SUPPORTING COMMUNICATION BETWEEN NURSES
AND PHYSICIANS

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Abstract

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Nurses and physicians in General Internal Medicine (GIM) work in a complex environment where patients present with complex (co)morbidities; management of such patients requires input from a full range of medical disciplines. In addition, there is regular resident physician changeover every 8-9 weeks in this teaching environment, and patient “flow” problems caused by overcrowding and placement issues. This complexity causes difficulties in the information exchange between nurses and physicians necessary to manage patient care.

Multidisciplinary team meetings have been suggested as helpful to interprofessional communication, and in General Internal Medicine these take place in the form of daily “Bullet Rounds”. More recently the use of process engineering approaches has been suggested as a way to increase efficiency in healthcare; this dissertation evaluates its impact on communication between nurses and physicians.

The initial observational field study showed that information exchange was the main focus of dialogue in Bullet Rounds, and identified information gaps between nurses and physicians. Script Theory (Schank and Abelson 1977) was used to propose that information gaps in Bullet Rounds are caused by different knowledge and goals, which result in inconsistent scripts.

A process engineering intervention took place in General Internal Medicine. Process engineering methods have been proposed as being helpful in process design and
improvement in healthcare but have not been systematically evaluated. The researcher conducted a pre and post intervention study of Bullet Rounds in order to identify and analyse the impacts of a process engineering intervention on information exchange between nurses and physicians. The results showed that information loss decreased after the intervention but that resident physicians were not satisfied with the nurses-physician information exchange. The staff and resident physicians appeared to have distinct and different information needs and perspectives, while the nurses felt that the Bullet Rounds process had improved, but that it needed revisiting, and were not aligned with staff physicians on respective roles and responsibilities.

The overall results suggest that even after the process engineering intervention, there was still misalignment of goals and scripts between the two groups of physicians and between the physicians and nurses, and strategies for addressing these gaps are proposed.
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Chapter 1 – Introduction

1.1. Interprofessional Communication

1.1.1. Approaches to Collaboration

Healthcare organizations encourage collaboration between healthcare professionals because it is seen as a benefit to all aspects of patient care. Collaborative practice has been defined as “an interprofessional process for communication and decision-making that enables the separate and shared knowledge and skills of care providers to synergistically influence the client/patient care provided” (Oandasan et al. 2005 pg 15). Bullet Rounds are multidisciplinary team based rounds used for decision-making, and an example of collaborative practice since they are an interprofessional process whose purpose, based on the research reported in this thesis, is communication of information. Teamwork is an important component of collaboration, and Bullet Rounds participants are engaged in teamwork based on the following definition; “health care professionals who perceive themselves and other health care professionals as working collaboratively for patient-centred care” (Oandasan et al. 2005 pg 14).

There is limited empirical evidence to show whether or not collaboration between healthcare professionals works in practice; the evidence is inconclusive due to poor measurement instruments, and the lack of an evaluative component in most studies. Where results are available, they appear to indicate that the affects are on care processes rather than clinical outcomes (Zwarenstein and Reeves 2000), although process change itself may be considered a desired outcome in some contexts. Other qualitative reports have claimed that team-building sessions, coaching and ground rules for nurse – physician collaboration have resulted in positive change (Horak 2004), and the concept of “negotiated order” has been suggested as a way to break down barriers to physician – nurse collaboration (Zwarenstein and Reeves 2002).

Establishment of multidisciplinary teams and team meetings such as Bullet Rounds is a common approach to encouraging interdisciplinary collaboration; for example, they are
mandated by the UK National Health Service in contexts such as cancer care (Kelly 2002). Optimising teamwork processes is more challenging in a multidisciplinary context such as Bullet Rounds, and some authors have questioned the value of Multidisciplinary Team Meetings, claiming a paucity of evidence to show their positive impact on patient outcomes (Tattersall all 2006, Acher 2005, Eagle 2005), although these studies were done in cancer care and a palliative setting. Other authors have suggested a number of barriers to effective multidisciplinary team processes and communication, including the strength of professional identity, differing perceptions of teamwork and dominance of medical personnel (Atwal 2002, 2005), and suggesting increased use of IT could be helpful (Cole 2003). However, most studies suggest they do have a positive impact on reducing variability in decision-making (Ruhstaller 2006) and time to discharge (Aston 2006), building interprofessional collaboration and awareness (Bennett-Emslie 2005), and dealing with complexity (Rivetti 1999).

1.1.2. The Communication Space in General Internal Medicine (GIM)

Patient care in the General Internal Medicine wards requires the collaboration of professionals from different disciplines; this group is referred to as the “multidisciplinary team” (Oandasan et al 2005) and meets daily at Bullet Rounds. Bullet Rounds represent the communication space (Coeira 2000) of the group because they are the only occasion when all the disciplines meet at once, and are therefore a key process in General Internal Medicine. Each professional discipline has its own model and view of the world, with specific training, experience, and scope of practice that accompanies it; these are sometimes referred to as professional “silos” because they do not provide a view of the broader system. The training and experience specific to a given discipline results in acquisition of knowledge and goals, and an accompanying communication style. For example, the physician medical model is focused on diagnosis of illness and problem solving and their communication style is very direct and to the point. The nursing model, however, is not diagnosis based but is more descriptive, and their communication style is more narrative (Haig 2006, Leonard 2004).
In Bullet Rounds individuals from different disciplines bring their specific knowledge and communication styles into the shared communication space. In the language of Script Theory (Schank and Abelson 1977), reviewed in depth in Chapter 3, they bring “scripts”, based on their individual knowledge and goals, which are the basis of their understanding of the world. For example, the physical therapist (PT) script includes a concern with the patient’s mobility and their ability to function physically. The social worker (SW) script includes an interest in family or societal issues that affect the patient’s future, as well as knowledge of the system of long term care. The physician script is focused on the medical diagnosis, treatment and cure for the patient while the nurse’s script revolves around the provision of the appropriate treatment and comfort to the patient, and monitoring the status of the many factors that affect them.

1.2. The Problem: Information Loss between Nurses and Physicians

The training of all the disciplines that take part in patient care in General Internal Medicine is focused on the well-being of the patient, but from different perspectives, as suggested above. Nurses and physicians contribute information to the discussion in Bullet Rounds based on their role in patient care and their understanding of the purpose of the meetings, which may not be shared by others. The research on Bullet Rounds was in response to concerns about the effectiveness of the meetings. The synergistic relationship between the knowledge and skills of different disciplines, which is the basis of collaborative practice, is not automatically or easily achieved. It was not perceived to be occurring between nurses and physicians in Bullet Rounds, and important information was being lost. The challenge was to understand why, and attempt to realign the processes in Bullet Rounds to encourage a better coalescence of knowledge.


The conceptual table of the thesis is shown below in Table 1. It provides an overview of the structure, progress and results of the thesis using as the explanatory framework the
theoretical concepts of Script Theory (Shank and Abelson 1977), which are described in detail in Chapter 3.

The table provides a summary of the progress of the research activities and results, and the evolution of the Bullet Rounds communication space, over time. “Communication space” in this context refers to the direct interactions between participants in the meetings. Column 1 shows the communication space at stage 1; the two groups of physicians and the nurses have separate and disparate scripts, and the field study undertaken at this stage uncovers gaps in communication. Column 2 shows where a process engineering intervention (Womack and Jones 1995, 1996) occurred, and the research activities and findings associated with the evaluation study following that intervention. Column 3 shows the changes in the Bullet Rounds communication space at Stage 2, after the intervention; physician and nurse scripts have begun to overlap, but more congruence is needed. The research suggests changes that may encourage the creation of a shared Bullet Rounds script.
Table 1: Conceptual Table of the Thesis: Evolution of the Bullet Rounds Communication Space
1.4. **Objectives and Rationale**

The objective of the Bullet Rounds field study was to understand the content and communication processes of Bullet Rounds, and the needs of the participants that required support to improve their effectiveness, as input into the design of information technology.

The objective of the evaluation study was to describe and evaluate the impact of the process engineering intervention on nurse/physician information exchange during Bullet Rounds, on the General Internal Medicine inpatient units at Toronto Western Hospital.

The rationale for studying this in a systematic way is that communication between nurses and physicians has been identified as having significant impact on interprofessional collaboration, and patient care and safety, and as such is a measure that reflects the goal of benefiting patients.

1.5. **Research Questions**

- What is the content and process of nurse-physician communication at Bullet Rounds meetings?
- What was the impact of the process re-engineering of Bullet Rounds on information categories and information loss in patient information exchanges between nurses and physicians?

1.6. **Importance**

The professional groups working in General Internal Medicine are charged with the care of patients with complex medical issues. The study of how they communicate to coordinate their activities and cope with complexity, volume and staff training/turover assists in the understanding of their goals, concerns, needs, and knowledge. Bullet
Rounds are the only occasion when healthcare professionals from all the disciplines engaged in the patients’ care meet simultaneously and are a key process in the coordination of work in the wards. As such they reveal the similarities and differences between the professions, and highlight potential issues such as interdependencies and conflicts, an understanding of which on a practical level can potentially be used to design processes that respond appropriately to the required tasks and are more resilient to failure.

The evaluation of the process to re-engineer of Bullet Rounds is important because it explores the degree to which a multidisciplinary process in this context this can be formalized or routinized and whether this results in more effective and reliable performance. It also attempts to measure whether the changes meet the goals, task certainty/uncertainty and needs of the participants.

The value of the research questions reside in their potential explanation of how common ground and common scripts are or can be established between professional communities of practice who have separate and distinct but interdependent knowledge that must be transformed and reconciled.

1.7. **Organization of the Thesis**

**Chapter 2** is a review of the literature relevant to the dissertation. Recent applications of Script Theory (Schank and Abelson 1977) are reviewed and an overview of the literature on multidisciplinary team meetings provided to identify what problems have been identified and strategies that have been found to be helpful in standardizing such meetings. Models of diffusion of innovation and change in organizations are discussed with the factors that impact their effectiveness. Finally different approaches to content analysis and how it has been applied in research are presented.

**Chapter 3** is an overview of the research motivation and strategy.

**Chapter 4** is an overview of Script Theory and how it is used to inform the research.
Chapter 5 describes the initial field study. In the first part, the Bullet Rounds structure and process within the hospital context are defined and modeled. In the second part, dialogue in Bullet Rounds on individual patients between nurses and physicians is documented, coded and analysed. The results showed that information exchange was the main focus of dialogue in Bullet Rounds, and that information gaps occurred and were a problem. Information needs in Bullet Rounds were analysed and a standardized script based on a structured language framework (Haig 2006, Leonard 2004) was created to guide the Bullet Rounds discussions. These were available as reference material during the process engineering intervention that took place in General Internal Medicine, which is described in the following chapters.

In Chapters 6 and 7 the evaluation of the process engineering intervention is presented.

Chapter 6 describes the background, objectives, research questions, and design of the study, including a description of the process engineering intervention.

Chapter 7 describes the methods and results of the evaluation. A pre and post intervention observational study of Bullet Rounds was undertaken in order to identify and analyse the impacts of the process engineering intervention on information exchange between nurses and physicians. The field notes were coded into information categories, and other observational data from Bullet Rounds used in the analysis. Resident (junior rotating) physicians were interviewed pre and post the process engineering intervention and staff (senior) physicians were interviewed post intervention. Interviews pre intervention and a focus group post intervention were conducted with the nurses involved in Bullet Rounds, using the same discussion points as the physicians.

The results of the content analysis showed that information loss decreased after the intervention and that this may have been caused by a realignment of the nurses’ goals in Bullet Rounds, and changes in the process of the meetings. The results of the interviews differed between resident and staff physicians. Resident physicians, even after the process
engineering intervention, continued to feel that they were not getting adequate information from the nurses, while staff physicians tended to feel there had been improvement in this area, as well as in the process in Bullet Rounds. It is proposed that these differences may suggest misalignment of scripts between the resident and staff physicians, and these findings are explored in more detail in focus groups with the resident physicians, as are potential solutions to repair the communication gaps.

