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Knowledge sharing across the boundaries between care processes, services and organisations: the contributions to 'safe' hospital discharge and reduced emergency readmission

Chief investigator	Justin Waring
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1. Aims/Objectives:

The aim of this study is to identify interventions and practices that support knowledge sharing across care settings and thus promote safe hospital discharge, including reduced risk of emergency readmission to hospital. This is elaborated through the following sixe research objectives:

1. Determine the different stakeholders and agencies involved in discharge, including their distinct roles, responsibilities and relationships, as elaborated in terms of: a) their specific **knowledge and practice domain**s; b) their prevailing **cultural norms and assumptions**; and c) **organisational** context;

2. Determine the patterns, media and content of knowledge sharing between stakeholders with a particular focus on interventions to facilitate communication, including: a) **MDTs**; b) **guidelines and toolkits**; c) **co-ordinators**; and d) **ICTs**;

3. Determine stakeholders' relative perceptions of the threats to 'safe' discharge associated with these patterns of knowledge sharing, with a particular focus on known risks and sources of readmission, including: a) **falls** and **b) medicines management**, as well as other perceived risks;

4. Determine how knowledge sharing represents a latent **threat to patient safety** and sources of hospital readmission, including known factors such as 'delayed', 'missing', 'fragmented' or 'repetitious' communications; the persistence of communication 'boundaries', 'cliques' and 'gaps', and relations between core/peripheral groups;

5. Explain why the patterns of knowledge sharing as threats to patient safety based upon the heuristic categories of **knowledge, cultural and organisational factors**;

6. Identify **lessons and interventions** that support knowledge sharing and in turn integrated, efficient and safe hospital discharge and reduced readmission, including strategies to mediate organisational boundaries, resource-sharing, technological innovations, leadership and co-ordinating roles, multidisciplinary team meetings; common discharge planning procedures.

2. Background:

Policy context: Patient Safety and Hospital Discharge

Patient safety is an international health services priority (WHO, 2004) and over the last decade there have been significance advances in research and policy in this area (Waring et al. 2010). To date, this research has tended to focus on single clinical environment or organisational settings, i.e. primary or secondary care; operating theatres or the emergency department. As such there is little attention to the threats to patient safety that arise when clinicians and patients cross these settings. As articulated by this SDO call [10/1007]: 'research is needed on how to improve patient safety in the "spaces between" care processes, services and organisations'. Taking this line of analysis further, it is important to understand the barriers and drivers to patient safety, not as linear casual chains within single or isolated care settings, but as complex and enmeshed 'constellations' of factors found within and between care processes (Waring, 2007a).

In line with this need for more research on the 'spaces' between care settings, a recent review of the UK Patient Safety Research Portfolio by the lead applicant and colleagues revealed a number of under-researched issues (Waring et al 2010). Significant amongst these was the connection and transfer of information between care providers as exemplified by the planning of hospital discharge. Data provided by the NPSA indicates that **'transfer/discharge of**

patients and infrastructure' accounts for 7-8% of all reported incidents through the National Reporting and Learning System (NPSA, 2009). Policies suggest a timely and integrated hospital discharge is integral to patient recovery, quality of life, independence and longer term care (Audit Commission, 2000). It is also recognised that there are many barriers, breakdowns and delays to routine discharge associated with this 'so called' integrated approach (Audit Commission, 2000). The range of potential threats to patient safety associated with hospital discharge is considerable, and often specific to the patients' physical, psychological, social circumstances. Common risks include the management of take home medicine, the prevention of infections or sores, fitting and utilising structural adaptations in the home, and ensuring the continuity of clinical and personal care (Audit Commission, 2000; Care Quality Commission (CQC), 2009; Haworth, 1983; Levesque, 1988; Mahoney et al. 1994; Moreland et al, 2009; Nosek, 1993; Rosenblatt et al, 1986; Simmon, 1986; Tansley and Gray, 2009; Utzolino et al. 2009). These are often acute for older patients with co-morbidities and complex care needs (Taraborelli et al. 1998). This extensive literature highlights falls and medicines management as two significant post-discharge clinical risks and sources of re-admission, especially for both stroke and hip fracture patients. **Falls** remains one of the most significant threats to safety in both hospital and community settings, especially for older and frail patients, with over 200,000 incidents reported to the NPSA for 2005-06 (NPSA 2007). Research shows that risk of falls is associated, for instance, with cognitive impairment, motor dysfunction, muscle weakness, balance deficit, medicines uses, and use of assistive devices (NICE, 2004; Rubenstein, 2006; Stewart, 2010). Equally, the **management of medicine** is identified as a significant risk following hospital discharge (CQC, 2009). Known risks are associated with the problems of continuing new medicines regimes in the community, managing repeat prescriptions and ensuring patient compliance. For both falls and medicines management, however, there is growing recognition that these threats to patient safety arise from latent factors found in the **connections between care settings** (CQC, 2009; NICE, 2004).

