't time myself so I'm not sure how long I took to answer the questions. I wonder in a large trust how many Chief Pharmacists would be able to answer these questions (30 seems quite a lot and some are very MI specific) in 10 minutes. For example, would [Chief Pharmacist] know in [hospital] whether we have all the right MI resources as per the UKMI list? Is it possible to part complete the survey and go back to it if you need to find out information?	Achieved.
P100	I don't seem to be able to log back into the survey and do it again – I'll try from home tonight	No action needed - resolved at start of pilot after this initial feedback to allow multiple log-on from same PC.
P500	I tried out your survey a few times, tried lots of combinations! Everything was working fine, the only thing I wanted to mention is that the survey allowed you to leave some of the questions blank and then move onto the next page, I wasn't sure if this was intentional?	Ethics submission required that questions were not forced. No further action needed.
P700	In your covering e-mail to me you refer to Paul Rutter as 'Professor' but in the attached information sheet you have him as 'Dr'.	Amend covering letter.
P700	2nd paragraph on information sheet you have 'objectives.....is' presumably should be 'objectives ....are'	Amend information sheet.
P700	4th paragraph on information sheet - you say information will only be identifiable 'by the investigator and my supervisors' - as you are the investigator and it's your name at the bottom of the sheet couldn't you say 'by myself and my supervisors'?	Amend information sheet.
P700	4th paragraph - you say there's an information sheet at the beginning of the online survey but I thought what I was reading was the information sheet - are there 2 - if so, suggest different terminology to avoid confusion	No further action needed.
P700	Couldn't use link in e-mail below - had to copy and paste into search on new page	Amend letter to say if hyperlink does not open, copy and paste link and insert into web browser.
P700	Survey - not sure about capitals for headings	Cannot change - limitation of online form. No further action needed.
P700	1st page - Reasons for conducting the study - here you describe as aims what you had as objectives in the information sheet	"Aims" changed to "objectives" for consistency.

UIN	Comment	Action taken
P700	1st page - you don't say that the participant can have a copy of the results of the survey although you offer this in the information sheet	This is offered at the end of the survey. No further action needed.
P800	The participant covering email/ postal letter refers to Dr Paul Rutter whereas email refers to Professor Paul Rutter	Amend letter/online survey.
P800	The first page of electronic survey has a title referring to OOH pharmacy services. As this is the start should it be in full i.e. Out Of Hours ??	Title changed.
P800	Does this survey need to go to Chief Pharmacists. would clinical pharmacy service managers or equivalent be able to provide more accurate answers?? Are you expecting Chief Pharmacists to delegate this down?? could this be expressed in the covering letter??	Chief Pharmacists first point of contact. No other way of identifying leads in each acute or mental health trust pharmacy.
P800	Some questions ask if you record number of enquiries etc. the next question is the same if you answer yes or no to the previous question and asks for their "opinion" on numbers. this would be ok if you answered no but if they answered yes they could provide a more accurate answer.	Checked. No further action needed.
P800	On the intro page of the survey all the headings are in block capitals. is that ok?? purely a style thing!!	Limitation of survey. No further action needed.
P800	it was an easy survey to complete and the Survey Monkey format is straightforward and easy to use.	N/A
P900	Overall: very good. Also see comments on information sheet (file P900Informationsheet)	Agreed. Make change to letter as suggested, i.e. move sentence "If you would like me to email you a copy of the results, please indicate this when asked at the end of this survey" to the end of the letter.

APPENDIX 12 Invitation (letter/email) to Chief Pharmacists to participate in the online survey

How can UK Medicines Information (UKMI) better support healthcare professionals providing a 24/7 NHS service in England?

Dear Ms/Mr [insert individual's surname],

I would like to invite you to take part in a study which I am carrying out as part of my PhD research project at the University of Wolverhampton. This study is being supervised by Professor Paul Rutter and Professor Ray Fitzpatrick.

The objectives of this first phase are to identify the way in which hospital pharmacies in NHS England provide out of hours services and how calls for medicines advice are handled during this time.

Participating in this study will involve you completing an online survey which should take no more than 10 minutes to complete.

The information you provide will only be identifiable by me, the investigator, and my supervisors. No data you provide will be identifiable in any reports or publications. The information sheet provided at the beginning of the online survey gives more details about the study.

You will be asked at the beginning of the survey to enter your Unique Identifier Number (UIN) which is XXXX.

The survey can be found at https://www.surveymonkey.com/s/8R7LQLJ or you can copy this link and paste into your web browser. You will be asked to read an information sheet and give your consent before participating in this study.

If you would like me to email you a copy of the results, please indicate this when asked at the end of this survey.

If you require any further information, please do not hesitate to contact either myself or my supervisors via email or telephone. Contact details are also provided in the information sheet.

Many thanks for your time.

APPENDIX 13 Online survey

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

STUDY INFORMATION AND CONSENT

REASONS FOR CONDUCTING THE STUDY

I am carrying out this service evaluation as part of my PhD research project at the University of Wolverhampton. The objectives are to find out how hospital pharmacies in NHS England provide out of hours services and how calls from secondary care health professionals for medicines information advice are handled during this time.

WHY HAVE I BEEN CHOSEN?

I am seeking the opinions of acute hospital and mental health trust chief pharmacists in NHS England.

DO I HAVE TO BE INVOLVED?

No – it is your decision whether you want to be involved in the study. Before completing the survey you will be asked to answer questions on consent (below). Even after agreeing to complete the survey you can end your participation in the survey at any time without giving a reason. There are some questions that require a response in order to take you to the next relevant section of the survey.

BENEFITS OF TAKING PART OR BENEFITS OF THE STUDY

There are no intended personal benefits. The information obtained will however, help to contribute to understanding how UK medicines information (UKMi) services can better support healthcare professionals providing a 24/7 NHS service in England.

WHAT WILL HAPPEN IF I DECIDE TO TAKE PART?

If you decide to take part you will be asked to complete the survey, which should take no more than 10 minutes.

WHAT WILL HAPPEN IF I DECIDE NOT TO TAKE PART?

I would like to thank you for taking the time to read this information. Please could you complete the tick box within the consent section (below) indicating that you do not want to participate.

WHAT WILL HAPPEN TO THE COMMENTS I PROVIDE AND CONFIDENTIALITY?

The data submitted will be confidential. Data will be held on the 'SurveyMonkey' server with access by the investigator. Data may be additionally analysed using other commercially available software. Any data transferred onto other software will be password protected and only accessed by the investigator. All electronic data will be destroyed after the study has been completed. Information provided may be used in reports, although these will be anonymous.

RESULTS OF THE STUDY

The results will be included in a final thesis submitted as part of the investigator's PhD to the University of Wolverhampton. The results may be made available for a peer reviewed journal or conference. No individual results will be made available.

WHAT SHOULD I DO NOW IF I WANT TO TAKE PART?

If you would like to take part in the study, please complete the section on consent below and begin the survey.

CONTACT FOR FURTHER INFORMATION

If you have any questions about this study before deciding to take part, please contact the investigator Mark Cheeseman, either by telephone (07527900143) or email mark.cheeseman@wlv.ac.uk

***1. Consent to Participate**

◯ I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and I confirm I have read and understood the information sheet. By ticking this box I am agreeing to take part in this research and understand that my comments will be used in this research anonymously.

◯ I do not wish to participate in this study.

2. Please enter your unique 3-digit code (located in the letter/email containing the link to this survey)

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

3. What type of organisation do you work for?

☐ Acute Hospital Trust

☐ Mental Health Trust

4. How many beds are in your Trust?

◯ < 300

◯ 300 - 500

◯ 501 - 700

◯ 701 - 900

◯ 901 - 1200

◯ > 1200

***5. Does your department provide an on-call pharmacy service to secondary care health professionals?**

◯ Yes

◯ No

6. Please explain why your department does not provide an on-call pharmacy service to secondary care health professionals.