The results suggest that the resident physicians did not feel their goals were aligned with those of the nurses, and that the nurses-physician information exchange overall was ineffective and error prone. The nurses, like the staff physicians, discussed communication issues from a more general perspective than the resident physicians, and had a similar view of the purpose of Bullet Rounds. They agreed with the staff physicians that the Bullet Rounds process had improved but that it needed revisiting, but were not aligned on respective roles and responsibilities. This may reflect the fact that resident physicians are engaged in front line patient care while the staff physicians and nurses have a more consultative role.

**Chapter 8** is a discussion of the overall results and their implications for Script Theory. It is suggested that even after the process engineering intervention there was still misalignment of goals and scripts between the two groups of physicians and between the physicians and nurses. In addition, there was a lack of consistency in all processes due to the “person specific” nature of goals, scripts and behaviour.

**Chapter 9** proposes recommendations to address the information gaps that continue to exist. Ways to reduce script variability are suggested, using the creation of a clearer Bullet Rounds script that includes better defined goals, roles and responsibilities and processes, a structure for continuous improvement and sustainability, and the use of information technology to enable synchronous information exchange.

**Chapter 10** is an overview of the contributions of the research, its limitations and implications for future work.
Chapter 2 - Related Research

The review of related research below covers the topics of Script Theory, multidisciplinary team meetings, content analysis and models of change. A brief explanation will now be given for why each of these topics is relevant to this research. Each of the topics will then be reviewed in more detail in the subsequent sections and the chapter will close with a review of models of change and a summary of lessons learned from the literature review.

Script Theory is the main theoretical framework that was used in this research. Since Bullet Rounds are a communication space, it is of interest to analyse the dynamics of Bullet Rounds in terms of communication scripts and to use this analysis to suggest ways to support the design of improved Bullet Rounds methodologies. Script Theory also helps to explain what actors (i.e. participants in Bullet Rounds) do and say and why, because it can explain human behaviour based on previous experience, including situations they have been in and what they have learned. Script Theory can be applied to both of the study’s two units of analysis examined in this research; individual pieces of dialogue in Bullet Rounds and the individuals themselves. Alternative theories that were considered for this dissertation prior to choosing Script Theory are briefly reviewed in Appendix 9 which provides an overview of other communication theories and why they are not appropriate to this study.

Bullet Rounds are a form of multidisciplinary team meeting. The large literature on issues surrounding multidisciplinary teams was reviewed in order to identify key principles that govern communication in Bullet Rounds and to examine the state of the art of research in this area.

The third and final topic covered in this literature review is content analysis. Bullet rounds are complex interactions between groups of people and the chief form of data collected in those meetings is what people say. Content analysis provides a systematic way to analyse and interpret the resulting interprofessional communication. Thus the literature was reviewed in order to assess best practices, and to provide a methodological guide for the use of content analysis in analysing the observations of Bullet Rounds.
2.1. **Script Theory**

Script Theory (Schank and Abelson 1977) suggests that humans possess cognitive scripts which are schematic mental representations of real-world events that guide their perception, comprehension and behavior, and is rooted in schema theories (Bartlett 1932.). In their book “Scripts, Plans, Goals and Understanding” Schank and Abelson (1977) define a script as “a predetermined, stereotyped sequence of actions that defines a well-known situation” (page 41). Cognitive scripts are different from roles (Sarbin and Allen, 1968, Solomon et al 1985) in that they are cognitive structures but can be influenced by roles which are a set of expectations. Schank and Abelson were interested in how people interpret text, and applied this to the artificial intelligence field. In a later publication “Knowledge and Memory: the Real Story” (1995), they broadened the discussion to situate language within stories, again based on experience; in both cases their focus is on communication.

Script Theory has been applied to restaurants (Schank and Abelson 1977, Bower et al 1979) and other consumer related experiences. For example, empirical research has shown that consumers possess specific cognitive scripts for grocery shopping (Rethans and Taylor 1982, Stoltman et al 1982), department store `shopping (Stoltman et al 1989), automobile buying (Leigh and Rethans 1982, Rethans and Taylor 1982) and household appliance acquisition (Erasmus and Boshoff 2003). Understanding of this phenomenon is viewed as useful in predicting behaviour. Empirical studies have shown that both level of experience (Alba and Hutchinson 1987) and the complexity of the script (Martin 1991) affect the cognitive structure of the consumer. More recent work has extended the study of consumer behaviour into on-line shopping where it was shown that consumers with experience of online shopping have a more developed online purchasing script, which represents a modification of their cognitive structure (Hallegate and Nantel 2007).

In the healthcare context, Script Theory has been applied in the areas of service delivery, consumer expectations and clinical reasoning. Alford (1998) used the idea of scripts in a
dental office setting to study the expectations of consumers and how they correspond to levels of satisfaction with the service received. He found that experienced consumers have scripts for a dental service encounter, and that deviation from consumers' expected cognitive script influences their perception of the quality of the professional service provider, satisfaction with the professional service encounter, and their intention to visit the professional service provider again.

Russ (2006) explored the notion of consumer expectations further: in his study he found that consumer expectations in health care services are multidimensional, involving role, process, outcome, and service quality. The research identified that the uncertainty of a health service encounter may cause certain consumers to choose coping strategies and have expectations based on their locus of control orientation, which is situated along a continuum ranging from “approach-active” to “avoidance-passive”. The script model was suggested as a useful basis for segmentation in health care services, to improve consumer satisfaction by designing integrated marketing communications and service offerings which meet unique psycho-social needs and consumer expectations.

Script Theory was also applied to the study of sociocultural competence in healthcare, looking at the medical consultation from the point of view of a cultural group whose traditional view of illness and medicine is very different from the western model they encountered in the United States. In the study, elicitation of scripts uncovered cultural knowledge which would affect the choice and sequencing of language functions in the medical consultation (Ranney 1992).

From the healthcare provider’s point of view Script Theory is also helpful in the study of clinical encounters with patients. In a study of physician behaviour in clinical encounters, Charlin et al (2007) suggested that physicians have “illness scripts” that develop and are refined through clinical experience, enabling them to perform the variety of intellectual and psychological tasks that comprise the clinical encounter. These include; perceiving the features of the situation, quickly assessing relevant hypotheses, checking for signs and symptoms that confirm or rule out competing hypotheses, and using related
knowledge to guide appropriate investigations and treatment. The important point is that the “illness script” enables the physicians to infer, a process based on pattern recognition, and reduces the need to deliberately reason, unless the complexity of the case causes several scripts to be activated at once. The authors suggest these “illness scripts” have certain characteristics; specific symptoms and signs can be shared between scripts, the activation of one script can lead to the automatic activation of another, and scripts are generic and can be applied to any instance of an illness. This script instantiation tests whether the script that has been invoked is in fact the right one.

The activation of scripts is also seen as a key feature in expert behaviour in medicine, including hypothesis generation. The authors conclude that Script Theory raises issues around medical education with respect to instructional methods that may or may not foster the construction and refinement of scripts, and suggest that both problem-based and experience-based learning are relevant and necessary.

Script Theory has been used in instructional design in general, with emphasis on the role of prior knowledge in processing, use of scenarios and facilitation of schema building (Widmayer 1997). However, a strongly situated schema may make it difficult for learners to develop functional problem solving skills that are appropriate across knowledge domains, because of the difficulties of transferring knowledge outside of the context in which it was originally acquired (Price and Driscoll 1997).

2.2. **Strategies to Improve Interprofessional Communication**

2.2.1. **Multidisciplinary Team Meetings – Script Alignment?**

In order to cover the appropriate literature for this research review, a search was carried out on the main healthcare databases, Medline, PubMed, Embase, CINAHL and the Cochrane Library. The key words used were multidisciplinary team meetings, interdisciplinary, interprofessional collaboration and communication.
Enhancement of interprofessional collaboration in the healthcare field is seen as a way to address the unacceptably high rate of errors in patient care (Corrigan et al 2000) and as a benefit to all aspects of patient care (Oandasan et al 2005) although the way healthcare is organised is not necessarily conducive to collaboration (Uhlig 2002).

There is limited empirical evidence to show whether or not collaboration between healthcare professionals works in practice; the evidence is inconclusive due to poor measurement instruments and the lack of an evaluative component in most studies. A systematic review of interventions designed to improve nurse-physicians collaboration found that increasing collaboration improved processes but results were inconclusive (Zwarenstein and Bryant 2005). Where results are available they appear to indicate that the affects are on care processes rather than clinical outcomes (Zwarenstein and Reeves 2000), although process change itself may be considered a desired outcome in some contexts. Other qualitative reports have claimed that team-building sessions, coaching and ground rules for nurse – physician collaboration have resulted in positive change (Horak 2004), and the concept of “negotiated order” has been suggested as a way to break down barriers to physician – nurse collaboration (Zwarenstein and Reeves 2002).

Establishment of multidisciplinary teams and team meetings is a common approach to encouraging interdisciplinary collaboration. For example, they are mandated by the National Health Service in the UK in contexts such as cancer care (Acher 2005, Whelan 2005, Ruhstaller 2006), but studies have shown there is wide variation in how they are run (Kelly 2002, Tarling 2006)) and that they do not meet the standards set by the UK National Health Service (Monaghan 2003).

A systematic review of the benefits of interdisciplinary team work found that the study of multidisciplinary team meetings in healthcare is hampered by inconsistent terminology, lack of documentation, and a lack of study of the factors that ensure their effectiveness (Schofield and Amodeo 1999). For example, in their systematic review these authors found that the terms “interdisciplinary” and “multidisciplinary” were undefined and used
interchangeably. Studies have included a variety of settings and diverse findings. In a stroke rehabilitation setting, results showed that in multidisciplinary team meetings dissemination of decisions was more common than exploration of alternatives (Gibbon 1999) and that team members were not forthcoming with information and did not find the meetings helpful (Pound 2000). In cancer care settings, results showed that clinical management was not affected by the meetings (Acher 2005, Kunkler 2005), the meetings were poorly organised (Kelly 2002) and inconsistently run (Whelan 2005), and that democratic leadership was important (Ruhstaller 2006). In the rehabilitation setting a study found that engagement of the patient in a multidisciplinary team meeting did not necessarily lead to collaboration (Abreu 2002); in a study of a fracture clinic setting that included observations of multidisciplinary team meetings, integrated documentation was shown to lead to better outcomes for the hospital but not necessarily an enhancement of interprofessional relationships and communication (Atwal 2002). A study in a long term care setting showed that shared decision making in multidisciplinary team meetings did not flatten the hierarchical structure (Cott 1997), and another in a pediatric setting found that interdisciplinary meetings positively affected patient care (Aston 2006). In a psychiatric setting a study suggested that the structure, process and outcomes of multidisciplinary team meetings should be studied (Mohr 1995) and that such meetings were linked to increased satisfaction for practitioners but this did not translate into better patient outcomes (Byng 2004). In a hospice care setting a study found that the meetings were predominantly physician led (Eagle 2005) while another in a forensic mental health setting showed that tensions in the meetings existed as a result of differing ethical codes of participants (Mason 2002).

Optimising teamwork processes is more challenging in a multidisciplinary context. A multidisciplinary “team” is not a unified entity but a complex and fluid entity based on a collection of distinct professional identities based on different models of care, skills, economic circumstances and political agendas (Lingard et al 2004). Studies focused on nurse – physician interaction in settings similar to General Internal Medicine found that nurses were reluctant to voice their opinions in meetings (Atwal 2005), and that team work was hindered by differing perceptions of teamwork and levels of skill acquisition.
and the dominance of medical personnel (Atwal 2006). Others identified lack of consistency in goals and processes as a problem across the organization (Tarling 2006), and the importance of leadership (Pethybridge 2004), and that individual “emotional intelligence” consisting of self-awareness, self-management, social awareness and social skills, impacts team effectiveness (McCallin 2007).