In recognition of the clinical risks associated with hospital discharge, it has become and continues to be a national policy priority with a shift in ethos and approach (Audit Commission, 2000). Policies recommended that discharge should be seen as "a process not an isolated event" (DH, 2003:2) involving the active participation of health and social care professionals, families, carers and patients to effectively plan and co-ordinate discharge. This 'whole system approach' highlights the inter-dependency of individuals and organisations in different care settings, such as hospital clinicians, GPs, pharmacists, social workers, carers, intermediate or domiciliary care agencies, the voluntary sector, and families. Glasby (2003) suggests three prominent factors influence the participation and co-ordination of these different stakeholders, which are also consistent with the 'whole systems' and 'systems thinking' approaches. These include **occupational factors**, related to the particular knowledge, culture and practice domains of care providers, such as doctors, social workers and nurses; **organisational factors**, related to the routine working patterns, facilities, capacities and resources of individuals agencies; and **compatibility and co-ordinating factors,** related to the how occupational, organisational and institutional factors align, including communication, decision-making and resources. Further analysis of the NPSA data reveals that the most common threats to safety in hospital discharge are associated with **notifying and organising 'external services'** (NPSA, 2009). This highlights the importance of communication between care providers as a 'latent' threat to patient safety. Amongst the range of strategies to support communication we highlight four prominent approaches (Carpenter and Ram, 2008; CQC, 2009; DH, 2003; Glasby, 2003). The first involves **multi-disciplinary team meetings** (MDTs) that bring together different stakeholders in a formal decision-making environment to share information and plan discharge. The second involves adherence to shared discharge planning **guidelines or tools** that direct and document discharge planning between stakeholders, such as early support discharge criteria. The third relates to the role of **discharge planning co-ordinators** who act as 'knowledge brokers' between agencies to ensure continuity of care. The fourth relates to the use of **information communication technologies** (ICTs) to store and share information related to patients discharge. Yet the literature on hospital discharge offers little in the way of a comprehensive review of either the latent threats to safety associated with inter-agency working, or the role of communication and knowledge sharing. With figures suggesting that emergency re-admission to hospital have increased by nearly 50% over the last decade (DH, 2008) and with governments eager to provide patients with some form of discharge 'warranty' (Lansley, 2010), it is important to see knowledge sharing as

a major latent threat to patient safety and source of emergency re-admission.

In considering these drivers and barriers to effective inter occupational, organisational and sectoral communication, the chief investigator and colleagues have synthesised theories within organisational studies, medical sociology and public policy to develop an inclusive and pragmatic conceptual heuristic of the range of possible factors that shape knowledge sharing, and have the potential to generate lessons to improve learning and patient safety in hospital discharge (Currie, Waring and Finn. 2007). Consistent with the occupational, organisational and compatibility factors outlined by Glasby (2003), this comprises:

- **Knowledge**: related to the epistemological differences between groups, e.g. how they *make sense* of discharge; understand the role of others professionals; how meanings are articulated (Cook and Brown, 1999; Chumer et al. 2000; Swan and Scarbrough, 2001; Waring, in 2010);
- **Culture**: related to the shared meanings, attitudes and values that shape communication, e.g. *when* knowledge should be shared and with *whom*; how norms, identities and trust reinforce boundaries and knowledge hoarding (Bosk, 1979; Waring, 2005; Waring et al. 2007);
- **Organisation**: related to the influence of departmental, regulatory, and institutional factors that shape knowledge sharing, such as socio-legal rules, professional jurisdictions, organisational priorities and resource constraints (Abbot, 1988, Currie and Suhomlinova, .2006, Currie et al. 2008; Waring, 2007b).

The study will be developed through a comparison of discharge processes and procedures for stroke and hip fracture patients. These represent high-demand areas of NHS services and national priorities for service improvement. For instance existing operating frameworks for the NHS provide incentives to improve care delivery in these areas, including best practice tariffs, as well as regional and CQUIN targets to support post discharge follow-up. Although the majority of patients in both services tend to be elderly, they offer an important opportunity for comparison in terms of how services might be organised differently, or indeed how resources could be shared across these two areas, as well as offering lessons for discharge in other areas.

a) Stroke is the third leading cause of death in the UK, the single largest cause of disability in community settings and costs the NHS over £2.8bn per year (NAO, 2005). For the last decade policies have promoted standards and improvements in the organisation and delivery of care for older people including stroke (DH, 2001), culminating in the *National Stroke Strategy* (DH, 2007). Research demonstrates the potential benefits of guidelines, procedures and assessment tools to support safe and timely discharge; including the use of Early Supported Discharge (ESD) models (Longhorne, 2003), which are currently being evaluated by members of this research team (Walker and Fisher). Such techniques bringing together service providers and users located in different settings to plan discharge. Within the *National Stoke Strategy*, two chapters have direct implications for the proposed study. Chapter 3 sets out the aspirations for 'life after stroke' by emphasising the importance of integration between stakeholders to plan and support the transfer of patient care. Building on this, Chapter 4 highlights the importance of 'working together' through stroke networks that bring together stakeholders to review, organise and deliver services. Linked to this, the *National Clinical Guideline for Stroke* (Royal College of Physicians, 2008) suggests that the stroke rehabilitation should include a multidisciplinary team of relevant agencies to plan care needs after hospital. As mentioned above, however, the threats to safe discharge for stroke patients are considerable, including falls, the use of take home medicines, psychological distress and cognitive recovery, access to and use of therapists, and the associated complications of personal care, such as incontinence (Levesque, 1988; Moreland et al, 2009; Nosek, 1993). Highlighting the contribution of 'systems' thinking, such risks often have their origins in the wider organisation and integration of services (Hart, 2001). Such policies acknowledge the importance of knowledge sharing and working across occupational, organisational and sectoral boundaries to bring together stakeholders in a way that promotes integrated, efficient and safe care delivery, but there is little evidence directly addressing how and why these represents latent threats to patient safety.