***7. Thank you for taking the time to complete this survey.**

Would you like me to send you the results of this service evaluation?

◯ Yes

◯ No

8. Please indicate which pharmacists according to Agenda for Change banding provide your on-call pharmacy service (You can select more than one option):

- [ ] Band 6
- [ ] Band 7
- [ ] Band 8a
- [ ] Band 8b
- [ ] Band 8c
- [ ] Band 8d
- [ ] Band 9

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

9. What route(s) are available to healthcare professionals for them to contact your on-call pharmacists directly or via hospital switchboard/bedsite team? (You can select more than one option)

- [ ] Phone - Landline
- [ ] Phone - Mobile
- [ ] Text - Mobile
- [ ] Email
- [ ] Bleep/radio-pager
- [ ] Other (please specify)

***10. Do you advertise your on-call pharmacy service to healthcare professionals?**

- ◯ Yes
- ◯ No

11. How is your on-call pharmacy service promoted? (You can select more than one option)

- [ ] Internet
- [ ] Intranet
- [ ] Sticker on hard copies of the BNF circulated throughout the organisation
- [ ] Notices on the wards/clinical areas
- [ ] Other (please specify)

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

12. Which of the following are advertised? (You can select more than one option)

- [ ] Contact name(s) of the on-call pharmacists
- [ ] Contact telephone number(s) for the on-call pharmacists
- [ ] Services provided by the on-call pharmacy service
- [ ] Other (please specify)

13. Where are your on-call pharmacists based when not in the hospital?

- [ ] Home
- [ ] Hospital residency

***14. What service(s) are provided by your on-call pharmacists?**

- ◯ Supply of medicines, e.g. in-patient supply, discharge supply
- ◯ Medicines information advice
- ◯ Both

***15. As a department, do you record the total number of calls received by on-call pharmacists for the supply of medicines?**

- ◯ Yes
- ◯ No

*16. As a department, do you record the total number of calls received by on-call pharmacists for the supply of medicines?

- ◯ Yes
- ◯ No

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

*17. How many calls about the supply of medicines, e.g. in-patient supply, discharge supply, are received during a typical week by the on-call pharmacy service?

- ◯ < 10
- ◯ 11 - 20
- ◯ 21 - 30
- ◯ 31 - 40
- ◯ 41 - 50
- ◯ > 50

18. Thank you for taking the time to complete this survey.

Would you like me to send you the results of this service evaluation?

- ◯ Yes
- ◯ No

*19. In the future, I would like to interview on-call pharmacists and secondary care health professionals from various different organisations. Would you be happy for me to contact you about this in due course?

- ◯ Yes
- ◯ No

*20. How many calls about the supply of medicines, e.g. in-patient supply, discharge supply, are received during a typical week by the on-call pharmacy service?

- ◯ < 10
- ◯ 11 - 20
- ◯ 21 - 30
- ◯ 31 - 40
- ◯ 41 - 50
- ◯ > 50

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

***21. In your opinion, how many calls about the supply of medicines, e.g. in-patient supply, discharge supply, are received during a typical week by the on-call pharmacy service?**

- ◯ < 10
- ◯ 11 - 20
- ◯ 21 - 30
- ◯ 31 - 40
- ◯ 41 - 50
- ◯ > 50

22. Thank you for taking the time to complete this survey.

Would you like me to send you the results of this service evaluation?

- ◯ Yes
- ◯ No

***23. In the future, I would like to interview on-call pharmacists and secondary care health professionals from various different organisations. Would you be happy for me to contact you about this in due course?**

- ◯ Yes
- ◯ No

***24. In your opinion, how many calls about the supply of medicines, e.g. in-patient supply, discharge supply, are received during a typical week by the on-call pharmacy service?**

- ◯ < 10
- ◯ 11 - 20
- ◯ 21 - 30
- ◯ 31 - 40
- ◯ 41 - 50
- ◯ > 50

***25. As a department, do you keep a record of the total number of calls received by the on-call pharmacy service for medicines information advice?**

- ◯ Yes
- ◯ No

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

***26. How many calls for medicines information advice are received during a typical week by the on-call pharmacy service?**

- ◯ < 10
- ◯ 11 - 20
- ◯ 21 - 30
- ◯ 31 - 40
- ◯ 41 - 50
- ◯ > 50

***27. In your opinion, how many calls for medicines information advice are received during a typical week by the on-call pharmacy service?**

- ◯ < 10
- ◯ 11 - 20
- ◯ 21 - 30
- ◯ 31 - 40
- ◯ 41 - 50
- ◯ > 50

***28. Do you record the types of healthcare professionals that contact your on-call pharmacy service for medicines information advice?**

- ◯ Yes
- ◯ No

***29. Please rank the following healthcare professionals according to how often they use your on-call pharmacy service (rank 1 - 4, with 1 the greatest users and 4 the lowest users):**

	1	2	3	4
Senior hospital doctors, e.g. consultant, registrar	◯	◯	◯	◯
Junior hospital doctors, e.g. FY1, FY2	◯	◯	◯	◯
Hospital nurses/midwifes	◯	◯	◯	◯
Allied healthcare professionals, e.g. dieticians	◯	◯	◯	◯

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

30. In your opinion, please rank the following healthcare professionals according to how often they use your on-call pharmacy service (rank 1 - 4, with 1 the greatest users and 4 the lowest users):

	1	2	3	4
Senior hospital doctors, e.g. consultant, registrar	◯	◯	◯	◯
Junior hospital doctors, e.g. FY1, FY2	◯	◯	◯	◯
Hospital nurses/midwifes	◯	◯	◯	◯
Allied healthcare professionals, e.g. dieticians	◯	◯	◯	◯

***31. Select which of the following statements apply to your on-call pharmacy service:**

◯ A medicines information pharmacist is available out of hours to SUPPORT on-call pharmacists when dealing with questions for medicines information advice from healthcare professionals

◯ An on-call medicines information pharmacist ANSWERS ALL calls out of hours for medicines information advice from healthcare professionals

◯ An on-call medicines information pharmacist ANSWERS CERTAIN calls out of hours for medicines information advice from healthcare professionals

◯ A medicines information pharmacist is NOT available outside of normal working hours.

32. Please give examples of the types of questions the on-call medicines information pharmacist would answer:

***33. Do you have a standard Trust policy for the documentation of medicines information advice provided out of hours by pharmacists?**

◯ Yes

◯ No

34. What information does the policy state should be documented?

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

35. In your opinion, what information should be documented by on-call pharmacists when they provide advice out of hours to healthcare professionals? (You can select more than one option)

- [ ] Time of call
- [ ] Enquirer's name
- [ ] Enquirer's job role
- [ ] Enquirer's contact details
- [ ] Enquirer's question
- [ ] Resources searched
- [ ] Information found in the resources
- [ ] Medicines information advice provided
- [ ] Other (please specify)

***36. Select which of the following statements apply to your on-call pharmacy service:**

- ◯ Medicines information advice is documented by on-call pharmacists ALL the time
- ◯ Medicines information advice is documented by on-call pharmacists SOME of the time
- ◯ Medicines information advice is NEVER documented by on-call pharmacists.

37. At the time of the call, where do your on-call pharmacists document the medicines information advice they have provided?