Some authors have questioned the value of Multidisciplinary Team Meetings such as Bullet Rounds, claiming a paucity of evidence to show their positive impact on patient outcomes (Tattersall 2006, Acher 2005, Eagle 2005), although these studies were done in cancer care and a palliative setting. The multidisciplinary team has been described as a “contested space” that is competitive rather than co-operative; using the theory of social structuration it has been suggested that each professional group attempts to distinguish themselves and others of their profession to acquire more “capital” and promote their ability to act. (Lingard et al 2004). The literature suggests that barriers to effective Multidisciplinary Team Meetings include the strength of professional identity, professional jealousy, role boundaries and communication (Atwal 2002, 2005). Other authors have noted issues around differing perceptions of effective teamwork and the ability to function in a team (Atwal 2006) and the dominance of medical personnel (Acher 2005, Atwal 2006, Mohr 1995).

Effective communication is central to collaboration (Beyea 2004) and is consistently highlighted as a key element of effective teamwork (Weiner 2005, Friedman 2004). The importance of information in communication has been highlighted (Matsusaka 2003, Pound 2000), but observations of the process of information exchange in multidisciplinary team working is rare. Those that occur have focused more on interpersonal interaction (Atwal 2006) and clinical outcomes (Acher 2005) than detailed content. Information is the “currency of interprofessional care”; the way it is gathered, stored, transferred and negotiated underpins and shapes other layers of team work but these processes in turn are shaped by the relational aspects of teamwork in a ward setting (Lingard et al 2007). Where conflicts of interest exist, the control of information becomes particularly important (Xiao et al 2007).
However, most studies suggest that multidisciplinary team meetings have a positive impact on reducing variability in decision-making (Ruhstaller 2006) and time to discharge (Aston 2006), building interprofessional collaboration and awareness (Bennett-Emslie 2005), and dealing with complexity (Rivetti 1999), and core quality measures including Length of Stay (O’Mahoney 2007). Their success depends on process compliance (Atwal 2002), cross professional understanding of roles and responsibilities (McGee 1996, Mason 2002), commonality of perceived purpose between participants (Atwal 2002), and consistency of structure and process (Ruhstaller 2006) and documentation (Simpson 2003).

In the multidisciplinary environment understanding the “rules of the game” is necessary if team members are to move beyond thinking as individuals and begin thinking as part of a team (Lingard et al 2004). The presence of conflict within multidisciplinary groups was observed in a study based in a hospital intensive care unit; it was suggested that its presence must be acknowledged in the study of multidisciplinary contexts if improvements are to be achieved (Xiao et al 2007). Conflict arises from resource limitations, high stakes consequences, uncertainty, goal conflict and hierarchical organizational structures (Lingard et al 2008) While “Rules of Engagement” can be used to stabilize interactions, solutions to unforeseen issues are found through negotiation. For example, a study based in a hospital operating room found that the use of an interprofessional checklist promoted proactive and collaborative team communication. (Lingard et al 2008) In addition to tools such as checklists that are essential for the management of distributed expertise, the coordination of work in fast-paced multidisciplinary environments also depends on response to novel events. Typically this is achieved through joint sense-making and protocol breaking practices that are highly contested because of epistemic differences, reputation stakes and possible blame (Xiao et al 2006).

Team members, especially novices, may tend to simplify and distort each others’ roles and motivations: for example, in a study based in a hospital operating room nurses and
physicians perceived their roles and behaviors differently from how the other saw them. It was suggested that the separate training and administration of professionals expected to work as a unit is not conducive to mutual understanding of professional identities and that through common experience and training cognitive functions of individuals may become connected (Ginsberg, Lingard et al 2002). This concept was echoed in another study in which it was suggested that mutual monitoring and sharing of responsibilities between disciplines tends to cause their cognitive functions to become interconnected. To explain multidisciplinary team interactions the concept of the “transactive responsibility system” was proposed. It is defined as a set of process and outcome responsibilities shared by a group, coupled with knowledge of who is responsible for what. This “group level” knowledge system has the advantage that individuals need not store all the required content; they need only know the content of their own area of expertise and where other required knowledge and expertise is stored, thus reducing their cognitive load and enhancing their own memory stores (Xiao et al 2004).

Information is central to the concept of “common ground” articulated by Herbert Clark in “Arenas of Language Use” (1993). Clark defines common ground as “a type of shared information. The common ground between Ann and Bob, for example, is the sum of their mutual knowledge, mutual beliefs, and mutual suppositions” (page 3). If these are different between the professions the potential for common ground is reduced: the more information that is shared the greater the common ground, and what information is shared affects the kind of common ground created. Hence the role of information is central to the creation of common ground, and whoever controls what is shared controls the common ground. Common ground is essential for co-ordinated action, and may be based on community membership. Clark proposes that “The basic idea is that there are things that everyone in a community knows and assumes that everyone else in that community knows, too” (page 36). These assumptions would include the scripts brought into a forum such as Bullet Rounds: the existence of common ground may indicate shared scripts and creation of new common ground would modify existing or create new scripts. A lack of common ground may cause difficulties even within the same profession: for example, a study of professionalism found that faculty members did not agree on how a medical
student should have behaved in a given scenario: they did not have a shared standard of professional behavior (Ginsberg and Lingard et al 2003). Faculty tended to rely on students to “just know” how to behave in a professional situation even when they had no experience of it, and were reluctant to give feedback because there may not be a consistent answer to cover all situations (Ginsberg and Lingard et al 2007). In another study based in the operating room it was found that while team members referenced professional roles to interpret discourse they displayed recurrent role disagreement, which was important because role perception was seen to influence the motivations attributed to colleagues’ discourse, which was seen as potentially problematic to novices who possess fewer experiential insights into the team dynamics and may misread the story unfolding (Lingard 2002). In fact, the discourse process itself may play a part in the formation of professional identities and assist in the creation of common ground and related scripts.

Information technology has been identified as a potential means to aid communication in multidisciplinary team meetings, but its static nature may remove the needed flexibility to negotiate solutions (Xiao et al 2007). Successful implementation of technology requires a proper assessment of user requirements and context (Weiner 2005), and a “task-technology fit” (Maruping 2004). For example, Physician Order Entry systems need to accommodate multidisciplinary collaboration and the primacy of the “communication space” based on the concept of common ground should be acknowledged in designing supportive technology (Coiera 2000). Other technology-based suggestions for improving communication have included the provision of mobile phones and the use of asynchronous communication tools and shared workspaces (Coiera 2000), automation and technology (Wright 2005) and use of the internet (Wiecha 2004). Some studies have found the use of audit (Atwal 2002), pro forma and overhead projector (Oliver 2003) or telemedicine approaches (Kunkler 2005) to be useful in establishing consistency or assisting communication.

2.3. Content Analysis
The Bullet Rounds meetings are part of the overall “communication space” (Coiera 2000) that contains all direct interactions between healthcare professionals in General Internal Medicine. Direct interactions are the largest part of the healthcare system’s information system, because the people involved are the main repository of information; however, they also contain the greatest potential for communication error, the result of poor practices and being interruption driven (Coiera 2000). Bullet Rounds are the only occasion when individuals from all the disciplines communicate as a group in General Internal Medicine, and therefore reducing communication failures in meetings such as these is important.

Understanding and analysis of the processes of communication between nurses and physicians in Bullet Rounds is based on the actual exchanges in the meetings. This content is rich and dense, but is human dialogue and requires systematic organization before it can be analysed. Content analysis provides a solution, because it offers a systematic way to analyse qualitative data (Greenhalgh et al 2005).

Content analysis focuses on the content presented, and is distinct from conversation or discourse analysis; they focus on the structure of sentences and are used more in linguistics or to look at the implications of body language behind the spoken words. Thematic analysis of content can be used with a variety of types of content, including conversation, particularly the “ethnography of communication” in medical, educational, organizational and evaluation research (Boyatzis 1998). It is useful at all stages of research; it is helpful in formulating the research question or agenda, and assists in communication between disciplines, because it enables quantification of qualitative data.

In “Transforming Qualitative Information” Boyatzis (1998) describes thematic analysis as a method to transform qualitative information into quantitative data by using an explicit “code” or codes (Boyatzis 1998 p 4), which assists in the identification of themes and systematic analysis, by relating the individual’s own ideas about the data to the data itself. He suggests that content analysis can be driven by theory, prior data or research, or by the data itself, with the latter being most likely to lead to reliability in coding. He
describes the process of categorization as the identification of patterns, classification of the data with labels and definitions, coding the data twice, and analysis of the data statistically. The resulting code should have a label, a definition, a description, identified qualifications and exclusions and examples of inclusions and exclusions. A similar approach is proposed by Neuendorf (2001), as shown in Appendix 1.

Content analysis using coding schemes has been used to analyse newspaper media (Bauer 1995), political platforms (Budge 1990), films (Capwell 1997, Smith 1999), music videos (Kalis 1989), advertisements (Kolt 1996, Naccarato 1990), TV programming (Lombard 1999, Neuendorf 1987), medical journal advertising (Michelson 1996) and demographics (Neuendorf 2000). The “Content Analysis Guidebook” (Neuendorf 2001) proposes a systematic approach to content analysis which is helpful in structuring the analysis.

A systematic review of prior research done on information seeking in physicians and nurses provides insight into relevant categories (Covell et al 1985, Cogdill 2003) and team interaction classification systems to analyse team verbal exchanges (Solomon 1998). They include Interaction Process Analysis (IPA), A System for the Multiple Level Observation of Groups (SYMLOG) (Marks 2001), and The Team Observation Protocol (TOP) which was adapted from Ducanis and Golin (1979).

Both prior and subsequent to this study, there are few empirical studies exploring the processes that take place in multidisciplinary patient care meetings, or documenting instances of collaboration and teamwork (Gibbon 1999, Oandasan et al 2005). TOP was used to analyse conversations that took place in multidisciplinary team meetings in the Health Care Field (Gibbon 1999). The understanding of the content is viewed as a necessary first step in introducing system supports, including those that are technology based (Carvalho et al 2001, Coiera 2000, McDermott 1999, Miller P 1998, Penuel 1999).

2.4. Conclusion
Script Theory has been applied in the context of consumer and clinical behaviour in healthcare because it provides a useful way to understand how and why people with different backgrounds and experience react differently in a given situation. It is equally relevant in the Bullet Rounds context, an interdisciplinary construct where participants come from diverse backgrounds and have different experience sets.

Approaches to changing professional behaviour include the use of educational materials, continuing medical education, interactive educational meetings, educational outreach visits, local opinion leaders, audit and feedback, reminders and prompts, computerized decision support, TQM and CQI, patient-oriented interventions, and multifaceted interventions. Grol (2001) found interactive educational meetings, reminders and prompts, computerized decision support and multifaceted interventions to be mainly effective. Grimshaw (2004) measured tools to evaluate strategies to implement guidelines and found effects were weak, with reminders and prompt the highest at 14%.

There are many models of implementation of change in organizations but overall it has high failure rates. Factors to consider include the implementation climate and context, compatibility of the change with values, the complexity of the change, and the pressures of the technical and institutional environment. Evaluation of the impacts of change has been hampered by the ability of organizations to ignore unwanted information (Champagne 2008).

Diffusion of Innovation models suggest that there are several stages to the diffusion of knowledge, including awareness, persuasion, decision, implementation and confirmation, and that it is a social process (Champagne 2008). Both individual and organizational attributes influence adoption; the latter is not always considered when methods of knowledge dissemination are chosen in healthcare settings (Lemieux-Charles 2004).

Content analysis techniques remain important for the systematic cataloguing, analysis and interpretation of rich qualitative data that can describe and explain human behaviour.
Chapter 3 - Research Strategy

The research was motivated by a real world problem. That is, Bullet Rounds are a key process in interdisciplinary communication in General Internal Medicine because they are the only opportunity for the full multidisciplinary team to meet simultaneously, but were not perceived to be functioning as well as they could and should be. The goal was therefore to improve the meetings.

The strategy was first to understand the nature of the meetings; this was done in the first study through field work involving observations, creation of process and structure models, and documentation and analysis of content.