b) Hip fractures: Each year in the UK around 310,000 patients, the majority of whom are old,

present to hospital with fractures and around a quarter of these are hip fractures (Torgerson et al. 2001). The number of these cases has risen by 2% per annum from 1999 to 2006 (DH, 2006) and projections suggest that, if this continues, numbers will rise from the current figure of c.70,000 to 101,000 in 2020. Care of fragility fractures is expensive. Direct medical costs to the UK healthcare economy have been estimated at £1.8 billion in 2000, with most of these costs relating to hip fracture care. Patient frailty is reflected in the outcome of hip fracture – 10% of people die in hospital within a month, and one third are dead at one year. The fracture is responsible for less than half of deaths (Parker, 1991), but patients and families will often identify the hip fracture as playing the central part in a final illness. Hip fracture seriously damages quality of life for survivors, of whom only half will return to their previous level of independence. Most can expect long term discomfort, but half will suffer deterioration in mobility, such that they will need an additional walking aid or physical help, and 10-20% of people admitted from home will move to residential or nursing care. Length of hospital stay varies considerably between units, reflecting variability in service structures and provision, such as in early rehabilitation and the availability of downstream beds. After discharge, average additional costs for health and social aftercare of £13,000 in the first two years. Many specialities and agencies are involved in hip fracture care, and when discharge is planned and co-ordinated effectively through inter-agency working it is shown to reduce length of stay and improve patient recover (O'Cathain, 1994; Farnworth et al. 1994; Tierney and Vallis, 1999). For instance, early supported discharge at home has been evaluated in more able patients (Crotty 2003; Parker et al. 1991) and, involves a multi-disciplinary team to assess at an early stage the patient's suitability for supported discharged. Again, this requires effective and timely knowledge sharing between agencies. Alternatively 'offsite' rehabilitation units are commonly aimed at more frail patients who require further rehabilitation, however the complexities around discharge planning are often more significant given the additional level of care introduced before the patient is ultimately returned home. In both groups of patients, there are many potential threats to patient safety around hospital discharge, including the risks of falls, social and personal care planning, and management of medicines, yet as with Stroke, there remains little evidence of the latent sources of risk manifest in these inter-agency patterns of interaction and knowledge sharing.

Clearly, the needs of both stroke and hip fracture patients will vary, with differences in terms of patients' physical, psychological, social and environmental needs. There remains, however, little direct evidence of the latent threats to safe discharge for these patients, especially research that considers how knowledge sharing across can represent a latent threat to integrated working and ultimately patient safety. Drawing together the above, the study will focus on the threats to safe discharge for stroke and hip fracture patients where there are known clinical risks (falls and medicines management) but also known latent systemic factors associated within knowledge sharing between care processes and organisations. The study will consider the contribution of existing interventions to mediate these latent factors, but will draw upon the proposed analytical model to better demonstrate how **and** why knowledge sharing can represent both a threat to and source of patient safety in the processes of hospital discharge – with the intention of developing practical recommendations for change (see table 1).

Discharge of Stroke & Hip Fractures			
Clinical Risk Focus	**Systemic Focus**	**Intervention Focus**	**Analytical Focus**
Falls Medicine management Other stakeholder identified	Knowledge sharing across the 'spaces' between care processes and settings	MDTs Guidelines & Toolkits Discharge co-ordinators ICTs	Knowledge Culture Organisation
As resulting in harm and readmission	As a latent factor to safe & efficient integrated care	As facilitating knowledge sharing	As drivers & barriers to knowledge sharing

3. Need:

a) *Health need*: patient safety is a major problem facing healthcare providers, especially the delivery of care across care services. This research will determine the threats to safe discharge associated with the sharing of knowledge across different care settings and organisation in line with the SDO call (10/1007). It will obtain from front line staff, patients and carers their views of these threats to safety and through detailed observational research will seek to explain these threats, and identify recommendations to resolve these threats, in terms of the barriers and drivers to effective knowledge sharing. Through investigating how knowledge sharing across sectors represents a latent threat to patient safety we will identify strategies that support the appropriate communication and enhance the safety of hospital discharge and reduce readmissions. The primary health care benefits will relate to stroke and hip fracture patients, especially those involved in our study, through formative feedback to service providers. We will identify and develop transferable lessons to other stroke and hip fracture services and work with our advisors to further extrapolate our findings in relation to other care settings with the aim of identifying strategies and techniques to improve knowledge sharing across for hospital discharge.

b) *Express need*: the study aligns with the aim of supporting and producing rigorous and relevant research knowledge for the NHS management community that will assist service leaders and managers to better plan and delivery services. It explicitly addresses the research need on patient safety on the boundaries between care processes, services and organisations (SDO 10/1007). Hospital discharge represents a key 'space', and area of clinical risk (NPSA, 2009), between care processes where the exchange of knowledge, and other resources, is integral to effective inter-agency working and safety. Our research offers a unique analysis of this patient safety problem through its focus on knowledge sharing and draws upon the established expertise in the research team. More broadly, the study complements previous commissioned research by the SDO around knowledge mobilisation and utilisation.

c) *Sustained interest and intent:* over the last decade, discharge from hospital has become a growing area of concern (Audit Commission, 2000). With a recent change in government and growing pressures to contain healthcare spending, efficient, timely, but also safe hospital discharge is likely to become an even higher priority (Lansley, 2010). Recent announcements highlight the problems of inappropriate discharge and the consequences of emergency re-admission, with suggestions for a 30 day 'warranty scheme' whereby payment is withheld in the case of readmission (Lansley, 2010). Moreover, recent policy announcements highlight a potential significant change in the organisation of NHS care, especially in the area of commissioning and the relationship between health and social care. The research will consider the possible impact of these changes on hospital discharge, especially the re-configuration of stakeholders involved in discharge planning. As such there will be growing attention to improve hospital discharge and a reduction of events that necessitate re-admission, including those related to medicines management and falls. The study will contribute directly to this growing area of policy and service innovation.