- ◯ A paper-based form
- ◯ MI department electronic enquiry answering database
- ◯ Non-MI department electronic-based form/database

***38. Do you provide training to pharmacists before they begin on-call specifically to help them provide medicines information advice out of hours?**

- ◯ Yes
- ◯ No

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

***39. What training is provided to pharmacists before they begin on-call specifically to help them provide medicines information advice out of hours? (You can select more than one option)**

- [ ] Communication skills
- [ ] Use of MI Resources/Databases
- [ ] Critical evaluation/interpretation of information/data
- [ ] Use of I.T.
- [ ] Documentation of enquiries
- [ ] Use of MiDatabank (MI electronic enquiry answering database)
- [ ] Questioning skills
- [ ] Mock 'on-call' scenarios
- [ ] Other (please specify)

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

***40. In your opinion, what training should be provided to pharmacists before they begin on-call specifically to help them provide medicines information advice out of hours? (You can select more than one option)**

- [ ] No additional training should be provided to that received as part of the pharmacist's 'normal working hours' role
- [ ] Communication skills
- [ ] Use of MI Resources/Databases
- [ ] Critical evaluation/interpretation of information/data
- [ ] Use of I.T.
- [ ] Documentation of enquiries
- [ ] Use of MiDatabank (MI electronic enquiry answering database)
- [ ] Questioning skills
- [ ] Mock 'on-call' scenarios
- [ ] Other (please specify)

41. Who delivers this training? (You can select more than one option)

- [ ] Medicines information staff
- [ ] Other pharmacy staff
- [ ] Non-pharmacy staff
- [ ] Non-Trust staff
- [ ] Other (please specify)

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

42. How is this training delivered? (You can select more than one option)

- [ ] 1:1 training session
- [ ] Group training session
- [ ] E-learning
- [ ] Other (please specify)

43. How often is 'refresher training' provided?

- ◯ Not at all
- ◯ Every 3 months
- ◯ Every 6 months
- ◯ Every 12 months
- ◯ Other (please specify)

***44. Do your on-call pharmacists have access to information resources when dealing with questions for medicines information advice?**

- ◯ Yes
- ◯ No
- ◯ Don't know

45. Have the information resources been reviewed against the recommended list for out of hours access provided on the UKMi website?

- ◯ Yes
- ◯ No
- ◯ Don't know

Chief Pharmacist Survey (NHS England) - Out of Hours Pharmacy

***46. Can your on-call pharmacists access MiDatabank (or MI enquiry answering database) within the organisation out of hours?**

- ◯ Yes
- ◯ No

***47. Can your on-call pharmacists access MiDatabank (or MI enquiry answering database) outside of the organisation, i.e. remotely, out of hours?**

- ◯ Yes
- ◯ No

48. Please use the box below if you have any additional comments that might be relevant to this survey.

49. Thank you for taking the time to complete this survey.

Would you like me to send you the results of this service evaluation?

- ◯ Yes
- ◯ No

***50. In the future, I would like to interview on-call pharmacists and secondary care health professionals from various different organisations. Would you be happy for me to contact you about this in due course?**

- ◯ Yes
- ◯ No

APPENDIX 14 University ethics approval (semi-structured interviews)

Name: **Mark Cheesman**

'How can UK medicines information (UKMI) better support healthcare professionals providing a 24/7 NHS service in England?'

Date: **11th November 2013**

Decision of School Research Ethics sub-Committee

Code 2. Pass - Approval with minor amendments. Supervisor to monitor proceed with study, following procedures within your local Trust/HA). You are strongly advised to follow the recommendations as follows:

1) Clearly explain the deadline when the participant can withdraw (participant cannot withdraw once data has been analysed but if not being interviewed then can withdraw at any time)
2) University of Wolverhampton logo to be put onto Information Sheet
3) Information Sheet and Consent Form needs to be in standard format

Comment was made that you may want to think about the potential problems noted as they appear to be quite ambitious

Signed *H Paniagua* and *D Chadwick* (Chair of School Research Ethics sub-Committee)

Dear Mark

Re: How can UK medicines information (UKMI) better support healthcare professionals providing a 24/7 NHS service in England? - Submitted to the Faculty of Education, Health and Wellbeing Ethics Sub-Committee Board (Health Professions, Psychology & Social Care)

The Faculty Ethics Sub-Committee (Health Professions, Psychology & Social Care) met on **11th November 2013.** Your project was considered and reviewed at this meeting.

On review your research proposal was passed and given approval **(Code 2 – Pass (Researcher/ Supervisor to Monitor).** You are free to begin your study contingent on addressing any minor amendments detailed below.

Supervisors must ensure the minor amendments have been completed prior to commencement of data collection.

We would like to wish you every success with the project.

Yours sincerely

H Paniagua
Dr. H. Paniagua PhD, MSc, BSc (Hons) Cert. Ed. RN RM
Chair – School Ethics Committee

D Chadwick
Dr. D. Chadwick PhD, MSc, BA (Hons). PGCE
Chair – School Ethics Committee

APPENDIX 15 Email to Chief Pharmacist to pilot on-call pharmacist interview schedule

Dear [name],

Thank you for completing the online survey that I sent you last year which was the first stage of my PhD research project. At the end of that survey you agreed that I could contact you in due course about the next phase.

I am now about to start the next stage of my PhD project with the University of Wolverhampton. The objectives of this next stage are to:

- Identify the perceptions of on-call pharmacists about the medicines advice they provide out of hours.
- Identify the medicines information needs of nurses and doctors when working out of hours.
- Identify how on-call pharmacists, nurses and doctors access information when needing medicines advice out of hours.
- Identify the perceptions of on-call pharmacists, nurses and doctors about the current provision of medicines advice by pharmacy out of hours services.
- Identify what would affect when and what on-call pharmacists document when providing medicines advice out of hours.

I wondered if you would allow me to conduct **pilot** face-to-face semi-structured interviews with your on-call pharmacists.

The information provided by the on-call pharmacists will only be identifiable by myself and my supervisors. No data that they provide including anything about the [hospital] will be identifiable in any reports or publications.

If you would be happy for me to conduct pilot face-to-face semi-structured interviews in your pharmacy department, I would be very grateful if you could email me the names and contact details of your **on-call pharmacists**. I will then contact each one providing them with information about the study. They will be asked if they are interested in participating and if they are, be asked to provide the most appropriate days(s) and time(s) for when they would be available to take part in an interview.

If you would like me to email you a copy of the results once this phase of the study is completed, please let me know.

If you require any further information, please do not hesitate to contact either myself or my supervisors via email or telephone.

Many thanks for your time.

Yours sincerely,

APPENDIX 16 Information sheet for on-call pharmacists

Reasons for conducting the study

I am carrying out this service evaluation as part of my PhD research project at the University of Wolverhampton. The aims are to find out the perceptions of hospital on-call pharmacists', doctors' and nurses' needs, access and provision of medicines advice out of hours.

Why have I been chosen?

I am seeking the opinions of on-call pharmacists.

Do I have to be involved?

No – it is your decision whether you want to be involved in the study. Before agreeing to participate in an interview you will be asked for written consent. Even after agreeing to take part in an interview you can choose to withdraw at any time without giving a reason.

Benefits of taking part of benefits of the study

There are no intended personal benefits. The information obtained will however, help to contribute to understanding how UK medicines information (UKMi) services usually based in hospital pharmacy departments can better support healthcare professionals providing a 24/7 NHS service in England.

If you decide to take part, you will be contacted to participate in an interview which should take no more than one hour to complete. Depending on the number of pharmacists agreeing to take part, it is possible that you will not need to be interviewed.

What will happen if I decide not to take part?

I would like to thank you for taking the time to read this information. No further action is needed on your part.

What will happen to the information I provide and confidentiality?

All contact information and data from interviews will be confidential. Interviews will be digitally recorded and transcripts manually entered onto a qualitative software package (NVivo). This software will be used to analyse data but may be additionally analysed using other commercially available software. All data transferred onto software packages will be password protected and only accessed by the researcher and the supervisory team. Any information that could identify you will be coded or not be entered. Any quotes you give that are used in reports will be anonymised. Recordings of all interviews will be destroyed at the end of the study.