To address the issues uncovered, standardized language, process and flow models were created to structure the communication in the meetings. However, during this period the hospital implemented a process engineering intervention which provided the opportunity to study the effects of process engineering approaches on the behaviour of healthcare professionals in the General Internal Medicine setting. The second study, then, is based on an evaluation of the process engineering intervention using measures identified through the first study, and using further observations of Bullet Rounds, interviews and focus groups to assess how the process engineering intervention affected communication behaviour in Bullet Rounds.
Chapter 4 - Theoretical Framework

4.1.  **Bullet Rounds Scripts**

The concepts behind Schank and Abelson’s’ theory of “Human Knowledge Structures” are shown in Figure 1 below. A fuller explanation is provided in Appendix 2.

![Image of Script Theory Diagram]

**Figure 1: Overview of Script Theory**
Individuals within an occupational role typically have elaborate scripts from their situational point of view, and this is true of physicians and nurses experienced in Bullet Rounds. The scripts below are proposed representations of scripts for physicians and nurses with and without experience in Bullet Rounds. They are reviewed again in Chapter 8 showing the linkages to the documentary evidence obtained.

**Example of a script that may be used in Bullet Rounds by an experienced physician**

- Enter room, find chair, sit down
- Hear patient name
- Give patient age, symptoms, diagnosis, current treatment and tests (if new)
- Give current status, treatment and tests
- Ask about patient overnight
- Hear nurse’s response
- Asks nurse to provide certain care
- Hear nurse’s question
- Respond to nurse’s question with treatment plan, estimated discharge schedule
- Agrees to certain actions – write order, follow up with CCAC, meet with family etc

In contrast, below is the basic script of the typical resident physician on their first day at Bullet Rounds:

**Example of a script that may be used in Bullet Rounds by an inexperienced physician (day 1 – basic script)**

- Enter room, find chair, sit down
- Hear patient name
- Notice all participants looking at you
- Check to see if name is your patient
- Say you have not seen patient yet, or
- Give patient age, symptoms, diagnosis, current treatment and tests
SUPPORTING COMMUNICATION BETWEEN NURSES AND PHYSICIANS

- Wait for next patient name
- Respond to nurse – I will have to get back to you on that.
- Ask questions about discharge planning
- Wait for next patient name

If there is a consistent process and pattern over time this script can develop and become more elaborate as the physician begins to understand the process and what is expected, and how to ask for certain things etc. Their script may evolve over time into the script of the experienced physician assuming there is a degree of consistency in the process; otherwise constant revision is required and the elaboration of a script is more difficult.

The scripts below show the differences between the script of the experienced nurse with a clear goal and that of the untrained replacement nurse. The first is that of the experienced nurse following a standard script:

**Example of a script that may be used in Bullet Rounds by an experienced nurse**

- Read out name
- Wait for physician to talk
- Give vitals or other “relevant” information from previous night
- Wait for treatment plan
- Interrupt discussion between physicians and other disciplines
- Ask for treatment plan
- Ask when patient will be discharged
- Ask what needs to be done for discharge
- Repeat back to physician what was agreed upon
- Read out next name

The replacement nurses, in contrast, may each have their own or a different Bullet Rounds script. This results in a variable Bullet Rounds process where known scripts cannot be applied and adaptation is necessary, which may result in gaps in understanding
SUPPORTING COMMUNICATION BETWEEN NURSES AND PHYSICIANS

and communication. An example of the script of a less experienced nurse is shown below:

**Example of a script that may be used in Bullet Rounds by an inexperienced nurse**

- Read out name
- Wait for physician to talk
- Give vitals or other information from previous night
- Read out next name

The concept of *role* is very important at Bullet Rounds, which is a staged event and part of the formal communication structure, where actors “enter role” and share stories. The physicians and nurses at Bullet Rounds exchange stories that contain scripts, but since their experiences and training are different the scripts may not overlap. In that case they can use role themes and invoke their knowledge of a role’s goals and plans to make sense of what they are hearing. This presupposes that their knowledge of the different roles in Bullet Rounds exists or is correct; for the new resident physicians this is most often not the case. This has implications for interprofessional practice and care (IPC); recent work in this area has highlighted the need to define core competencies and clarify roles and responsibilities within IPC contexts (Klossen, Oandasan et al 2007)

It is important for actors in a particular social situation to know “what is going on here” on several levels; who the actors are, the roles they perform, the relations between the different roles, the “props” and settings and the themes of the interaction. Rarely are real social situation clearly specified with well articulated scripts on all of these levels; the scripts evolve through the interaction of the actors. Given that Bullet Rounds involve regularly changing groups of actors unfamiliar with them, finding ways to speed up this learning process would be helpful.

Deustch (2007) suggests that along with the cognitive there are other psychological orientations of individuals in social situations. He cite moral and motivational orientations as well. The moral orientation provides the mutual obligation to respect and
protect the framework of social norms that define fairness in the situation, including what actions are appropriate and the equality-inequality dynamic. Deutsch suggests that in a cooperative, equal relationship one would expect an egalitarian relationship, while in a cooperative unequal relationship the more powerful person should employ their power to benefit others. Bullet Rounds are a task oriented artifact and as such, it would be expected these conditions to be quite specific, as compared to a social-emotional relationship. However, the changing nature of the understanding of who is responsible for Bullet Rounds suggests that the nature of the equality-inequality relationship between nurses and physicians is undefined, which impacts their perception of their roles. The motivational orientation is important as well, because it orients the individual to what they want out of the situation and how they can get it. In a task-oriented artifact like Bullet Rounds this is closely linked to the individual’s perceived role for themselves.

Typically an actor’s goals are determined by their role, and there are a number of goals associated with it. The “Role Theme” referred to in Figure 1 comprises diverse knowledge including the rules for triggering the goals, role plans to realize the role goals, and a set of expected or mandated acts by other actors and situational scripts. Role behaviour also interacts with personal behaviour. This tends to take place outside of Bullet Rounds but has an impact on them; for example, through the more personal bonds that form if people recognize and know each other. In Bullet Rounds the resident physicians operate without this informal background script, at least until they get to know and become known to the members of the other disciplines. Since prediction of an individual’s goals is based on our belief of what the individual will want in a given situation, which can be based on individual or role based factors, this may make such predictions difficult for resident physicians when they first join Bullet Rounds, and on an ongoing basis, if there is no consistent format to the meetings.

Stories may contain many types of goals, including main or substitute goals, goal embellishments and dangling goals. In Bullet Rounds “instrumental” goals or those that are the precondition for another goal are the most frequent. They may be stacked in a hierarchy; if an instrumental goal cannot be realized substitute goals may become
unrealizable also, in which case a tactical goal substitution may occur. The workaround strategies and tactics seen in healthcare may represent such tactical goal substitution.

**Plans** arise out of the individual’s goals and are the mechanisms that underlie scripts. If one is familiar with a situation, there is no need to plan because you have a script available. Being in a novel situation where you have no script requires planning, or understanding someone else’s planning. This is both cognitively demanding and inefficient, particularly where the participants who share the script assume knowledge you do not have. The ability to plan is important since it enables the individual to describe what is important. It is necessary, for example, to understand what the plan is for Bullet Rounds in order to know what information to provide. Understanding of the plan is predictive in nature and possibilities for enhancing this aspect of information exchange are considered in the thesis.

Lack of understanding and poor communication may occur where individuals in different and even in the same occupational role do not share goal and plan congruence. For example, although both are physicians, the roles of staff physicians and resident physicians are somewhat different, and give rise to different scripts. If there is sufficient variation between them, opportunities for misunderstandings and incorrect inferences may occur. This may at best cause discomfort and inefficiency, and at worst potential errors. Even within the staff physician group, for example, the goals or plans may be somewhat different, and this incongruence is brought to Bullet Rounds. The nurses form another role group with potentially different plans and scripts from those of both of the physician groups.

Unclear roles may mean that for a third party the understanding of the goals and plan must be constantly re-evaluated, which may be a significant effort. They may fall back on their own version of what the goals and plan should be. Similarly, understanding of the responsibilities associated with a role may differ; for example two waiters working in different restaurants may have somewhat different responsibilities. One may have to pull out the customer’s chair when they sit down, the other may not. In a restaurant context it
is not serious if a waiter misunderstands the full extent of his responsibilities; in healthcare the consequences could potentially be much more severe. Members of different roles may make wrong assumptions about what member of other roles are or should be doing, again raising the potential for misunderstanding and error.

Context is important in understanding text or speech; Schank and Abelson (1977) make the point that the “appropriate ingredients” for extracting the meaning of a sentence are often nowhere to be found within the sentence, and that the meaning of text or speech is more than the sum total of the meaning of the individual sentences that comprise it. Bullet Rounds contain a great deal of subtext about contextual background that is not explicitly discussed unless questions arise. This in turn presupposes that the questioner knows enough to ask, and it may be supposed that a good deal of this will be learned through experience over time. The researcher suggests potential approaches to addressing a lack of contextual experience in this thesis.

4.2. Application of Script Theory to Communication in Bullet Rounds

By analyzing information exchange the researcher’s goal was to build knowledge in the area of factors that enhance or are barriers to it. The concepts and terminology of Script Theory are particularly applicable to this context since the notion of a scripted process and standardised language has been advanced as a means of improving communication. In health care, communication may be hampered by the differences in training that physicians and nurses receive, resulting in different scripts. Physicians have a problem-solving action-oriented approach, while nurses are trained to describe and narrate and not to make diagnoses. Structured language frameworks can be seen as a tool for creating script congruence in a specific situation, and has been used mainly for reporting on clinical issues around patient care. The theory goes further, however, in including the role of prior experiences. The challenge in Bullet Rounds is twofold; to create a common script based on congruent goals and plans, and to accommodate different scripts that are brought to Bullet Rounds by a regularly changing population.
Applying process engineering principles to process improvement is a strategy for aligning goals among the participants in the process. Process engineering interventions can be, and usually are, employed in isolation, and do not represent a process engineering transformation, but is a process engineering technique. Such was the case in the setting of the study in this thesis. A process engineering intervention can be an affective way to achieve goal and script alignment through shared experience, although the development of a new process script through an process engineering intervention may not mirror the goals articulated by the organizational meta script, which may preclude sustainable change, an issue which is explored in this thesis in the context of General Internal Medicine.

Physician – nurse information exchange is seen in terms of Script Theory throughout this thesis. Consideration is made of the degree to which their scripts are aligned, the possible causes for any misalignment and its consequences and the potential for creating a shared script for use in Bullet Rounds.
Chapter 5 - Mapping The Bullet Rounds Environment

5.1. Research Question and Objective

The initial Bullet Rounds field study is represented in column 1 of the conceptual overview of the thesis in Table 1. Its purpose was to answer the first research question:

What is the content and process of nurse-physician communication at Bullet Rounds meetings?

The objective was to document the context and content of the meetings and identify process gaps and environmental constraints, in order to suggest or create supports for the meetings that would improve their effectiveness, and potentially provide input into the design of information technology.

5.2. Overview

There are two steps to the Study:

Step 1 is an observational study of Bullet Rounds using non-participant observation which was documented with field notes.

Step 2 is an analysis of the field notes to identify potential errors and the content areas of the discussion in the meetings.

Content analysis is a good way to control for observer bias and provides a systematic way to analyse qualitative data (Greenhalgh et al 1997, 2005). A systematic approach was used based on the “Content Analysis Guidebook” (Neuendorf 2001) and categories compared to those cited in a systematic review of prior research done on information seeking in physicians and nurses (Solomon 1998).
One way to understand the information needs of nursing and physician participants in Bullet Rounds is to use team interaction classification systems to analyse team verbal exchanges (Solomon 1998). They include Interaction Process Analysis (IPA), A System for the Multiple Level Observation of Groups (SYMLOG) (Marks 2001), and The Team Observation Protocol (TOP) which was adapted from Ducanis and Golin (1979). Both prior and subsequent to this study, there are few empirical studies exploring the processes that take place in multidisciplinary patient care meetings or documenting instances of collaboration and teamwork (Gibbon 1999, Oandasan et al 2005). TOP was chosen as the categorisation tool because it has been used to analyse conversations that took place in multidisciplinary team meetings in the healthcare field. (Gibbon1999). This understanding is viewed as a necessary first step to introducing system supports, including technology based. (Carvalho et al 2001, Coiera 2000, McDermott 1999, Miller P 1998, Penuel 1999).