d) *Generation of new knowledge:* there is a growing evidence of the social and organisational processes involved in hospital discharge, including the importance of communication, but this is rarely modelled to take account of the complex social and cultural dynamics of knowledge sharing. Moreover, the existing research rarely addresses directly the central issue of patient safety. As such, the study will draw together and build on this research through producing a more 'systems' analysis of how and why knowledge sharing can represent a threat to patient safety in the processes of hospital discharge. The study will also contribute to knowledge in the area of organisational learning. Knowledge sharing, especially knowledge brokering, is also a major theme of contemporary management and organisational research, as exemplified by previous SDO programmes. The application of our heuristic model will provide an inclusive and pragmatic basis for deepening this area of research. More broadly, we see the application of our model in the context of hospital discharge as contributing to research in the area of organisational learning, or rather 'system learning'. There is growing attention to the need to exchange and translate knowledge between different actors and organisations to bring about performance improvements and innovations. One growing area of analysis relates to absorptive capacity and the need for organisations to identify, acquire, assimilate and apply knowledge (Cohen and Levinthal, 1990). In contributing to this area of research we will seek to

understand the barriers and drivers to foster this absorptive capacity across different actors and sectors at the system level.

e) P*rospects of change:* the study will seek to identify and develop strategies and interventions to enhance knowledge sharing across care processes and organisations and thereby enhance the safety of hospital discharge. These will be developed in consultation with service providers and users through formative feedback events and workshops. We will also work with providers to make recommendations and help optimise existing inter-departmental and inter-organisational processes in ways that reduces risk to safety as well as improves service efficiencies. Moreover, the system-led focus on knowledge sharing and patient safety is consistent with regional 'productivity' initiatives and will contribute to this broader programme of change.

4. Methods:

a. Setting
The study will be undertaken in and around two NHS Trusts (University Hospitals of Leicester & United Lincolnshire Hospitals). Additional university resources have been provided for a doctoral student to work on a third site in parallel with the main SDO funded study (Nottingham University Hospitals). This student will draw from and contribute comparative lessons to the two primary research sites, but will focus their own work on a third distinct site where they will investigate the discharge processes for hip fracture patients. The selection of these three trusts reflects recognised, but as yet undetermined contextual variations related to hospital discharge as the selected hospitals vary according to their location (rural/urban), size (medium/large) and teaching/research activities. Such differences provide a basis for comparison of the different discharge processes and the development of more widely applicable study recommendations. Within the two main NHS Trust, the study will focus, in the first instance, on the corresponding clinical departments for stroke and hip fracture care, and in line with our sampling strategy it will extend into other clinical and social care settings, including primary, community and social care agencies. In the third site for doctoral research, the study will only focus on hip discharge due to existing research activities in the area of stroke discharge. The three NHS sites include

University Hospital Leicester (UHL) (large, multi-site city-centre university hospital):
- Stroke Unit (Leicester General Hospital)
- Musculo-skeletal (Leicester Royal Infirmary)

United Lincolnshire Hospitals NHS Trust (ULH) (medium, dispersed county-wide DGH):
- Orthopaedics and trauma
- Stroke Rehabilitation

Nottingham University Hospitals (large, single-site, city-centre university hospital)
- Orthopaedics and Hip Fracture Unit

The two primary research sites (UHL & ULH) have been chosen to support the investigation of difference and similarity in discharge processes and to facilitate empirical generalisation. In particular, we highlight the following differences in population service, demographic and organisations as impacting upon discharge processes. In particular we see differences in the geographic spread of services, the proportion of single-handed GPs and ethnic diversity as potentially impact upon knowledge sharing and discharge safety. For example, single-handed GP practices might have fewer in resources in depth, such as nursing support, access to therapists or medical second-opinion and this might have implications for ensuring the continuity of GP or out-of-hours access following discharge. As such, these might constitute a range of organisational factors that shape knowledge sharing and represent threats to patient safety. Equally the ethnic diversity of the local community will also have an impact on knowledge sharing, especially between care services and patients/families, where there are likely to be particular knowledge and cultural differences between individuals and groups. As such particular attention will be given to investigating how these issues, first represent a threat to safety and second are (or might be) be mediated through new interventions.

	University Hospitals Leicester	*United Lincolnshire Hospitals*
Population Served	940,000	735,000
Ethnic Diversity	60%(City)/80%(County) White	95% White
Number/type hospitals	3 city-based hospitals form this large teaching hospital	7 Sites, including 3 medium-sized DGHs and community (cottage hospitals)
Number GP Practices	145	102
Single-hand GPs	14	Unavailable (est.20-30)
Other issues	Serving population of Leicester, Leicestershire & Rutland over 832 sq miles, but significant demographic variation between City/County (e.g. % non-white 40/20)	Large dispersed population over 2350 sq miles with three small-medium Towns

b. Design

The study is designed as four linked and dovetailed work packages (WPs), combining complimentary methods to studying knowledge sharing in and between complex healthcare processes and organisations. We first outline the work packages in relation to the study objectives and outcomes, before describing sampling and selection and the specific research methods and tools.