Results of the study

The results will be included in a final thesis submitted as part of the researcher's PhD to the University of Wolverhampton. The results may be made available for a peer reviewed journal or conference. No individual results will be made available.

What should I do now if I want to take part?

If you would like to take part in the study, please email me with the most appropriate day(s) and time(s) of the week that you would be available for an interview within your organisation. You will be asked for written consent before the interview.

Contact for further information

If you have any questions about this study before deciding to take part, please contact the researcher Mark Cheeseman, either by telephone XXXX or email XXXX

APPENDIX 17 Consent form for semi-structured interviews

Title of study:	How can UK Medicines Information (UKMI) better support healthcare professionals providing a 24/7 NHS service in England?
Name of Researcher:	Mark Cheeseman

Thank you for reading the information sheet about this research project. If you would like to take part, please read and sign this form.

Please initial the boxes if you agree with each statement

1.	I have read the information sheet for the above study and have been given a copy to keep. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐
2.	I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.	☐
3.	I agree to my interview being audio recorded and I understand that transcripts of my interview will be anonymised.	☐
4.	I understand that the recording will be digitally stored until the end of the study whereupon it will be destroyed/deleted.	☐
5.	I understand that the information will be kept confidential.	☐
6.	I understand that I will not benefit financially from this study.	☐
7.	I know how to contact the researcher if I need to.	☐
8.	I agree to participate in this study	☐

Participant: Date Signature

name surname

Mark Cheeseman

Researcher taking consent: Date Signature

name surname

One copy to participant and one copy to researcher

APPENDIX 18 Information sheet for doctors

Reasons for conducting the study
I am carrying out this service evaluation as part of my PhD research project at the University of Wolverhampton. The aims are to find out the perceptions of hospital on-call pharmacists', doctors' and nurses' needs, access and provision of medicines advice out of hours.

Why have I been chosen?
I am seeking the opinions of doctors.

Do I have to be involved?
No – it is your decision whether you want to be involved in the study. Before agreeing to participate in the study you will be asked to give written consent. Even after agreeing to take part in the study you can choose to withdraw at any time without giving a reason.

Benefits of taking part of benefits of the study
There are no intended personal benefits. The information obtained will however, help to contribute to understanding how UK medicines information (UKMi) services usually based in hospital pharmacy departments can better support healthcare professionals providing a 24/7 NHS service in England.

If you decide to take part, you will be contacted to participate in an interview which should take no more than one hour to complete (subject to pilot). Depending on the number of doctors agreeing to take part, it is possible that you will not need to be interviewed.

What will happen if I decide not to take part?
I would like to thank you for taking the time to read this information. No further action is needed on your part.

What will happen to the information I provide and confidentiality?
All contact information and data from interviews will be confidential. Interviews will be digitally recorded and transcripts manually entered onto a qualitative software package (NVivo). This software will be used to analyse data but may be additionally analysed using other commercially available software. All data transferred onto software packages will be password protected and only accessed by the researcher and the supervisory team. Any information that could identify you will be coded or not be entered. Any quotes you give that are used in reports will be anonymised. Recordings of all interviews will be destroyed at the end of the study.

Results of the study
The results will be included in a final thesis submitted as part of the researcher's PhD to the University of Wolverhampton. The results may be made available for a peer reviewed journal or conference. No individual results will be made available.

What should I do now if I want to take part?
If you would like to take part in the study, please email me (XXXX) and provide any dates and times which would be suitable for me to conduct the interview with yourself within your organisation.

Contact for further information
If you have any questions about this study before deciding to take part, please contact the researcher Mark Cheeseman, either by telephone XXXX or email XXXX

APPENDIX 19 Reflective diary for interviews

I thought I struck up a good rapport with interviewees before the start of the pilot interviews. Before the interviews started, I spoke to each interviewee without taking any notes about their background, e.g. how long they had worked at the organisation, their role at the Trust, and tried to use positive body language, i.e. arms not folded, smiled. The reason I did not take notes at this moment was to distinguish this initial discussion of putting the interviewees at ease with the actual interview.

During all interviews I tried hard not to interrupt during the interviewee's responses to questions. This seemed to work well during the first pilot pharmacist interview but less so during the second interview. Despite this, the conversation seemed to flow well. Interruption was not such an issue with subsequent interviews conducted with pharmacists, doctors and nurses and I believe this was because my confidence had developed by this point.

During both pilot pharmacist interviews I used my iPad to view the interview schedule. However, because of the length of time between questions asked, the iPad kept turning itself off. This then meant I had to keep entering my password to turn the iPad back on and this led to some delay between questions. I was aware that this caused me to feel a little under pressure (despite trying hard not to show this to the interviewee) and it is not clear what impact this may have had on the interviewee. I therefore decided that for all future interviews with on-call pharmacists, doctors and nurses, I would take a printed copy of the interview schedule to avoid this happening again. This did mean that pauses related to technological issues was not a problem for all other interviews conducted.

Both pilot pharmacist interviewees involved use of an office with windows (blinds were closed) located within the pharmacy department. I did not change the layout of the room and I was sat across a table from the interviewee. I did not notice any unusual body language and I attempted to reflect the body language of all interviewees as much as possible. Subsequent interviews with on-call pharmacists were conducted in an office within their hospital pharmacy department. One of these interviews experienced interruptions because it was an office in which other pharmacy staff had left personal belongings that they needed to collect. Whilst frustrating, this did not appear to be affect the manner in which the interviewee responded to questions. All interviews with doctors except one were conducted in their own offices, which I believe helped to put them at ease. During one of these interviews, there was a doctor's colleague (another doctor) in the room working at their computer. I was conscious of their presence and also that this may have affected the responses given to my

questions. During this interview it did feel as though the consultant wanted to finish the conversation quickly. However, I made sure that I asked all of the questions and maintained the same approach used in other interviews. This required discipline from myself to ensure that I did not mirror this apparent notion of the interview finishing quickly. Another interview with a doctor had to be completed at the rear of the hospital restaurant because no other space had been secured. This was not ideal as it was particularly noisy at times, although this subsided as with continuation of the interview as the staff lunchtime was coming to an end. The interview was conducted in a corner of the restaurant which meant that the interviewee was less likely to be concerned about staff colleagues over-hearing the conversation. Interviews with most nurses were conducted in an office with the hospital pharmacy department and I am aware that this may have influenced their responses. One nurse interview was conducted within an office on the ward that they were working.

I was aware that some interviewees knew me as a pharmacist and may have perceived me as such, rather than as a researcher. Although I tried to ensure that before, during and after the interviews I approached matters as a researcher, e.g. all correspondence included PhD researcher rather than Pharmacist, I am aware that this may have had an influence on interviewee's behaviour.

APPENDIX 20 Letter/email to Chief Pharmacists requesting on-call pharmacist contact details

Dear [name]

I am contacting you because you previously agreed for me to contact you about the next phase of this study which is part of my PhD research project at the University of Wolverhampton. This study is being supervised by Professors Paul Rutter and Ray Fitzpatrick.

The objectives of this second phase are to:

Identify the perceptions of on-call pharmacists about the medicines advice they provide out of hours.

- Identify the medicines information needs of nurses and doctors when working out of hours.
- Identify how on-call pharmacists, nurses and doctors access information when needing medicines advice out of hours.
- Identify the perceptions of on-call pharmacists, nurses and doctors about the current provision of medicines advice by pharmacy out of hours services.
- Identify what would affect when and what on-call pharmacists document when providing medicines advice out of hours.

Participating in this study will involve your **on-call pharmacists** completing a face-to-face semi-structured interview which should take no more than an hour to complete. Depending on the number of pharmacists agreeing to take part, it is possible that not all on-call pharmacists will need to be interviewed.