5.3. Methods

5.3.1. Step 1- Observation

5.3.1.1. Data Collection

The researcher attended a total of 20 meetings over the course of 3 months in 2005. The wards and patients in question were in General Internal Medicine at an academic hospital, and over 400 patient discussions were documented. She attended the full meetings which generally took between 1 and 1.5 hours in the morning, for an approximate total of 30 hours of observation.

During the observations the researcher, who did not participate in any way in Bullet Rounds, took extensive notes by hand; these notes transcribed the conversations that took place at Bullet Rounds and identified the role of the speaker (doctor, nurse etc).
This body of data has been transcribed into Field Notes, and is referred to as the Baseline Data.

5.3.2. Step 2 - Content Analysis

5.3.2.1. Errors

The Field Notes obtained in Step 1 of the field study were analysed using the Institute of Medicine medical error categorization taxonomy (Corrigan et al 2000) to identify potential areas of error.

5.3.2.2. Content of Discussions

A content analysis taxonomy was used to examine the verbal content of Bullet Rounds from several perspectives: the types of statements made by speakers, which of them speaks the most and what they speak about, along with the main types of information shared and by whom. The taxonomy used was an adapted version of the Team Observation Protocol (TOP) taxonomy (Gibbon 1999). The Field Notes were organised into whole or part sentences to enable coding, and each interaction at Bullet Rounds coded into one category of statement. Based on the observations the hypothesis was that a large proportion of the statements would be related to information.

5.3.2.3. Team Observation Protocol (TOP)

The Team Observation Protocol (TOP) categories are shown in column 1 of Table 2 below, with a description of each in column 2. Column 3 provides examples. Since information exchange was shown to be the dominant category of communication in Bullet Rounds, the TOP framework was later extended by subdividing the information category. The field notes were reviewed and for each instantiation of information exchange the information characteristics recorded. These were then grouped in to four
information subcategories based on the kind of exchange that occurred or the topic of the exchange. The subcategories used were; Giving Instructions, Discussion of a Process of Care, discussion of events that take place Outside of Bullet Rounds and discussion of Patient Status. This analysis was done as input into the design of a potential intervention in Bullet Rounds.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Client</td>
<td>All affective statements regarding the client: i.e. joking/hostile references indicating emotional reaction</td>
<td>Doctor notes that the patient’s social situation is complicated and that he is not aware of it</td>
</tr>
<tr>
<td>2. Team</td>
<td>All affective statements about the team or team member. Includes joking, laughing or hostile remarks</td>
<td>Comment that there is a lack of coordination between what the team wants to happen and what is actually happening, and the need to delegate tasks</td>
</tr>
<tr>
<td>3. Questions</td>
<td>All statements asking for information, suggestions, or opinions or requesting reports</td>
<td>How do we know if something is booked? Do we enter that in system?</td>
</tr>
<tr>
<td>4. Information</td>
<td>All statements giving factual information, dealing only what is observed without interpretation</td>
<td>I ’m not sure, I’ll check into it/It’s not the in notes</td>
</tr>
<tr>
<td>5. Interpretation</td>
<td>All statements that give an opinion or interpretation, going beyond empirical data to make inferences about what has been observed</td>
<td>She doesn’t need an MRI – clinically doesn’t make sense. We’ll talk to pharmacy about meds</td>
</tr>
<tr>
<td>6. Alternatives</td>
<td>All statements that suggest alternatives, explore or compare possible courses of action</td>
<td>Who’s doing plastic surgery? They’ll have to find her a bed after head surgery. Is this the thought? That this should fix things with the falls?</td>
</tr>
<tr>
<td>7. Decisions</td>
<td>All statements which deal directly with the final decision –expressing, clarifying, or elaborating the decision reached.</td>
<td>Ok she can go back to the Nursing Home/waiting for two things – then discharge/ Homecare – being discharged.</td>
</tr>
</tbody>
</table>

Table 2: TOP Categories and Examples
5.4. Results

5.4.1. Structure and Process Models

The field data was used to construct models of the Bullet Rounds environment and processes, in order to identify where handoffs occur, and potential constraints, bottlenecks and gaps. Figure 2 below shows the participants in the inner circle of the model of the Bullet Rounds environment in with the patient at the centre of the overall process.

Figure 2: Model of the Bullet Rounds Communication Space
The participants are a multidisciplinary group that includes the following medical professionals:

- Physicians: staff, resident and medical students
- Nurse manager (in charge of administration, ensuring staffing levels are appropriate, general management of wards)
- Ward nurse (nurse who actually administers care for patient on 13th and 14th floor wards)
- Emergency nurse (nurse who works in and represents the Emergency area, caring for patients and keeping treatment team up to date on situation in Emergency rebeds available etc)
- Occupational Therapists
- Physical Therapists
- Dietician
- Social Workers
- Pharmacist
- Speech/Language Therapist

They interact with and depend on each other, as well as the middle circle, which shows Specialist Services, Investigations and other Wards, all of which are contained within the hospital. Specialist Services includes other medical specialities such as Urology, Haematology, Nephrology, and General Surgery. Investigations include x-rays, echograms, cardiogram etc. Other Wards would be those where, in the case where a patient has a specific problem but is otherwise stable, they would be more appropriately placed. An example would be Palliative Care or the Cardiac Ward.

The outer circle represents the outside agencies with which the team must follow up to enable a patient to leave the General Internal Medicine wards, and potentially after they have left. It shows the various types of follow up, including another hospital, another ward, the care of a family physician, Alternate Level Care such as a Nursing Home, or Long-Term Care Facility, their family, outpatient services, or Home Care (CCAC).
The patient journey through General Internal Medicine was mapped in a process model to identify the inputs and outputs to the process that affect Bullet Rounds, and where delays or other constraints may occur. Figure 3 below was reviewed by a staff physician and Patient Care Coordinator nurse in General Internal Medicine, and shows the steps in the process.

Figure 3: Model of the Patient Journey through General Internal Medicine

The progression through these steps is not linear. There may be a number of loops, retracing of steps, and repeated steps, and many of the steps will take place in parallel.
The time taken to progress from one step to the next is not consistent, since it will often depend on the outcome of the previous step.

The groups shown in the inner circle of Figure 2 are involved in the process almost from the beginning. The physician in Step 2 makes contact with the patient, who, when admitted to either the Emergency department or the wards, becomes the responsibility of the designated treatment teams.

In Step 11 the rest of the inner circle shown in Figure 2 become involved and thereafter the process must be managed by the entire inner circle team, with assistance from the middle circle group. Eventually the patient transitions to the groups in the outer circle, as shown in the final steps of the Patient Journey.

One individual not shown in Patient Journey although they do play an indirect part in the patient treatment is the Nurse Manager or Charge Nurse. Their duties are more administrative; they assist the treatment team to coordinate the many tasks that are part of the overall process. One of these tasks is participation in Bullet Rounds.

### 5.4.2. Content and Process of Bullet Rounds

The results of the error analysis showed a preponderance of issues dependent on timely and accurate information, which is not always available. The main issues reside in the following error categories:

- **Inadequate monitoring or follow-up of treatment**
- **Failure of Communication.**

**Figure 4** below shows the results of the allocation of statements into categories.
Information exchange dominates communication at between 48% and 56% of verbal exchanges, and questions are the second main category of verbal exchanges at between 24% and 29%. Questions are typically requests for missing information.

By tagging each piece of verbal exchange to a speaker, participation by speaker could be identified. Figure 5 below shows that doctors and nurses have the largest amount of verbal participation at Bullet Rounds with 58% and 27% respectively, followed by social workers at 8%.
Figure 6 below shows the different types of information used at Bullet Rounds and by whom. The physicians at Bullet Rounds talk a great deal about sources outside the meetings (such as specialist reports, test results etc) to provide additional information required by the team, while nurses talk mainly about patient status.

![Figure 6: Types of Information at Bullet Rounds](image)

**5.5. Discussion**

The goal of the field study was to reach an understanding of the environment and processes of Bullet Rounds because to improve a system it must first be understood, and was achieved by collecting field data.

Creating the models was useful because they document the environment of Bullet Rounds and can be used as a shared reference for understanding and improving processes. The structural model shows the interdependencies that exist between the group members and between themselves and other groups, over whom they may have no control. For example, although after discharge the patient is no longer the responsibility of the team,
the team must enable the transition from hospital to home or an external agency to happen, which means that a good deal of interaction with the outside agencies must take place. All three circles form a whole in the sense that the treatment team and they interact back and forth during the progress of a patient through their care on the General Internal Medicine wards. In terms of Script Theory the services in the middle and outer circles all have different scripts that must be integrated into the Bullet Rounds script through the knowledge of them that Bullet Rounds participants either have or acquire over time. The process model shows the complexity of the environment.

While most of the steps shown involve processes, many of them are not familiar to some or all of the team members, either because they are not clearly defined, because they are not within the purview of the team member’s knowledge, or because they are in training and are recent arrivals to these wards. In Script Theory terms they may not have scripts for these processes but must acquire them over time. There is no template or “typical” progression through the process: each patient truly is different, and the outcomes of treatment cannot necessarily be predicted or known. This makes the acquisition of the process scripts particularly difficult and highlights the potential value in reducing the complexity of the process wherever possible. Few if any of the healthcare professionals that participate in Bullet Rounds have a view of the full system described in these models.

The goal of the content analysis was to understand the content of the discussions in Bullet Rounds, and the results showed the domination of information exchange in the Bullet Rounds communication space, and that information is often missing, which results in efficiency caused by extra follow up and repetition. Since the information exchange between physicians and nurses accounted for most of the activity in Bullet Rounds this was the focus of design of supports to improve information exchange in Bullet Rounds. The categories of information related to clinical issues appeared to be those of greatest concern, and these were therefore targeted for improvement.
In terms of Script Theory, the results appear to suggest that the goals of the physicians and nurses were aligned because they were both talking about clinical issues. However, this was not made explicit, and resulted from the fact that the physicians were driving the discussion and therefore the agenda. The high frequency of missing information suggests that although there was an implicitly shared high level goal there was a lack of clarity around what information was required to support it. The meetings appeared to be a process of script evolution: the process of information exchange, which includes requests for more information, is therefore the main way the participants in Bullet Rounds build common ground and their scripts, but without a clear goal the script never appeared to stabilize. The physicians must integrate a good deal of information from outside Bullet Rounds, and tend therefore to need to incorporate scripts from outside Bullet Rounds into their Bullet Rounds scripts more then the nurses, which adds complexity to their script acquisition.

### 5.5.1. Standardizing the Script

Human Factors approaches to error reduction have emphasized the importance of shared situation awareness (Endsley 2000) and mental models so that people working in teams are working from a common understanding of what is happening, especially in complex, high risk environments (Haig 2006, Leonard 2004). In health care, shared situation awareness may be hampered by the differences mental models between physicians and nurses caused by the differences in training they receive, which results in different scripts. Physicians have a problem-solving action-oriented approach, while nurses are trained to describe and narrate and not to make diagnoses. To bridge communication gaps Human Factors research has emphasized the use of standardized and structured language and processes. Structured communication approaches have been used successfully in aviation and the military to reduce errors, and are now being applied to health care because it is also a high stakes error prone environment where the unexpected happens quite regularly. Structured language can be seen as a tool for creating script congruence and assisting in role coordination in a specific situation, and has been used mainly for reporting on clinical issues around patient care. It has been used in other healthcare
contexts such as Operating Rooms, and Rehabilitation (Guise 2006, Leonard 2004). Studies using structured language have shown that communication improves and errors are reduced when individuals in teams feel able, because they share an agreed upon script, consisting of set of tools, with others, to speak up and question what is happening (Beyea 2004, Leonard 2004, Haig 2006).