Work packages: activities and outcomes

WP1) Research planning and preparation (-2 to 2 months)
WP1 will be directed towards preparing and planning the study. Following written notification from the SDO, but prior to project start, we will a) commence Research Governance and Ethical approval applications, (undertaken by Waring), including local R&D arrangements for the research sites; b) recruit the researcher, including necessary induction and training; c) conduct synthesis of existing literatures in the areas of 'patient safety', 'knowledge sharing', 'inter-organisational/sectoral working', 'hospital discharge', and 'stroke' and 'orthopaedic' care (each team member will summarise the relevant literature in their respective areas); and d) consult the Scientific Advisory Board (SAB) and Patient Public Involvement (PPI) group to clarify research objectives, identify risks and define operational goal posts.

WP2) Stakeholder interviews and qualitative network mapping (2 – 10 months)
WP 2 will be direct towards identifying, mapping and understanding the patterns of knowledge sharing involved in hospital discharge with a particular focus on the contributions to patient safety. Through multiple phases of semi-structured qualitative (social network) interviews it will:

- identify and recruit stakeholders involved in discharge processes, including those based within and between hospital, primary and community care setting;
- map the different roles and responsibilities of these stakeholder;
- identify key actors, events, procedures, tools and technologies involved in hospital discharge, e.g. MDTs, discharge guidelines, ICTs, and knowledge brokers;
- elaborate stakeholder differences in terms of knowledge and practice domains, culture norms and attitudes and organisational arrangements of work;
- elicit stakeholders' perceptions of the threats to 'safe' hospital discharge associated with knowledge sharing and with a focus on known risks and sources of readmission, including falls and medicines management, as well as other risks identified by participants;
- inform subsequent observational research as to the different patterns, media and content of knowledge sharing activities involved in hospital discharge

WP3) Patient tracking and observational research (10 – 21 months)
WP3 will dovetail with WP2, with observations undertaken alongside later phases of interviewing. WP3 will be directed towards producing a detailed and 'real time' understanding

of hospital discharge through observations of interactions and knowledge sharing activities and through 'tracking' patient discharge. Specifically, it will:

- elaborate and enrich the descriptive patterns of stakeholder interaction identified in WP2 through direct observations of how, when, where, and why knowledge sharing takes place, including the role of MDTs, discharge guidelines, knowledge brokers and ICTs;
- identify the threats to safe discharge associated with knowledge sharing through identifying missing, delayed and repetitious communications; jurisdictional boundaries; cliques and structural 'holes'; and marginalised groups;
- understand differences in stakeholders' perception, interpretation and understanding of discharge processes the role of knowledge sharing and patient safety;
- understand how cultural and attitudinal differences influence discharge processes, knowledge sharing and patient safety;
- understand how the organisational context of care delivery and institutionalised occupational boundaries influence discharge processes, the role of knowledge sharing and patient safety.

WP4) Data analysis, formative feedback and dissemination (20 - 24 months)
WP4 will be directed towards the analysis of empirical data and contextualisation of findings with available of hospital statistics with the aim of identifying recommendations for change. This work will be undertaken in consultation with the SAB and research partners, including:

- development of social network sociograms of discharge processes to identify cliques, holes, knowledge brokers/boundary spanners, and key chains of communication;
- synthesis of interview and observational data to understand how and why knowledge sharing represents a latent threat to patient safety or can contribute to 'safe' hospital discharge and reduced emergency readmission;
- contextualisation of the qualitative research findings in relation to available hospital statistics for discharge time, delays, rates, and emergency re-admission;
- identify practical solutions and strategies to enhance knowledge sharing around hospital discharge;
- disseminate and validate preliminary findings to SAB and research partners;
- host formative one-day workshop to disseminate findings to wider health economy;
- prepare and submit SDO, feedback reports and publications.

c. Data collection
The study utilises a range of qualitative approaches for mapping and understanding the social processes, interactions and communications around hospital discharge:

Interviews
Qualitative interviewing allows for the exploration of meanings, beliefs, actions and interactions, from the perspectives of different stakeholders. Each semi-structured interview will follow a thematic guide broadly divided into four sections. The first will ask participants to describe what they see as the discharge process, including the 'gap' between the 'ideal' and 'typical' discharge process and to locate their own roles and areas of expertise in this process. Based upon these answers, the second part will ask participants to identify other stakeholders involved in the discharge process especially those they directly interact and share knowledge with. These questions will serve two purposes, first to provide a basis for subsequent sampling of participants (see discussion of social network interviews) and second to elaborate the patterns of knowledge sharing. The third section of interview questions will ask participants to describe the different settings, processes and media involved in the discharge process including the role of interventions such as MDTs, policies, discharge coordinators, ICTs. The fourth section of the interview will identify what participants see as the potential threats to patient safety in relation to knowledge sharing, exploring known risks associated with falls and medicine management as well as other identified by participants. This will include questions related to the impact of out-of-hours, evening and weekend discharge, together with questions that make particular reference to the particular demographic and geographical factors relevant to the research site. The interview themes will more broadly seek to provide a basis for understand difference in participants' understanding of discharge and knowledge sharing (knowledge), their attitudes and beliefs about discharge and knowledge sharing (culture) and the influence of particular settings, processes or resources (organisation). The interview

questions will also explore participants' experiences and expectations of changes in discharge in light of current NHS reforms, especially changes in stakeholder configuration, commissioning and the work of social services departments.