I will also be contacting your medicines information (MI) pharmacist(s) in due course to recruit nurses and doctors that contact the service. These nurses and doctors will then be contacted by myself for the purpose of conducting a semi-structured interview. This will not create any significant increase in the MI service workload.

The information provided by on-call pharmacists will only be identifiable by myself and my supervisors. No data that they provide including individual hospitals will be identifiable in any reports or publications.

I would be very grateful if you could email me the names and contact details of your **on-call pharmacists**. I will then contact each one providing them with information about the study. They will be asked if they are interested in participating and if they are, be asked to provide the most appropriate days(s) and time(s) for when they would be available to take part in an interview.

If you would like me to email you a copy of the results from this phase of the study, please let me know.

If you require any further information, please do not hesitate to contact either myself or my supervisors via email or telephone.

Many thanks for your time.

APPENDIX 21 Letter/email to on-call pharmacists

Dear [name],

I am contacting you because your Chief Pharmacist [name] has agreed for me to contact you.

I would like to invite you to take part in a study which I am carrying out as part of my PhD research project at the University of Wolverhampton. This study is being supervised by Professors Paul Rutter and Ray Fitzpatrick.

The objectives of this second phase are to:

- Identify the perceptions of on-call pharmacists about the medicines advice they provide out of hours.
- Identify the medicines information needs of nurses and doctors when working out of hours.
- Identify how on-call pharmacists, nurses and doctors access information when needing medicines advice out of hours.
- Identify the perceptions of on-call pharmacists, nurses and doctors about the current provision of medicines advice by pharmacy out of hours services.
- Identify what would affect when and what on-call pharmacists document when providing medicines advice out of hours.

Participating in this study will involve a face-to-face semi-structured interview with myself at your place of work. The interview should take no more than one hour to complete. Depending on the number of pharmacists agreeing to take part, it is possible that you will not need to be interviewed.

The information you provide will only be identifiable by the myself and my supervisors. No data that you provide will be identifiable in any reports or publications.

If you would like to participate in this study, please email me the most appropriate day(s) and time(s) that you would be available. An information sheet is enclosed and gives more details about the study. Before the interview takes place you will be asked to give your consent in taking part in the study.

If you require any further information, please do not hesitate to contact either myself or my supervisors via email or telephone. Contact details are also provided in the information sheet.

Yours sincerely,

APPENDIX 22 Interview schedule for on-call pharmacists

1. What do you think are the medicines information needs of doctors and nurses' when working out of hours?
2. How does this differ to normal working hours?
3. How do you go about answering questions for medicines advice when working out of hours?
4. How does this compare to the same question being asked during normal working hours?
5. What barriers (if any) do you face?
6. What do you think about the way in which calls for medicines advice are handled out of hours by the pharmacy service?
7. How does this compare to normal working hours?
8. Is there anything that you would change about the way pharmacy departments provide medicines advice out of hours?
9. What impact do you think 7 day working will have on on-call pharmacy services?
10. What do you document when you handle calls for medicines advice out of hours?
11. What affects what you document?
12. What affects what you use to document medicines advice calls? I.e. Paper, electronic
13. How would this compare to normal working hours?
14. What are your views on the training that on-call pharmacists receive specifically to help them handle medicines advice calls?
15. Do you have anything else you would like to tell me?

END

APPENDIX 23 Letter to MD/DoN/R&D

How can UK Medicines Information (UKMI) better support healthcare professionals providing a 24/7 NHS service in England?

Dear [name],

I would like to inform you of a study which I am carrying out as part of my PhD research project at the University of Wolverhampton. This study is being supervised by Professors Paul Rutter and Ray Fitzpatrick.

The objectives of this study are to:

- Identify the perceptions of on-call pharmacists about the medicines advice they provide out of hours.
- Identify the medicines information needs of nurses and doctors when working out of hours.
- Identify how on-call pharmacists, nurses and doctors access information when needing medicines advice out of hours.
- Identify the perceptions of on-call pharmacists, nurses and doctors about the current provision of medicines advice by pharmacy out of hours services.
- Identify what would affect when and what on-call pharmacists document when providing medicines advice out of hours.

The participation of doctors and nurses in this study will involve a face-to-face semi-structured interview with myself at their place of work. The interview should take no more than one hour to complete (subject to pilot).

I would be extremely grateful if you could display and/or circulate the enclosed poster within your organisation as you see fit to help me recruit doctors and nurses.

Doctors and nurses may also be asked if they would like to participate in this study if they contact the pharmacy department for medicines advice during normal working hours.

Depending on the number of nurses and doctors agreeing to take part, it is possible that not all of them will need to be interviewed.

The information they provide will only be identifiable by myself and my supervisors. No data that they provide will be identifiable in any reports or publications.

If you require any further information, please do not hesitate to contact either myself or my supervisors via email or telephone. Contact details are also provided in the information sheet.

Yours sincerely,

APPENDIX 24 Recruitment poster

***Are you a doctor or a nurse? ***

Do you work out of hours?

Do you find yourself looking for advice or information about medicines out of hours?

Do you need medicines advice out of hours?

You are invited to participate in a research project.

The aims are to find out the perceptions of hospital doctors' and nurses' needs, access and provision of medicines advice out of hours.

You would be required to participate in **ONE** face-to-face interview within the organisation which will take no more than **ONE** hour to complete (subject to pilot).

If you are interested in receiving more information regarding this study, please contact the researcher XXXX

APPENDIX 25 Email to MI services

How can UK Medicines Information (UKMI) better support healthcare professionals providing a 24/7 NHS service in England?

Dear [insert Medicines Information Pharmacist name],

I would like to invite you to take part in a study which I am carrying out as part of my PhD research project at the University of Wolverhampton. This study is being supervised by Professors Paul Rutter and Ray Fitzpatrick.

The objectives of this study are to:

- Identify the perceptions of on-call pharmacists about the medicines advice they provide out of hours.
- Identify the medicines information needs of nurses and doctors when working out of hours.
- Identify how on-call pharmacists, nurses and doctors access information when needing medicines advice out of hours.
- Identify the perceptions of on-call pharmacists, nurses and doctors about the current provision of medicines advice by pharmacy out of hours services.
- Identify what would affect when and what on-call pharmacists document when providing medicines advice out of hours.

I would like to recruit doctors and nurses to take part in a face-to-face semi-structured interview with myself within their organisation. One of the ways I would like to recruit doctors and nurses is via your medicines information service.

This will involve asking doctors and nurses from within your organisation if they would like to participate in this study. Recruitment will be over a 4 – 8 week period depending on numbers recruited. A 'script' will be provided for you to use. If the doctor/nurse is willing to be contacted by myself, their full name, job role, contact email and telephone number will need to be logged on a proforma which I will provide. At the end of the recruitment period you will need to email these details to me (via secure email).

Please let me know if you would be willing to participate in this study.

If you require any further information, please do not hesitate to contact either myself or my supervisors via email or telephone. Contact details are also provided in the information sheet.

Yours sincerely,

APPENDIX 26 Script and template for MI services

Data collection form for MI pharmacists from _____ to _____

Medicines Information script for recruiting doctors/nurses when they contact service:

A research project is aiming to find out what doctors and nurses' think their medicines information needs are when working out of hours and how they deal with such questions.

This would involve a short face-to-face interview here in the hospital, lasting no more than one hour at a day and time of your convenience. Any information you provide in the interview will be treated anonymously.

If you would like to participate in an interview, then I need to record your name, email address and contact telephone number.

My colleague will then contact you in due course. You can withdraw from participating in the interview at any stage.