A structured language approach could be applied to Bullet Rounds. The researcher created process flow diagrams using a structured language framework based on the outputs from the study and input from Bullet Rounds physician and nurse participants. **Figure 7** shows the physicians’ process of information exchange in Bullet Rounds.
Figure 7: Communication of Information at Bullet Rounds: Physicians

Figure 8 below shows the nurses’ process of information exchange in Bullet Rounds.
Figure 8: Communication of Information at Bullet Rounds: Nurses
The flow diagrams show the areas of overlap of the nurse and physician scripts and were created as a tool for standardizing information exchange between them in Bullet Rounds. They were based on the exchange of clinical information which was the predominant category observed in the study; although they were not formally evaluated the nurses reviewed them and indicated they saw them as potentially useful tools because they could contribute to the development of a consistent, scripted approach in Bullet Rounds, which could improve efficiency and communication in the meetings. They were able to use the concepts inherent in the design for the tools developed during the process engineering intervention.

5.6. Conclusions

Based on the evidence gathered at the time of this first study, the design focus was on supporting and stabilising the exchange between nurses and physicians in Bullet Rounds of information relevant to patient care in General Internal Medicine. The goal of the design was to standardize the information exchange process: the tools were designed using a structured language framework but are adaptable to other information categories or other frameworks that lend themselves to process standardization.
Chapter 6 - Evaluation of the Process Engineering Intervention: Background and Study Design

6.1. Research Question

The research question which was the focus of the evaluation study was:

What was the impact of the process re-engineering of Bullet Rounds on information categories and information loss in patient information exchanges between nurses and physicians?

The approach was to describe and evaluate the impact of the process engineering intervention on nurse/physician information exchange during Bullet Rounds on the General Internal Medicine inpatient units at Toronto Western Hospital. Information exchange was shown in the previous study to be the main component of communication between nurses and physicians in Bullet Rounds.

The study explores the hypothesis that adding structure to multidisciplinary team meetings improves this information exchange, and the results may be useful for analytic generalization of the hypothesis.

The rationale for studying this in a systematic way is that communication between nurses and physicians has been identified as having significant impact on interprofessional collaboration, and as such is a measure of the goal of improving patient care. Nurse-physician communication in Bullet Rounds has not been specifically measured and evaluated by the General Internal Medicine project team: the evaluation study purports to fill that gap.

The study comprises three parts. The goal of part one of the study was to compare information exchange between nurses and physicians over two two-month periods pre
and post the process engineering intervention to identify any changes in information availability. The goal of parts two and three of the study was to obtain and explore feedback from physician and nurse stakeholders on the process of information exchange in Bullet Rounds and any changes that they felt had occurred, and to explore other issues that were of concern to them.

6.2. Background

The background section of this chapter describes the intervention shown in the middle column of the conceptual overview diagram in Table 1. The process engineering intervention evaluated in the thesis is the Rapid Improvement Event (RIE) that occurred as part of the project called the “ED-GIM Transformation Project” that took place at the Toronto Western Hospital. “ED” refers to the Emergency Department and “GIM” to “General Internal Medicine”, which comprises the wards (3B, 8A, and 8B) that generally receive patients admitted from the ED.

The researcher was present as a non-participant observer throughout the 4.5 days of the process engineering intervention. The purpose was to observe and document the process and dynamics of the process engineering intervention, and obtain documentary evidence of the processes and documentation created during the process engineering intervention. She took notes of the discussions that occurred, reviewed the process maps created, and was provided with copies of the finished artifacts for use in Bullet Rounds and on the wards, as seen in Appendices 2-5.

The specific goals of the ED-GIM transformation project as stated on the UHN intranet were to:

- enhance the quality of patient centred care
- enhance clinician satisfaction and morale
- provide long term sustainability of process change
- transform ED-GIM units into integrated collaborative clinical areas
- utilize the approach to share with other Ontario hospitals as a provincial tool.
The “transformational framework” took the form of six major themes or “pillars” of areas for Best Practice Intervention: Care Coordination, Team Alignment/Care Model, Team Renewal, Workflow (for lab results and tests), Work Environment and Information Management. Each pillar has several foci: for example, the interventions in emergency and General Internal Medicine were within the first pillar, Care Coordination, and for this pillar the foci were patient flow, admission, discharge planning, interdisciplinary communication, Alternative Level Placement and education.

The intervention for the Care Coordination pillar had four phases. Phase 1 was a focus group meeting in December 2006; the purpose of this meeting was stated as improving the discharge process and this was the main focus. Phase 2 was a process engineering intervention in March 2007 to plan the elements of the changes and how they would be implemented. Phase 3 was the implementation of the tools and process changes from March 2007 to present, and phase 4 was tracking the results of the intervention.

**6.2.1. The Process Engineering Intervention**

The participants at the process engineering intervention were representatives from General Internal Medicine and included 2 charge nurses, 2 Patient Care Coordinator nurses, a social worker, a physical therapist, an occupational therapist and a staff physician who attended part of the time. The process engineering intervention took place over 4.5 days; the participants met in a Boardroom for the first 4 days and on the fifth day presented their results to a large group from the ED-GIM project team including the management sponsors.

The Patient Care Coordinator nurses were new to their Bullet Rounds role; they started in December 2006 and at the time of the process engineering intervention had been in their positions only a few months. The nurses referred to in the first (observational) study were not therefore the same individuals. The Patient Care Coordinator nurses are those who regularly attend Bullet Rounds, but may be replaced at times by ward nurses who provide direct patient care.
The participants went through the process of “value steam” mapping of General Internal Medicine processes, identifying wastes and deciding upon strategies and tools to eliminate them and improve efficiency. The overall target was improving discharge efficiency: the concentration was on reducing delays and improving the communication in Bullet Rounds by focusing on how they are run, as well as the inputs into them and follows up actions from them.

6.2.2. The Objectives of the Process Engineering Intervention

The five objectives and action plans that were agreed upon at the process engineering intervention are shown below; the results were provided to the researcher in July 2007 by the project management team.

**Objective 1:** To address poor communication with patients and their families

Action Plan: Create a patient calendar (*Appendix 3*) to post in patient rooms; the calendar was intended as vehicle for caregivers and families to write notes to each other. It was used for approximately a week in one patient room: no data on its use were collected.

**Objective 2:** To address discharge delays caused by sub optimal communication with Alternate Level Care facilities and CCAC (Home Care).

Action Plan: Invite representatives from CCAC, Bridgepoint and Toronto Rehab to attend Bullet Rounds and participate.

Results: Representatives from CCAC, Bridgepoint and Toronto Rehab began to attend Bullet Rounds and participated on alternate days. Between April, when the change was made and July when the results were shared, the project team reported an increase of 77% in patients transferred to Bridgepoint after a referral, and a reduction of 24% of Alternate Level Care days for General Internal Medicine patients going to Bridgepoint, (“Alternate
Level Care days” can be interpreted as days when a patient is medically fit for discharge but has not yet been allocated a bed at Bridgepoint). Neither baseline data nor any specific information as to how these numbers were arrived at was provided.

**Objective 3:** To address the wasted time and poor communication caused by lack of structure and a clear process in Bullet Rounds meetings

Action Plan:
- Document a process with respect to structure (speaker order), content and workflow.
- Create posters to post in the meeting room and pocket cards to hand out.
- The artifacts created include: the order of speakers in Bullet Rounds and the content to be covered for new and continuing patients and by whom (poster and pocket card - Appendix 4)
- The Patient Care Coordinator nurses were given responsibility for running the meetings and ensuring compliance with agreed upon processes.

Results: The Action Plan for this goal was implemented in Bullet Rounds. Tools were created and displayed. Results were cited as “staff feedback”: an anecdotal quotation from an unidentified stakeholder was “Improved interdisciplinary communication and patient care planning”. There were no other results provided to track the efficacy of the new processes and tools.

**Objective 4:** To address delays in discharge caused by physician delays in writing orders;

Action Plan:
- Creation of a timeline for writing orders that physician must adhere to
- Creation of a poster and pocket card for resident physicians
- Workflow diagram for follow up activities after Bullet Rounds outlining the steps to be taken and the timelines located in the Bullet Rounds room (Appendix 5)
- Creation of a Control Board to track order completion located at the nurses’ station on the wards (Appendix 6).
• Patient Care Coordinator nurses to bring order sheets into Bullet Rounds

Results: The project team reported a 47% increase in patient care discharge tasks completed on time, and an 81% increase in ALC discharges prior to 11 am. An anecdotal quotation from an unidentified stakeholder was that the changed process “creates bed capacity for ED patients in the morning”. These metrics came from the tracking of inputs to the Control Board by the Patient Care Coordinator nurse. Since there was no baseline data on what proportion of orders were completed prior to 11 am before the Rapid Improvement Event an estimate of 50% completion was used as the baseline, and results measured against that. These were tracked for only 60 days, since the process engineering intervention provides for controls at 30, 60 and 90 days. At 60 days the process was deemed to have been operationalised by bringing physician order sheets into Bullet Rounds for orders that did not need to be entered into the computer (for example referral to OT), a process which continues to be followed.

**Objective 5:** To address the need for Resident education around the purpose and processes of Bullet Rounds

Action Plan:
• Use of the posters as described above as well as reinforcement in the meetings
• Inclusion of Bullet Rounds training as part of resident orientation, to be the responsibility of the Chief Resident.

Results: An informational orientation for new resident physicians was created and trialed at the beginning of the July 2007 rotation. No metrics around its efficacy were planned or produced.

**6.2.3. Discussion**
The information provided above on the results of the process engineering intervention was provided in a presentation on July 18th 2007, by a project manager from the project management office at University Health Network who participated in the implementation.

She identified three issues that needed to be resolved:

- **Physician engagement**: although there was support at the higher levels general physician engagement was perceived to be a problem
- **Sustainability**: the project management team was not certain what was being sustained and what was not.
- **The electronic White Board**: although it is present in the Emergency Department and on the General Internal Medicine wards and originally intended as a communication tool, she indicated there were issues with data entry and that the physicians were not on board with its use. However, this needed to be taken on as a separate project since it was not within the scope of the intervention.

### 6.3. Study Design

#### 6.3.1. Narrative Methods and Structures

Narrative research methods are useful in understanding phenomena in terms of human experience (Greenhalgh et al 2005). The overall structure of this thesis is an Organizational Case Study, but includes Naturalistic Story Gathering in the form of ethnographic field work. The narrative approach is particularly appropriate here as it mirrors the basis of Script Theory, that humans use stories to make sense of their experience and communicate it. The epistemological perspective taken is closest to what is defined as “constructivist” (Clandinin 2007) and uses a methodology that incorporates a mix of structured and semi structured approaches.

#### 6.3.2. Rationale

Yin (2003) defines the Case Study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries
between phenomenon and context are not clearly seen (Yin 2003 p 13). Case Studies are useful as a tool for evaluation because they are suited to examination of how or why phenomena occur over time (Yin 2003 p 6, Greenhalgh et al 2005) as opposed to a purely descriptive approach, are appropriate where behavioural events cannot be controlled, and can deal with a wide array of documentary evidence. The researcher chose the Case Study method for this study because Bullet Rounds are an example of complex social phenomena in their real setting, where the behavioural events cannot be controlled. She was interested in understanding how and why changes have or have not occurred, which requires a tracing of links over time. In addition, the contextual conditions are highly relevant to the phenomenon being studied and cannot be separated from it.

6.3.3. Case Study Structure

Yin suggests that there are five important components of a case study design; the study’s question, its propositions, its unit(s) of analysis, the logic linking the data to the propositions, and the criteria for interpreting the findings (Yin 2003 p 21). Each of these components is included in the design of the study and is discussed below.

6.3.4. Research Questions

Theory development is an essential step in case study designs (Yin 2003). An exploratory ethnography of Bullet Rounds identified issues around Bullet Rounds that appeared to be related to lack of structure and process standardization. The communication literature was reviewed to identify a theoretical basis that could explain the different approaches of the nurses and physicians and issues in Bullet Rounds. Script Theory provided the best explanation because it focuses on interpersonal communication and its content. As a result of these insights, tools based on a structured language framework were designed to add that structure.

The research questions that motivate the study are shown below:
1. How has the process engineering intervention impacted communication between nurses and physicians in Bullet Rounds, as measured by the availability of information?

Objective: To assess the degree to which information that is requested between nurses and doctors in Bullet Rounds is available pre and post the process engineering intervention.