As a part of the qualitative interviews an additional (fifth) series of question will be dedicated to better understanding the patterns and dynamics of knowledge sharing based upon established social network questions. Social network Analysis (SNA) is an approach that seeks to understand social processes through investigating and mapping the relationships (ties) between people, groups and organisations (nodes) (Granovetter, 1976, 1983; Scott, 2004). It is used widely in the study of knowledge sharing to establish 'relational' data that maps the networks of interaction and exchange amongst a social group (Cross and Borgatti, 2004). The social network component of the interviews is therefore integral, not only to understand the flows of knowledge, but for the sampling of subsequent participants. For example, we anticipate asking discharge co-ordinators not only about the discharge processes, procedures and risks, but about the specific people or groups they share information with or need information from when arranging discharge. This then provides the basis for the next round of interviews (and areas for observation), so as to understand how differences in knowledge and culture are perceived and played out from both sides of the interaction.
Whilst the majority of these interviews will be carried out during WP2, they will also be used during WP3 when observing and tracking patient discharge processes, especially with family members, carers, support groups and individual not identified previously. All interviews will be conducted face-to-face where feasible, but recognising the challenges of accessing stakeholders in primary and community care telephone interviews will be used as a last resort. The interviews will be digitally recorded with the consent of participants and transcribed verbatim by a transcription service.

Ethnographic observations & Patient Tracking

To investigate the 'real-time' patterns of knowledge sharing involved in hospital discharge, as well as to understand how and why they can represent threats to patient safety, the research also follows in the ethnographic tradition. Ethnography is particularly suited to organisational research (Bate, 2004), providing insight into how knowledge is constructed; how beliefs and assumptions are shared; the importance of shared language and stories; how meanings, stories and discourses represent and shape social practice; how ceremonies and rituals guide interaction; and how wider socio-cultural and institutional pressures shape social life (Fetterman, 1998). In line with this approach, the study will involve direct non-participant observations of hospital discharge procedures, including observations of MDTs, transfer activities, and community interactions. Observations will commence during the latter phases of interviewing during WP2 and continue into WP3 and the patient tracking. The observations will elaborate and provide detail to the patterns of interaction developed from WP2, through providing a 'rich description' of the everyday processes of hospital discharge, the routine patterns of communication and the prevailing norms and values that guide work. In the first instance this observational research will be undertaken in blocks of 3-4 days per week, over a month within and around each of the stroke and hip fracture departments at both participating NHS Trust (4 months). We will also ensure that observations are carried out at least one weekend in each of the four departments and during evenings for one week period to determine the impact of out-of-hours, evening and weekend discharge, which is recognised as constitute a particular high risk area for patient discharge. These observations will then be followed up through further observations in other NHS and community as identified through these sites visits and then detailed 'patient tracking'.

Following the initial phases of observations, the study will seek to focus our understanding of the discharge process and the contribution of knowledge sharing by 'tracking' 40 patients (8 from each department) throughout their discharge process and then follow-up these patients in the community setting for 30 days. The observations do not intend to produce statistical or generalisable data, but rather to develop a more contextual understanding of how discharge occurs as an unfolding process for different patients and groups. This approach has been used in previous patient safety related studies and involves shadowing and tracking as many of the interactions, knowledge exchanges and decisions made within a discharge process. It aims to understand how these interactions unfold in real-time, for specific patients, within a

particular temporal and spatial context. It is expected that tracking 8 patient discharge processes in each of the 5 clinical sites will provide a rich quality of empirical detail. In particular, observations will enable us to record the interactions, information and knowledge exchanges and socio-cultural context of hospital discharge. The selection of these patients will be determined in consultation with the local service providers to take into account differences in patient characteristics, such as suitability for early discharge and co-morbidities. Observational records will be recorded in field journals including both detailed descriptions of activities and interactions as well as analytical interpretation and emergent coding.

Routine service data

The study will also collect routine NHS performance data related to hospital discharge, to be used in WP4 to contextualise and better compare our empirical findings. For the purpose of this study and given constraints of systematically producing additional outcome measures, we will utilise existing data related to the number of discharges, delayed discharge, number of days in hospital, and number of emergency readmissions. This will only be used to provide contextual our data analysis and to identify associations with the social network analysis, but will not be used to established statistical associations or correlations. This information will be collected and reviewed in collaboration with each respective department and hospitals. We will also collect summary data for patient safety incidents reported during the course of the study and work with the risk managers in each department and hospital to analyse these reported incidents in relation to our emerging empirical data set. The intention being that by the end of the study risk managers will be able to better understand the latent threats associated with knowledge sharing in the context of hospital discharge.

Participant selection issues

The selection of participants for interviews and observations is centred on identifying those individuals and groups who participate in, or might be excluded from discharge procedures. This will involve 'snowball' sampling, which is geared towards identifying participants involved in complex social activities, but about which there is limited prior knowledge who these people are and how they relate to one another in advance of the study. Elaborating this, an initial group of known 'key' staff will be sampled within each hospital department and will provide the primary focus of understanding discharge processes, including the ward managers, lead clinicians and discharge co-ordinator. Through the snowball approach each of these participants will be asked to identify the individuals, agencies and organisations with whom they interact and share knowledge in the processes of discharge, including those both inside, outside or working across the NHS. The individuals and groups identified through these interviews then provide the next phase of sampling. The initial interviews, therefore, provide the basis of subsequent selection. This type of 'snowball' or chain referral sampling is a well established in social network analysis given the difficulties in sampling relationships about which there is little prior knowledge (Biernacki and Waldorf, 1981; Granovetter, 1976), for example, it can be difficult to pre-determine members, boundaries and take into account temporal and spatial changes (Knox et al 2006). This snowball sampling will continue for at least three phases in order to identify and recruit as inclusive a range of stakeholders involved in hospital discharge. As such, it is difficult to determine in advance the exact groups, numbers or locations of participants but it is estimated that approximately **15 individuals** will be selected from each of the hospital departments, including medical consultants and SPRs, nursing staff; discharge co-ordinators; patient liaison & support groups; administrative staff; physiotherapists; occupational therapists; speech therapists; hospital pharmacists; social workers and porters, Ambulance/transport staff.