If the doctor or nurse consents to be contacted, please complete all sections where possible

No.	Consent (please tick)		Full name of doctor/nurse	Job Role (please tick)		Contact details	
	Y	N		Nurse	Doctor	Email	Tel No.
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

APPENDIX 27 Email to doctors and nurses who expressed an interest to participate

Dear [name],

Thank you for expressing an interest when you contacted your hospital medicines information service to participate in this study.

Please find attached an information sheet about the study.

If you are still interested in participating in this study, I would be grateful if you could let me know what day(s) and time(s) of the week would be best for me to conduct the interview.

The interview would take place at your hospital and we would need a room/venue that allows the interview to be recorded clearly.

I look forward to hearing from you soon.

Yours sincerely,

APPENDIX 28 Information sheet for nurses

Reasons for conducting the study
I am carrying out this service evaluation as part of my PhD research project at the University of Wolverhampton. The aims are to find out the perceptions of hospital on-call pharmacists', doctors' and nurses' needs, access and provision of medicines advice out of hours.

Why have I been chosen?
I am seeking the opinions of nurses.

Do I have to be involved?
No – it is your decision whether you want to be involved in the study. Before agreeing to participate in the study you will be asked to give written consent. Even after agreeing to take part in the study you can choose to withdraw at any time without giving a reason.

Benefits of taking part of benefits of the study
There are no intended personal benefits. The information obtained will however, help to contribute to understanding how UK medicines information (UKMi) services usually based in hospital pharmacy departments can better support healthcare professionals providing a 24/7 NHS service in England.
If you decide to take part, you will be contacted to participate in an interview which should take no more than one hour to complete (subject to pilot). Depending on the number of nurses agreeing to take part, it is possible that you will not need to be interviewed.

What will happen if I decide not to take part?
I would like to thank you for taking the time to read this information. No further action is needed on your part.

What will happen to the information I provide and confidentiality?
All contact information and data from interviews will be confidential. Interviews will be digitally recorded and transcripts manually entered onto a qualitative software package (NVivo). This software will be used to analyse data but may be additionally analysed using other commercially available software. All data transferred onto software packages will be password protected and only accessed by the researcher and the supervisory team. Any information that could identify you will be coded or not be entered. Any quotes you give that are used in reports will be anonymised. Recordings of all interviews will be destroyed at the end of the study.

Results of the study
The results will be included in a final thesis submitted as part of the researcher's PhD to the University of Wolverhampton. The results may be made available for a peer reviewed journal or conference. No individual results will be made available.

What should I do now if I want to take part?
If you would like to take part in the study, please email me (XXXX) and provide any dates and times which would be suitable for me to conduct the interview with yourself within your organisation.

Contact for further information
If you have any questions about this study before deciding to take part, please contact the researcher Mark Cheeseman, either by telephone XXXX or email XXXX

APPENDIX 29 Interview schedule for doctors and nurses

1. What are the types of information or advice about medicines that you need to find when working out of hours?

(If the interviewee replies ‘don’t know’ or struggles to answer this question, I would prompt with,

Doctor: For example, have you ever needed some information/advice when you’ve been asked to prescribe a medicine for a patient?

Nurse: For example, have you ever needed some information/advice when you have had to administer a medicine that a doctor has prescribed for a patient?

2. How does this compare to normal working hours?
3. How do you access information on medicines when working out of hours?
4. What sources would you typically use to find information on medicines out of hours?
5. What barriers (if any) do you face when trying to access information on medicines out of hours?
6. How does this (question 3, 3a and 3b) compare during normal working hours?
7. Tell me what support does the pharmacy department provide you with during out of hours when you have questions related to medicines?
    a. Is there anything that you would change?
    b. How does this compare to normal working hrs?
8. Do you have anything else you would like to tell me?

APPENDIX 30 Expressions of interest received from on-call pharmacists and those contacted to participate

Trust (UIN)	Number of expressions of interest (n=107) received from on-call pharmacists to participate in semi-structured interviews		
	Yes (n=30)	No (n=2)	None (n=75)
223	4	0	11
191	3	1	12
253	2	0	6
128	3	0	5
225	6	0	15
202	4	0	9
311	3	0	6
137	5	1	11

Trust (UIN)	Number of on-call pharmacists (n=30) contacted to participate in semi-structured interviews	
	Contacted (n=12)	Not contacted (n=18)
223	2	2
191	2	1
253	0	2
128	3	0
225	1	5
202	0	4
311	1	2
137	3	2

APPENDIX 31 Expressions of interest received from doctors and nurses via MI services or recruitment poster

Trust (UIN)	Number of expressions of interest received from doctors and nurses to participate in semi-structured interviews			
	Recruitment poster (n=0)		MI services (n=20)	
	Yes	No	Yes	No
191	0	0	9	1
128	0	0	10	0
202	0	0	0	0
137	0	0	N/A	N/A

On-call hospital pharmacy services in NHS England: service provision and documentation of medicines advice calls

Mark P Cheeseman, Paul Rutter

Faculty of Science and Engineering, School of Pharmacy, University of Wolverhampton, Wolverhampton, UK

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ABSTRACT

Objectives UK hospital pharmacy services have historically been delivered during typical 'office' hours, which include the provision of medicines advice via the pharmacy's medicines information department. Outside office hours, an on-call service operates whereby pharmacists handle requests for medicine supply and advice. It is not known how this out-of-hours service operates. The aim of this study was to quantify the extent and scope of its provision across England.

Methods A piloted self-administered survey was sent to every chief pharmacist in England representing acute hospitals and mental health trusts (n=218).

Key findings Just over half (n=116/218, 53.2%) of chief pharmacists returned a completed survey. Most hospitals provided an on-call pharmacy service (87.1%, n=101/116). Nearly all on-call pharmacy services (91.1%, n=92/101) provided both supply of medication and medicines advice. Two-thirds (66.2%) of pharmacists who provided on-call services were junior. The majority of trusts (83.1%, n=74/89) receive <20 calls for medicines advice per week. Hospital nurses/midwives were seen as the most common users of the on-call pharmacy service. Medicines advice was documented by on-call pharmacists all (49.5%, n=47/95) or some of the time (49.5%, n=47/95). Just under half of trusts (41.1%, n=39/95) had a standard policy for the documentation of medicines advice. Two-thirds (66.7%, n=62/93) of respondents stated that advice was documented using paper-based forms. Most trusts (81.1%, n=77/95) provided training prior to pharmacists being on-call, with medicines information pharmacists involved in nearly 80% of cases (n=61/77) (respondents could select more than one option).

Conclusions Medicines advice is an integral part of the pharmacy on-call service, which was provided by junior staff. Variability existed in resourcing the service across trusts. In addition to existing standards for documentation of medicines advice, professional standards should be developed for on-call hospital pharmacy service provision and training.

INTRODUCTION

The provision of UK hospital pharmacy services has historically been delivered during typical 'office' hours, for example, 9:00–17:00. This is increasingly at odds with the provision of services by other areas of hospital practice, particularly general medical and nursing services.[1] Increasingly, there is an expectation that pharmacy services should extend their opening times, and although some have achieved this, most continue to only provide an on-call pharmacy service.[2 3]

In the UK, on-call is defined as a system that exists as part of arrangements to provide appropriate service cover across the National Health Service (NHS). A member of staff, for example, a pharmacist, is on-call when, as part of an established arrangement with their employer, they are available outside their normal working hours—either at the workplace (typically termed residency) or at home —to work as and when required.[4]

Outside office hours, the on-call pharmacist receives calls from other healthcare professionals, usually within their organisation, that may involve either the supply of medication or medicines advice. On-call pharmacists are typically employed from the pharmacy department of that hospital, and their knowledge, experience and training in medicines information (MI) can vary.