1. How has the process engineering intervention impacted the experiences of physicians and nurses around information exchange in Bullet Rounds, as measured by their perceptions and opinions?

Objective: To obtain and explore feedback about information exchange in the meetings from nurses and doctors participating in Bullet Rounds.

**6.3.5. Propositions and Units of Analysis**

The case study has an “embedded” design; that is, there are two propositions, one embedded in the other, which have different units of analysis and rely on different data collection techniques. The propositions behind the case study are:

1. That use of a standardized script and processes in Bullet Rounds improved efficiency of information exchange; the study will examine how and why this occurred.
2. That improved efficiency of information exchange in Bullet Rounds did not necessarily lead to participant satisfaction; the case will examine the mechanisms and causes of this phenomenon.

Proposition 1 is an example of what Yin calls a “study of verbal behaviour” (Yin 2003 p 110) and is part of a larger issue that is examined in Proposition 2, which is in effect a rival theory. That is, if the goal of changes made to Bullet Rounds was to improve
communication of information between nurses and physicians, this, if successful, would be presumed to lead to increased satisfaction on both their parts. By triangulating the observational results in the case with qualitative data in the form of interviews and focus groups, the researcher discovered that the phenomena did not appear to be linked, and was able to explain the reasons for this through the application of Script Theory, and suggest that lack of script alignment caused the mismatch of efficiency and perceived effectiveness in Bullet Rounds.

The unit of analysis for proposition 1 is the individual “patient information exchange” in Bullet Rounds, that is, a single exchange between nurses and physicians about a specific patient. Patients from wards 3B, 8A and 8B were part of the analysis, including Family Medicine patients: patients from all other wards were excluded. For proposition 2 the unit of analysis is the individual nurse or physician participating in Bullet Rounds.

6.3.6. Linking Data to Propositions

Pattern matching is often done in case studies to establish links, but Yin acknowledges that this is not as precise as assigning subjects and treatment conditions in psychological experiments (Yin 2003 p 26). In this study the unit of analysis for proposition 1 is a discrete event, which permits the assignment of a numerical code and counts of frequencies for a chi-square analysis, done to identify whether or not the results appear to be linked to the intervention and if so, the strength of the effect. For proposition 2 the data is at the level of the individual, because the exploration is of individual perceptions. The data for the second proposition does not consist of discrete data points, but is verbal commentary around relevant themes that can be grouped and analyzed.

6.3.7. Interpreting Findings

The analytic strategy for the case study was to put the evidence in the order that corresponds to the propositions: the verbal behaviour was dealt with first, and then the analysis moved out into the deeper explanation of what is behind the verbal behaviour, in
each case using a different category of evidence and placing the appropriate evidence into each category. For the content analysis for example, the data was numerically coded and statistically analysed, while for the analysis of nurse and physician satisfaction, the data used was verbal transcripts from which data related to pre-determined themes were extracted. This approach follows the theoretical propositions and rules out potential alternative interpretations: in this case, for example, the content analysis alone might have led to a misleading conclusion.

Generalization of case study results is analytic in nature, based on developed theory rather than statistical analysis: that is, previously developed propositions are used as a template with which to compare the empirical results of the case study (Yin 2003 p 33). This case is representative of a phenomenon that is common to other healthcare contexts and as such the findings may be viewed as informative about other similar contexts through the use of Script Theory (Yin 2003 p 41).

6.3.8. Threats to Validity and Rival Explanations

Appendix 7, Analysis of Potential Threats to Validity, shows the four threats to case study validity proposed by Yin; construct, internal, external and reliability, and how they are dealt with in this case. For each, the potential problem caused by the threat is described, at what stage of the case study process it must be addressed, how it should be addressed and how it is addressed in the present case. The Logic Model that was constructed as part of how the researcher addressed the threat to internal validity is shown in Appendix 8.

Appendix 9, the Analysis of Potential Rival Explanations, shows the three Craft and six Real-Life types of potential rival explanations suggested by Yin, their definitions and how they are dealt with in the present study. One rival, the “Implementation” rival is part of the explanation of the results of the study. That is, the evaluation of the impact of the process engineering intervention raises the possibility that the “Hawthorne Effect” may have had an impact on the outcome: that is, while the nurses felt empowered to take
control of Bullet Rounds meetings after the process engineering intervention, this result could potentially have also been achieved through a different intervention.

6.3.9. Case Study Process and Format

Appendix 10 shows an overview of the process used for the Case Study. The three phases are Define and Design, Prepare Collect and Analyse, and Analyse and Conclude. The activities completed for each phase are shown.

In this case study the evaluation is summative, assessing effectiveness and net impact. It comprises three parts:

- **Part 1**: Observations of Information Exchange in Bullet Rounds
- **Part 2**: The Physicians’ Script
- **Part 3**: The Nurses’ Script
Chapter 7 - Evaluation of the Process Engineering Intervention: Methods and Results

7.1. Methods

7.1.1. Observations of Bullet Rounds

7.1.1.1. Data Collection

The data collected, analysed and presented in this thesis is shown in Appendix 11, with dates and participants. They include data collected through observations, interviews, focus groups and questionnaires.

The researcher conducted observations in two two-month sequences; prior to the process engineering intervention in January and February 2007 and after the process engineering intervention, in August and September 2007.

The dates of the observations were:

January 2007: January 15, 16, 17, 18, 19, 23, 26, 29 and 30 (9 days).
February 2007: February 1, 2, 5, 6, 9, 15, 16, 20, 22, and 23 (10 days)
(The process engineering intervention took place in March 2007)
August 2007: August 2, 7, 8, 10, 17, 21, 22, 29, 30 and 31 (10 days)
September 2007: September 5, 6, 10, 11, 14, 18, 20, 21, 26 and 28 (10 days)

The days were selected to reflect a variety of days of the week. The Bullet Rounds meetings were approximately 1.5 hours long, but varied in length due to a number of factors such as number of patients, patient complexity, and personnel involved: the total hours of observation were approximately 30 hours pre and 30 hours post the process engineering intervention.

The researcher documented the information exchange between nurses and physicians in Bullet Rounds using a checklist; these field notes were the content used for the data
analysis. Each patient discussed was numbered and notes were taken about what kind of information was exchanged, whether there were any gaps in the information, and who was responsible for the gap. Additional data regarding non-medical reasons for discharge delays and comments were also recorded where available. A verbal exchange between a nurse and physician regarding an individual patient is defined as a Patient Information Exchange. Each day the patient discussions at Bullet Rounds are about different patients; however, subsequent days may involve repeat discussions about the same patient. In other words the same patient is not discussed twice on the same day, but may be discussed again on subsequent days; these repeat discussions are still defined as a Patient Information Exchange.

Other observational and contextual data was recorded in the form of notes which have been transcribed into the case study database under “Comments”. These include notations about when the nurses were replaced, when there were events such as cdifficil outbreaks, when the resident physician orientation was done and how well, and the researcher’s personal anecdotal observations around aspects of the meetings.

### 7.1.1.2. Data Coding and Transcription

The researcher transcribed the field notes into a database containing the following fields, which are shown along with their definitions in Table 3 below.

<table>
<thead>
<tr>
<th>Field</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient #</td>
<td>A unique identifier for each patient discussion in daily Bullet Rounds (1 – n)</td>
</tr>
<tr>
<td>Date</td>
<td>Date of Bullet Rounds</td>
</tr>
<tr>
<td>Information Category</td>
<td>Category of information discussed for the patient - eg vitals, tests, treatment, placement etc - multiple types may be entered for an individual patient</td>
</tr>
<tr>
<td>Information Gap</td>
<td>Between nurses and physicians only - defined as non-provision of information: either no information provided or a specific request for information cannot be fulfilled. Y/N field</td>
</tr>
<tr>
<td>Category of information Missing</td>
<td>Specifies what category of information was being discussed when either no information was provided or a specific request for information could not be fulfilled.</td>
</tr>
</tbody>
</table>

61
The researcher entered the appropriate details for each patient information exchange into the database. The information exchanged was coded by category. The categories used were based on a structured language framework; the rationale for this was that both physicians and nurses from General Internal Medicine had reviewed them and indicated they reflected the kind of information discussed in Bullet Rounds. The information categories used and their definitions are shown below in Table 4:

### Table 3: Database Fields and Field Definitions

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<tr>
<th>Field</th>
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<tbody>
<tr>
<td>Information Category</td>
<td>Definition</td>
</tr>
<tr>
<td>Vitals</td>
<td>Patient blood pressure and other vital signs</td>
</tr>
<tr>
<td>O2 sats/electrolytes/blood</td>
<td>Patient’s blood oxygen saturation, electrolyte levels, any other blood issues</td>
</tr>
<tr>
<td>Pain</td>
<td>Discussion around patient’s pain level</td>
</tr>
<tr>
<td>Bodily Functions</td>
<td>Includes bowel movements, urine output, whether patient had vomited etc</td>
</tr>
<tr>
<td>Meds</td>
<td>Issues around medication patient is/should be taking</td>
</tr>
<tr>
<td>Tests/treatment/consult</td>
<td>Tests include xrays, MRI or CT scans, treatment includes the need for physiotherapy or rehabilitation, special diet etc, consult refers to involvement of specialists such as cardiologists, nephrologists, palliative care etc</td>
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</tbody>
</table>
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<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foley/IV</td>
<td>Any issues around the use/removal of a foley catheter or IV</td>
</tr>
<tr>
<td>O2</td>
<td>Whether patient needs oxygen either in hospital or for discharge</td>
</tr>
<tr>
<td>Mental/emotional</td>
<td>Whether patient has delirium or cognitive issues, is depressed or violent etc</td>
</tr>
<tr>
<td>Family</td>
<td>Any issues with the family members – cannot contact, what their wishes are, are not cooperative etc</td>
</tr>
<tr>
<td>Placement</td>
<td>Issues around the future placement of the patient, such as what their level of functioning is, whether they can return home, whether appropriate placement is available etc</td>
</tr>
<tr>
<td>Discharge</td>
<td>Discharge plan, date, readiness, delays and reason, what needs to be done etc. A physician’s inability to provide a discharge date because of uncertainty around medical diagnosis or judgment was not coded as an information gap.</td>
</tr>
</tbody>
</table>

**7.1.1.3. Data Analysis**

Patterns or trends in the data were analysed to assess what changes had occurred post the process engineering intervention, and then contextual information used to explain the changes identified.

Assigning the information exchange for each patient a unique identifier **Patient #** enabled a count of total patient information exchanges per day without identifying the patients by name. The use of the **Date** field enabled comparison by month, and pre and post the process engineering intervention. **Information Category** was a numerical field; entering a category number in a separate cell enabled a filtering process whereby a count of the different categories of information exchanged (and missing) could be obtained. Use of a Yes/No field **Information Missing** to indicate whether a unique information exchange had suffered information loss enabled a count of **Yes** results versus **No** results which could then be compared to total exchanges. In exchanges where a **Yes** occurred in the **Information Missing** field, examples entered in the **Example** field provided a rationale for the coding used. Entering **Nurse** or **Physician** in the **Source of Information Gap**
field enabled a filtering and count of the results. The fields **Non-Medical Discharge Delays** and **Reason** were used where possible to enable an additional analysis around this important issue in General Internal Medicine. The **Issues and Comments** field was used to record any contextual information that would be helpful to explain the results of the analysis.

The wards that comprise General Internal Medicine are 8A, 8B and 3B. General Internal Medicine patients may also be assigned to other clinical services, specifically on floors 5 and 9; patients that still remain in the emergency department but have been admitted to the hospital also become part of General Internal Medicine. Although the total number of on and off ward discussions were counted for each day, only discussions of patients on wards 8A, 8B and 3B were included in the analysis because the other patients are not yet known to the nurses attending Bullet Rounds. The patients of all four General Internal Medicine medical teams and the Family Medicine team are included in the analysis.

To address the second research question, the data from the observations were analysed to determine:

- Number of patient information exchanges with information gaps, and changes pre and post the process engineering intervention (as a proportion of total exchanges).
- Information categories used most frequently, and changes pre and post the process engineering intervention.
- Information categories where gaps occurred, and changes pre and post the process engineering intervention.
- Source of information gap, whether nurse or physician. The “nurse” category includes both the Patient Care Coordinator nurses and their replacements.