In terms of those identified in primary, social and community settings, it is again not possible to determine the exact range and number of participants. However, it is anticipated this will include patient support groups, social services, housing services, GPs, community nurses, community pharmacists, community therapists, dieticians and care home managers. Given the diversity of this group and the fact their involvement will often be unique to a given patient, a representative sample of key individuals and agencies for each discharge process will be selected, including GPs, social workers, carers, therapists and pharmacists. These will be contacted through the Trust and through local agencies, such as Social Services. For each Trust we aim to select and interview an estimated **10 representatives** from outside of each

Trust .

Observational research will be commenced during the later rounds of snow-balling sampling, after determining the patterns of interaction and knowledge sharing and having built rapport and trust with staff members. An initial objective of the observation will be to focus on key knowledge sharing activities and settings as identified through interviews and early stages of observation. This included known interventions, such as MDTs and the use of ICTs. To further focus the observations as 'real time' unfolding events we will also undertake 'patient tracking'. Working with discharge co-ordinators, service managers and patient/family representatives we will identify **eight** patients within **each** departmental site for the purpose of observing or shadowing their unique discharge processes. Although this number may not seem particularly high in the context of other trials or evaluations, the research work and volume of data collected during these process aims to generate a rich and detailed qualitative understanding of discharge process from a small number of purposively selected case. For the selection of patients we will work with discharge co-ordinators, service managers and patients and families to identify and recruit patients. These will be selected purposively with the intention of exploring known risks. Specifically, patients will be selected to reflect the clinical risk foci as outlined above, including patients at high risk of falls, patients with complex medicines management, and two patients with other identified threats to safety, such as dietary problems or lack of support in the home environment. As a part of this selection process we will also have to balance the need to recruit patients where the discharge journey can be observed over the length of the observational period, for example, some patients may experience a discharge process that occurs over several months of planning.

d. Data analysis

The research findings will be analysed through a combination of distinct techniques. From WP1 the study will synthesise the existing literature in relation to hospital discharge, knowledge sharing and patient safety, with specific reference to the study's clinical focus. This will identify empirical and conceptual gaps in existing knowledge. Data collected through interviews in WP2 will be analysed in two ways. First, the individuals and agencies that participants 'name' as sharing knowledge during hospital discharge will be inputted into specialist social network software (UCInet) to generate socio-grams of the patterns of interaction and knowledge sharing for each hospital department. These patterns will be further analysed to understand the strength and dynamics of knowledge sharing, including the degree of **cohesion**, **connectivity** and **density** (how actors are connected actors), **core/peripheral** boundaries, the existence of **cliques** (sub-groups), **boundary spanners** or **knowledge brokers** (those who link groups), the existence of gaps or **holes** and the existence of multiple or redundant communications channels (Wasserman and Faust, 1994). Second, the interview data will be analysed to understand from the experiences of participants, how and why discharge processes occur as they do; the role of knowledge sharing; the contribution of interventions to support knowledge sharing; and the perceived threats to patient safety. This will pay particular attention to the positive and negative contributions of MDTs, discharge policies and guidelines, co-ordinators and ICTs as facilitating knowledge sharing across these groups. This will involve close reading and interpretation of the interview data in line with the heuristic model. Initially this will be led by Waring and the appointed researcher. During WP3 and WP4 the research team will also organise three data analysis workshops alongside their regular team meetings. These will be directed towards identifying and developing common analytical codes and themes from the data. This will be concerned to understand the shared and distinct practice and **knowledge** domains of participants; their **cultural** values, norms, customs and rituals; and the **organisational** and institutional factors that shape knowledge sharing and hospital discharge. This will explain the patterns of interaction developed through the SNA.

The SNA and qualitative data analysis will be elaborated through analysis of observational data. The observations and tracking of patient discharge will focus on understanding the socio-cultural and organisational contexts of hospital discharge as a situated, ongoing process. It will provide further evidence as to when, how and why knowledge is, or is not, shared. It will also elaborate and empirically ground the latent threats to safe discharge as identified by participants and reported incidents. Specifically, the findings will inform the

analysis of the upstream latent factors related to knowledge sharing, for example, 'tracing' the influence of missing, delayed, broken or fragmented communications and their impact upon service planning and delivery. This will focus on determining the **relative contribution of knowledge sharing as a latent threat to safe discharge**, and then explaining this threat in terms of our heuristic model of knowledge, culture and organisation. This will also involve the systematic coding and analysis of field journals, which will be written by the researcher as case reports for the use of the wider research team. Qualitative data analysis will use the software package Atlas ti.

The analysis of data will make within and between case comparisons. The study design facilitates analysis of the similarities and differences between stoke and hip fracture discharge, thereby having the potential to identify more common recommendations, as well as service-specific changes. The study design also includes comparison between a large city-centre and a medium-sized rural service provider. It is expected that these differences in locality, size and organisation will highlight further differences in terms of discharge planning thereby offering, again, more general lessons for different service providers. The ultimate aim of the analysis is to identify recommendations, interventions and practices to support communication and knowledge sharing between care processes and settings. This will involve explaining the threats to safe discharge in terms of differences in knowledge, culture and organisation, which will enable us to make tangible recommendations for service improvements to address these differences. For example, developing communication media that use shared phraseology or that is exchanged at times that aligns with the most convenient working practices of different stakeholders. We will develop these recommendations through workshops with participants and through the expertise found within the research team.