During normal working hours, a healthcare professional can contact the hospital pharmacy MI department for medicines advice. UK Medicines Information (UKMi) is an NHS pharmacy-based service provided by a network of >200 MI centres based in the pharmacy departments of most hospitals. The centres are mainly staffed by pharmacists with particular skills in locating, assessing and interpreting information about medicines handling over a half a million enquiries each year during normal office hours.[5]

Almost all UKMi research outputs have concentrated on enquiries received during normal office hours; very little is known about what happens outside these hours.[6–8]

It is not known how the provision of medicines advice out of hours compares to normal office hours, particularly as an MI pharmacist may not be available during on-call periods. Therefore, the aim of this study was to identify how hospital pharmacies in NHS England provide out-of-hours services and how calls for medicines advice from healthcare professionals are documented.

METHODS

A piloted self-administered survey was sent as a hyperlink contained in an email and printed in a postal letter to every chief pharmacist in England representing acute and mental health trusts (n=218) in October 2012. Each trust was assigned a unique identification number to maintain anonymity. The survey consisted of four sections: section A asked for demographics of the organisation; section B quantified the provision of the on-call pharmacy service; section C looked at the

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documentation of medicines advice questions; and section D explored the training provided to pharmacists to help them answer questions out of hours. Questions consisted of multiple option, closed and open questions.

Returns were included for analysis up to 6 weeks from the initial mailing. A reminder letter and email were sent to each chief pharmacist approximately two weeks after the first posting if they had not already replied. The survey data were transferred and analysed using SPSS V.20. Quantitative data were subject to basic descriptive statistics, for example, Pearson's χ^2 test. Open-ended questions were subject to thematic analysis.

RESULTS

Just over half (n=116/218, 53.2%) of chief pharmacists returned a completed survey. The majority of respondents were from acute hospitals (76.7%, n=89/116 compared with 23.3%, n=27/116 from mental health trusts). Response rates between acute and mental health trusts were comparable (54.3% vs 50.0%). Hospital nurses/midwives were the most common users of the on-call pharmacy service; junior doctors were second highest users, followed by senior doctors and then allied healthcare professionals.

Provision of the on-call pharmacy service

Most hospitals provided an on-call pharmacy service (87.1%, n=101/116); of these acute hospitals were the main providers (86.1%, n=87/101). Nearly half of mental health trusts (48.1%, n=13/27) did not provide an on-call pharmacy service but did state a service-level agreement with another provider, for example, local acute hospital, was in place in most cases. The standard model of on-call services was for pharmacists to be at home (94.1%, n=95/101), with just 10% (n=10/101) of pharmacy services operating a residency programme (note that some provided both models).

Those pharmacists involved in the provision of on-call services are shown in table 1; two-thirds (66.2%) of the pharmacists were either band 6, 7 or 8a (see table 1 for definition of bands). The majority of trusts (80%, n=76/95) did not routinely have an on-call MI pharmacist available; seven trusts had a dedicated on-call MI pharmacist that answered all calls for medicines advice. However, a further 12 trusts did have an MI pharmacist available out of hours to support the on-call pharmacist with questions for medicines advice if necessary.

Table 1 Job banding of pharmacists providing on-call services

Agenda for Change banding*	Number (%)† n=101
Band 6	89 (21.9%)
Band 7	93 (22.9%)
Band 8a	87 (21.4%)
Band 8b	69 (17.0%)
Band 8c	35 (8.6%)
Band 8d	23 (5.7%)
Band 9	10 (2.5%)

*Agenda for Change is the pay system used within the National Health Service for all staff (except doctors and dentists). Staff are placed in pay bands (bands 1–9) on the basis of their knowledge, responsibility, skills and effort needed for the job. Newly qualified pharmacists usually start at band 6, and typically chief pharmacists are band 9.
†Respondents (n=101) were asked to indicate the Agenda for Change banding of those pharmacists providing the on-call pharmacy service and so could select more than one option.

Table 2 Location of the on-call pharmacist when not in the hospital and number of medicines information advice calls

Location	Number of calls per week*† n=92 ≤20	>20
Residency	1 (12.5%)	2 (25%)
Home	44 (52%)	28 (34%)

*Respondents (n=92) could select more than option.†χ^2=11.272, df=1, p=0.001.

Nearly all on-call pharmacy services (91.1%, n=92/101) provided both supply of medication and medicines advice. Eight trusts (7.9%) provided medicines advice only and one acute hospital only supplied medication. Table 2 shows the number of medicine advice calls handled in a typical week. Data suggest that home-based on-call pharmacists handle a greater number of medicine advice calls compared with resident pharmacists.

Table 3 shows the number of calls for medicines advice compared with those for the supply of medication in a typical week. The majority (83.1%, n=74/89) receive <20 calls for medicines advice per week compared with 65.9% (n=56/85) for the supply of medication. There are only a small number of trusts (4.5%, n=4/89) that handle >50 calls per week for medicines advice compared with nearly a fifth of trusts (17.6%, n=15/85) handling the same number of calls per week for the supply of medication.

Documentation of activity

Documentation of on-call pharmacist activity by trusts was high for both supply of medication (94.6%, n=88/93) and for medicines advice (91.8%, n=89/97). Just under half of the trusts (41.1%, n=39/95), primarily acute hospitals, had a standard policy for the documentation of medicines advice. Box 1 highlights the themed information received from chief pharmacists regarding what their policies specified should be documented out of hours.

For those trusts that did not have a policy, chief pharmacists were asked what they thought should be documented out of hours (see table 4).

A comparison between box 1 (themed policy standards) and table 4 (chief pharmacists' perceptions on documentation) shows similarity, although policy standards expect that the urgency of the answer required, patient details (where

Table 3 Comparison of the number of calls for supply of medicines and medicines advice received during a typical week by the on-call pharmacy service

Number of calls per week	Calls for supply of medication Number of NHS hospital trusts (%) (n=85)	Calls for medicines advice Number of NHS hospital trusts (%) (n=89)
<10	30 (35.3%)	45 (50.6%)
11–20	26 (30.6%)	29 (32.6%)
21–30	10 (11.8%)	4 (4.5%)
31–40	2 (2.4%)	5 (5.6%)
41–50	2 (2.4%)	2 (2.2%)
>50	15 (17.6%)	4 (4.5%)

NHS, National Health Service.

Box 1 Chief pharmacists' thoughts on requirements to documentation (data presented as themes drawn from 37 respondents)

- Time the enquiry was received
- Urgency of the answer required
- Date and time of the enquiry received
- Enquirer's contact details (including name and role) and location
- Patient's details (where appropriate)
- Enquirer's question
- Resources used to answer the enquiry
- Answer provided to the enquirer
- Name of the pharmacist handling the call
- Time taken to answer the enquiry and respond to the enquirer
- Follow-up needed during normal working hours further to the enquiry

appropriate), name of the pharmacist handling the calls and follow-up to be documented. These were not identified by chief pharmacists where policy standards do not exist.

Medicines advice was documented by on-call pharmacists all (49.5%, n=47/95) or some of the time (49.5%, n=47/95). One respondent claimed that medicines advice was never documented.

Two-thirds (66.7%, n=62/93) of the respondents stated that advice was documented using paper-based forms, with nearly a third (29%, n=27/93) using electronic-based forms or database systems. More than half (57.9%, n=55/95) of trusts' on-call pharmacists had access to a bespoke database (MiDatabank) for documenting medicines advice calls within their organisation, and just over half of these (52.7%, 29/55) were able to access it remotely when outside the organisation, yet recording directly on to this database was very low (4.3%, n=4/93).

All on-call pharmacists had access to information resources to enable them to answer requests for medicines advice. Respondents were asked if their information resources had been reviewed against a recommended list provided by UKMi. In almost two-thirds of trusts (63.8%, n=60/94), this had been done, although a fifth of respondents did not know if their information resources had been reviewed against this recommended list (21.3%, n=20/94).