The study has been designed to the increase the generaliseability of the research in a number of areas. First, we highlight the areas of comparison between clinical risk (falls/medication/other), clinical condition (stroke/hip) and hospital location (including demographic and urban/rural differences). These differences in foci enable the study to draw out specific lessons for risk, patient groups or hospital settings, but also through comparison and cross-referencing these categories we can draw out the more common lessons. For example, we will be able to elaborate specific lessons for managing stroke discharge in both rural and urban areas, as well as more lessons for stroke discharge that are common to both rural and urban areas. Equally, we can identify the areas of difference and commonality for both stroke and hip fracture discharge in the area of risk of fall or access to social services. Through comparing across all categories we can also elaborate more general recommendations for service-wider changes. We will also validate and explore the generaliseability of our findings through consulting with partners within the Stoke and Hip fracture services based at Nottingham University Hospitals and CLAHRC NDL
Specifically, through the presentation of emergent research findings (in WP4) to service providers and groups of staff working with this additional Trust will assess the validity and relevance of our findings beyond the specific empirical cases.

Second, the use of theory enables us to generalise beyond the specific empirical case. The heuristic model enables us to understand how specific differences in knowledge, culture and organisation compare, relate and differ to more general expectations and explanatory models of knowledge sharing and patient safety. For example, framing our analysis through the concept of 'absorptive capacity', especially at a system level and with a focus upon the impact of professional hierarchy, is likely to extend transferability to other health and social care settings beyond the empirical sites. For instance, professional hierarchy of evidence, which privileges RCT clinical evidence, impacts upon acquisition and assimilation of other types of knowledge. Our study may show how this can be moderated (e.g. though knowledge brokering) working across health and social care generally.

5. Contribution of existing research:
The study links to the explicit needs set out in the research brief (10/1007) especially the need to address the wider organisational and managerial dimensions of patient safety. With particular reference to section 3.4 it will contribute to and develop our understanding how the

threats to patient safety associated with working across and between occupational, organisational and sectoral groups – the spaces between care settings –focussing on hospital discharge and knowledge sharing as examples of this problem. The research will develop our understanding of the potential threats to patient safety in hospital discharge, especially those 'hidden' risks that 'fall between the cracks' and widely associated with knowledge sharing. It will develop recommendations to enhance knowledge sharing so as to enhance patient safety. This study will contribute to the SDO's growing expertise in the area of patient safety [SDO 08/1501/92], through building and showing the links between more explicit patient safety research [SDO10/1007] and existing or current funded research, such as the knowledge mobilisation and utilisation programmes that highlight the importance of knowledge brokers and inter-sectoral working [SDO 08/1801/220; KM259].

6. Plan of Investigation:

7. Project Management:
The study will be managed by Waring with the support of the wider research team. Waring will be primarily responsible for managing the study, and will take an active lead in finalising ethical approval, working with research partners, communicating with stakeholders and planning and arrangement SAB and PPI activities. Waring will also manage and supervise the appointed researcher and doctoral student and undertake high-level research activities, such as interviews with Trust executives and liaison with patients and families. An operational research team will meet weekly (Waring, Bishop, appointed researcher and doctoral student) to set, monitor and evaluate research objectives and critical pathways for research completion. The wider research team will meet on a bi-monthly basis to review progress and plan future activity, setting and reviewing clear objectives and participant in qualitative data workshops. Individual members of the research team will take leadership responsibility for specific project issues, including research tool design (Bishop), access or ethical issues (Currie & Waring), the generation of service recommendations (Avery, Sahota, Walker) liaising with families and carers (Fisher and Waring) and formative dissemination (Fisher). The team represents an established partnership of clinical and non-clinical researchers in Nottingham and brings together expertise in patient safety, inter/intra-professional working and knowledge sharing; together with clinical research expertise in patient safety, hospital discharge, stroke and orthopaedic rehabilitation.

A Scientific Advisory Board (SAB) will provide high level governance of the research (design, findings, dissemination). It will comprise expertise in patient, inter-agency working, stroke and orthopaedic medicine (to be appointed in consultation with research sites), research methods, and local NHS organisations (R&D managers for Leicester and Lincolnshire hospitals), including an experienced user in the region and a representatives from the Nottingham Patient Osteoporosis Support Group. The SAB will meet 3 times over the course of the research, including end of WP1, between WP2 and WP3, and prior to the feedback event during WP4.

8. Service users/public involvement:
The study will utilise existing user engagement arrangements established with CLAHRC NDL, including existing PPI mechanisms (POPULOS), to obtain the input of patients & carers. The PPI sub-group will comment upon research design, comment on ongoing findings, & facilitate dissemination. The PPI sub-group will meet separately with the research team 3 times, immediately prior to each SAB meeting above, on the basis that such structural arrangements engender greater participation & patient and public 'voice'. A representative from PPI sub-group will participate in SAB meetings. Beyond the involvement of end-users of the research as outlined above, we will disseminate our findings at a specific event utilising CLAHRC NDL structures & processes to ensure that research makes a difference to practice. CLAHRC NDL will offer a 'situated learning' workshop (for 20 participants), which will be opened up beyond NHS East Midlands. Additionally there will be a half day national symposium tailored for the academic or applied health research community on completion of research.

9. References:

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