Table 4 Chief pharmacists' opinions (where no policy existed) on the information that should be documented by on-call pharmacists when providing advice out of hours to healthcare professionals

	Number (%)* n=56
Time of call	54 (13.1%)
Enquirer's name	56 (13.6%)
Enquirer's job role	52 (12.6%)
Enquirer's contact details	50 (12.2%)
Enquirer's question	55 (13.3%)
Resources searched	41 (10.0%)
Information found from resources accessed	35 (8.5%)
Medicines information advice provided	54 (13.1%)
Other†	15 (3.6%)

*Respondents (n=56) could select more than one type of information that should be documented by on-call pharmacists.
†This included date/day that the enquiry was received, the amount of time it took the on-call pharmacist to answer the enquiry and the reason for the enquiry.

Training provided to pharmacists to help them answer questions out of hours

The majority of trusts (81.1%, n=77/95) provided specific training for on-call pharmacists to help them provide medicines advice out of hours. Both MI (79.2%, n=61/77) and other pharmacist staff (70.1%, n=54/77) delivered this training. Although small numbers, all nine trusts' resident pharmacists received training compared with 79.8% (n=71/89) of trusts that operated a home-based on-call service. Additionally, chief pharmacists stated that before being put on-call, pharmacists should spend time in the trust MI service and shadow or be buddied with a senior colleague at the start of their on-call role. Table 5 shows the training provided compared with the training that chief pharmacists felt should be provided. A small number of chief pharmacists (44.4%, n=8/18) felt that no additional training was required (respondents could select more than one option).

Nearly half (48.1%, n=37/77) of those trusts that provide initial training never give any refresher training. Only 13.0% (n=10/77) of trusts provide refresher training ranging from every 3 to 12 months, which was generally identified through staff appraisal. The remaining 38.9% (n=30/77) selected the option other and submitted their own opinions. On-call pharmacists trained by MI staff (57.4%, n=35/61) were more likely to have their training refreshed compared with training provided by other pharmacy staff (44.4%, n=24/54, χ^2=1.918, df=1, p=0.166) but did not reach statistical significance.

DISCUSSION

This is the first study to investigate the provision of on-call pharmacy services by acute hospital and mental health trusts in NHS England that focuses on the provision of medicines advice. The study found that on-call pharmacy services are almost universally provided by trusts through non-residency (home-based)

Table 5 Provision of training to pharmacists before they begin on-call specifically to help them provide medicines information (MI) advice out of hours

Training	Training provided by trusts Number (%) n=77*	Training that should be provided Number (%) n=18*
No additional training should be provided to that received as part of the pharmacist's 'normal working hours' role	N/A	8 (13.4%)
Communication skills	25 (6.9%)	6 (10.0%)
Use of MI resources/databases	71 (19.8%)	12 (18.3%)
Critical evaluation/interpretation of information/data	25 (6.9%)	6 (10.0%)
Use of information technology	54 (15.0%)	6 (10.0%)
Documentation of enquiries	53 (14.7%)	7 (11.7%)
Use of MiDatabank (MI electronic enquiry answering database)	50 (13.9%)	5 (8.3%)
Questioning skills	33 (9.2%)	5 (8.3%)
Mock 'on-call' scenarios	33 (9.2%)	3 (5.0%)
Other (please specify)	16 (4.4%)	3 (5.0%)

*Respondents could select more than option.

pharmacists and almost all trusts provide medicines advice. The volume of calls for advice increased with the size of the organisation, although this was less than that for medicine supply and reflects the traditional model of on-call pharmacy services, which have centred on medicine supply rather than advice.[1]

Hospital nurses were the most common users. This was expected as they account for the largest staff group employed by the NHS,[9] and in an on-call situation there is typically less medically qualified staff available, meaning nurses are more likely to contact the on-call pharmacist for advice rather than a doctor. This scenario may also explain why junior doctors were also high users as fewer senior doctors are present at this time. In normal working hours, it is common practice for junior doctors to consult senior medical staff associated with prescribing decisions.

The service was predominantly provided by relatively low banded pharmacists (band 8A or lower) and suggests that as pharmacists move up through the Agenda for Change banding they are less likely to undertake on-call. This means that the on-call service lacks senior (8B or higher) pharmacists participating in the service[10] and implies that the knowledge, skills and experience of pharmacists providing on-call services are less than the pharmacy workforce during normal working hours. Almost 50% of on-call staff were band 6 and 7 posts. These are usually held by younger less experienced pharmacists who may have limited skills and experience, which could affect the standard of medicines advice provided. While no empirical evidence exists to support this view, data from medical literature have shown that greater clinical experience is associated with better diagnostic ability.[11] It therefore seems reasonable that pharmacists with greater clinical experience will provide higher-quality answers. This assumption is supported by the Department of Health highlighting a specific role of MI departments to assist in the safe and effective use of medicines 'out of hours'.[12] This study was not designed to compare medicines advice provided by pharmacists providing on-call services with that provided by MI departments during 'office hours'. This warrants further research. What is known from these data though is that pharmacists had good access to information resources and most had received training prior to starting on-call services. This should provide some reassurance that answers are being provided to an acceptable standard, although chief pharmacist perception was that medicines advice was not documented all of the time. This may be attributable to a lack of organisational procedure (eg, no trust policy on documentation) or operational reasons such as the individual on-call pharmacist, the type of question asked or the time of day/night that the question is asked. Further research is needed to explore the exact reasons for apparent poor documentation. Pharmacy departments lacking policy on documentation was unexpected given there are national standards for what medicines advice should be documented,[13] and professional standards for data capture to demonstrate the impact of the service on patient outcomes.[14] Regardless of whether a policy on documentation existed, data showed there was broad agreement on what should be documented, although where policy was lacking chief pharmacists placed little value on which resources were used. This is concerning, as the basis of answers stems from the resources used and acts as an audit trail to follow-up advice given if required. A national report has previously recommended that computer technology should enable on-call pharmacy services to be provided off-site and out of hours.[12] Although a bespoke enquiry answering database (MiDatabank) is used by MI pharmacists to document medicines advice during normal working hours,[15] its uptake out of hours is very low. Further research is needed to explore the exact reasons for this.

LIMITATIONS

This study had a number of limitations. First, the response rate was just over 50%, and although comparable to other published studies involving this target group,[16–18] the data cannot be said to be truly representative and therefore need to be interpreted with caution. The response rate may also have been affected because at the time that the survey was sent the NHS England was going through organisational change. With regard to the quality of responses, chief pharmacists may not have always been the best person to answer all questions posed because some were related to the everyday rather than managerial aspects of the service. However, the chief pharmacists may have delegated the completion of the survey to more appropriate staff without the researcher's knowledge.

CONCLUSIONS

Medicines advice is provided by all trusts out of hours. However, service provision varies and is provided by relatively junior pharmacy staff. Further work is needed to determine the appropriateness of medicines advice provided. In addition to existing standards for documentation of medicines advice, professional standards should be developed for on-call hospital pharmacy service provision and training.

Key messages

What is already known on this subject

- UK hospital pharmacy services have historically been delivered during typical 'office' hours, which include the provision of medicines advice via the pharmacy's medicines information department.
- Outside normal 'office' hours, an on-call service is provided by UK hospital pharmacy services whereby pharmacists handle requests for medicine supply and advice from clinicians.
- Almost all research has focused on the medicines advice during normal office hours; very little is known about what happens outside these hours.

What this study adds

- An out-of-hours pharmacy service for medicines advice is almost universally provided in English hospital trusts.
- The service is provided by relatively junior staff.
- Variability exists across trusts with regard to levels of training received and documentation of activity.
- Professional standards for on-call pharmacy services should be considered.

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