To eliminate coding bias a second researcher familiar with General Internal Medicine and Bullet Rounds was asked to replicate the coding independently. She coded a randomly selected subset of approximately 10% of the total observation days coded: that is, of a total of 39 days she coded 4. The inter-rater agreement for missing information and allocation of categories of information was calculated using Cohen’s Kappa. This statistic
is used to assess inter-rater reliability when observing or otherwise coding qualitative/categorical variables. Kappa is considered to be an improvement over using % agreement to evaluate this type of reliability because it takes into account agreement that might have occurred by chance, which a simple percent agreement does not. Kappa has a range from 0-1.00, with larger values indicating better reliability. Generally, a kappa > .70 is considered satisfactory. For the coding of missing information in the evaluation study the kappa was .8, showing an adjusted inter-rater agreement of 80% and for the coding of the allocation of information categories the kappa was .73, showing an adjusted inter-rater agreement of 73%. The calculations are shown in Appendix 12. Table 5 below represents the results of the coding for the source of information loss. The total of 73 represents only the patient information exchanges where there was agreement that information loss had occurred. The double coding resulted in only one discrepancy, as shown below.

<table>
<thead>
<tr>
<th>Coder Agreement on Source of Information Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Patient Exchanges Where Coders Agree Loss Has Occurred</td>
</tr>
<tr>
<td># of Patient Exchanges Where Coders Agree On Source of Loss</td>
</tr>
<tr>
<td># of Patient Exchanges Where Coders Disagree On Source of Loss</td>
</tr>
</tbody>
</table>

Table 5: Inter-rater Agreement on Source of Information Loss in Patient Information Exchanges

7.1.2. The Physicians’ Script

The second part of the study comprised both structured interviews and focus groups (with associated questionnaires) with physicians. Interviews took place with both resident physicians and staff physicians, and there were two resident physician focus groups. Resident and staff physicians groups were kept separate to avoid bias from hierarchical structure.

7.1.2.1. Data Collection

Individual Interviews with resident physicians led by the researcher were structured and short (approximately five minutes). Time constraints around access to the residents
reduced the opportunity for unstructured interaction, and the brevity of the interviews did not require that they be taped. The physicians were not aware of the questions in advance. Interviews occurred immediately after Bullet Rounds with structured questions, as shown in Appendix 13. The interviews took place in 2007; in February, prior to the process engineering intervention, and in April and June, after the process engineering intervention. Each of these dates represents a different contingent of resident physicians; in February there were seven respondents from General Internal Medicine and two from Family Medicine, in April five respondents from General Internal Medicine and in June ten respondents from General Internal Medicine and one from Family Medicine. Structured interviews are useful for obtaining information that an individual might not share in a group but do not allow for the richer exploration of themes that can occur in a focus group. The rationale for the use of structured short interviews in this case was to obtain the maximum number of responses over time to a set series of questions, in order to identify issues and themes, which could be explored in an unstructured setting. The resulting notes have been tabulated in a database.

Interviews with staff physicians took place in early 2008 and were semi-structured; they covered the themes shown in Appendix 14, which had been identified from prior interviews and focus groups with resident physicians. These interviews lasted approximately one hour, were taped and later transcribed. Consent was obtained from participants. Semi-structured individual interviews share some of the benefits of both interviews and focus groups. They are less intrusive to those being interviewed as the semi-structured approach encourages two-way communication. Those being interviewed can ask questions of the interviewer and in this way it can provide insight into their level of understanding or concerns. Often the information obtained from semi-structured interviews will provide not just answers, but the reasons for the answers because it provides the flexibility to probe for details or discuss issues. The rationale for using semi-structured interviews with staff physicians was that they had not previously been interviewed and had not participated in focus groups so a format was chosen that was a synthesis of the two.
Focus Group sessions with resident physicians and led by the researcher took place in August 2007. Focus groups are similar to unstructured interviews except that they are done with groups, and are used for triangulation of results, by confirmation or refutation of information gained in prior interviews (Krueger 2000). They are also useful to explore themes in greater detail and expand on a topic. However, in focus groups individuals may be hesitant to share what they might share individually and they are more difficult to manage than individual interviews. The rationale for using the focus group format with resident physicians after the structured interviews was that themes had already been identified and the goal was to explore them further and discover if additional issues not previously considered became apparent.

The researcher followed standard focus group protocol (Krueger 2000 p 63): the questions were reviewed by an external staff physician familiar with Bullet Rounds, and are shown in Appendix 15. The questioning route went from more general to more specific. Materials for the groups included an overview of the purpose, length and process of the meeting, a list of topics to be covered and a consent form that was signed by all participants. The meetings took approximately one hour and were taped and later transcribed. The focus groups were held separately by profession because they are more effective when the participants are of similar backgrounds (Krueger 2000).

Questionnaires (Appendix 16) were filled in by resident physicians who participated in focus groups. The questionnaires focused on similar issues to those raised in interviews.

7.1.2.2. Data Analysis

All the transcripts were read at one sitting to identify potential trends and patterns and linked the relevant sections of the transcript to each question asked, to enable a summary and later comparison with other groups. First, the raw data were reviewed and actual words used were compared to see whether they were identical, similar, related or unrelated. If words used were similar, comparisons of context were made, as well as emphasis and intensity, internal consistency, and level of specificity. Finally statements were ordered by theme. The descriptive analysis includes a summary of typical quotes
based on the purpose of the discussions, that is, information exchange, and finally the interpretive analysis explores the meaning of the results. The process of analysis was to review the transcripts and assign pieces of text in a transcript to a theme: additional names were created for any new themes that emerged during the discussion. The text was then grouped by theme; references to the transcripts have been provided to justify these groupings. The questions used in physician interviews, focus groups and questionnaires are shown in Appendices 13-16.

The data were organized to enable the following comparisons:

- Within group analysis: compare and contrast the responses of the resident physicians pre and post the process engineering intervention.

  Using the process engineering intervention as the demarcation point, the researcher’s goal was to identify changes that occurred pre and post the process engineering intervention and that may be causally related to it.

  She compared the responses of the resident physicians in interviews prior to and after the process engineering intervention, and in interviews and focus groups that took place after it.

- Between group analysis: compare and contrast the responses of the resident and staff physicians.

  The researcher’s goal was to identify and analyse similarities and differences between the experiences and perceptions of resident and staff physicians.

  She compared the responses of the resident physicians to those of the staff physicians.

- Between group analysis: compare and contrast the responses of the staff physicians with the Patient Care Coordinator nurses
The researcher’s goal was to identify and analyse similarities and differences between the perceptions of the staff physicians and those of the Patient Care Coordinator nurses.

The data from this process are shown in Appendix 17 in the Comparison Table of Results from Nurse and Physician Interviews and Focus Groups. References to and excerpts from the transcripts are provided to support the discussion of the findings.

The references cited in brackets in the format (TR n) are to the list of Transcript References.

### 7.1.3. The Nurses’ Script

The third part of the study consisted of unstructured interviews with the Patient Care Coordinator nurses pre the process engineering intervention and a focus group post the process engineering intervention. The researcher’s ongoing anecdotal notes of conversations with the nurses and own reflexive notes have been recorded in the Case Study database.

#### 7.1.3.1. Data Collection

Interviews with nurses were led by the researcher, were unstructured and took place prior to the process engineering intervention. The interviews were individual because the nurses were new to their positions and appeared uncertain of their role, and the interviews were very exploratory, since they had little experience of Bullet Rounds. Their responses were therefore based more on descriptions of what they felt should happen rather than their experiences in Bullet Rounds. The unstructured format allowed for flexibility of discussion around topics as they arose. The researcher took detailed notes in the interviews and these have been tabulated in a database.
The Focus Group session with the nurses took place in early 2008. The rationale for using the focus group format was to explore the changes in the nurses’ perceptions around Bullet Rounds in more depth, and to allow for the synthesis of their viewpoints. The questions were generated from the propositions of the case study and the process followed standard protocol (Krueger 2000 p 63). The questioning route went from more general to more specific. Materials for the groups included an overview of the purpose, length and process of the meeting, a list of topics to be covered and a consent form that was signed by all participants. The meetings took approximately one hour and were taped and later transcribed.

The questions used in the Patient Care Coordinator nurse interviews and focus group is shown in Appendix 15.

### 7.1.3.2. Data Analysis

The results of the Patient Care Coordinator nurse interviews and focus groups are presented through a number of themes. These themes are based on the questions asked in the interviews and focus groups and additional themes that emerged during conversations. The process of analysis was to review the transcripts and assign pieces of text in a transcript to a theme: additional names were created for any new themes that emerged during the discussion. The text was then grouped by theme; references to the transcripts have been provided to justify these groupings. The questions used in the focus group with the nurses are shown in Appendix 15.

The data was organized to enable the following comparisons:

The nurse group is made up of the Patient Care Coordinator nurses (4) who attend Bullet Rounds.

- Within group analysis: compare and contrast the responses of the Patient Care Coordinator nurses pre and post the process engineering intervention.
Using the process engineering intervention as the demarcation point, the goal was to identify changes that occurred after the process engineering intervention and may be causally related to it.

- Between group analysis: compare and contrast the Patient Care Coordinator nurses responses against the two physician groups.

The goal was to identify and analyse similarities and differences in their perceptions.

The researcher compared the Patient Care Coordinator nurses’ responses to those of both physician groups.

The data from this process are shown in Appendix 17 in the Comparison Table of Results from Nurse and Physician Interviews and Focus Groups. References to and excerpts from the transcripts are provided to support the discussion of the findings.

A comparison table of the results of the nurse and physician interviews and focus group results is shown in Appendix 17.

### 7.2. Results

#### 7.2.1. Observations of Bullet Rounds

The results from the observations of Bullet Rounds are reported in four areas; Information Loss, Frequencies of Information Categories, Categories of Information Loss and Source of Information Loss.

The first area, Information Loss, and second, Frequencies of Information Categories, are dichotomous variables, that is, there are two possible outcomes. For the first the goal was to establish if there is a relationship between the two categorical variables, that is, the
number of exchanges with missing information and the number of exchanges without missing information, before and after the process engineering intervention. Each patient information exchange can fall into only one or other of the two categories. For the second the goal was to compare the relative positions of the Placement and Discharge categories before and after the process engineering intervention.

Analysis of the mean in this case would not be possible because the variables cannot be measured continuously and the mean of each category would depend on how many members each category has. Pearson’s chi-square calculation was used because it compares the frequencies recorded with what might be expected to occur by chance, that is, it is based on expected values, and can be used in cases such as this where cell counts are greater than five. Since proportionately small differences in cell frequencies can result in statistically significant relationships between variables, the row and column percentages are included to assist in interpretation where sample sizes are different. Since the chi-square calculation measures significance of association but not its strength, the odds ratio calculation has been included to provide this. The chi-square calculation was not used for the third and fourth areas, Categories of Information Loss and Source of Information Loss, because they are not dichotomous variables: instead, percentages have been calculated to show trends pre and post the process engineering intervention (Fields 2007).

The results have been calculated twice: the initial calculation includes all the observations while the second omits the days when the Patient Care Coordinator nurses were away and replaced by a substitute. This occurred on January 15 and 30, February 15, 16 and 20, August 2 and 10, and September 28, 2007. The rationale for the second calculation is that the absence of the Patient Care Coordinator nurses could be viewed as a potential confounder and the additional analysis was necessary to show that the replacements did not substantially change the results.
7.2.1.1. Information Loss

Table 6 below shows the results of the primary analysis of overall information loss in patient information exchanges. It shows the total number of exchanges that took place by month, and pre and post the process engineering intervention, and the number pre and post the process engineering intervention where information was missing, expressed as a proportion of the total. Prior to the process engineering intervention the total number of independent patient information exchanges that were observed was 762: each of these was coded as either missing or not missing information. Of the total observed, 341 of the exchanges were coded as missing information, while 421 were coded as not missing information. After the process engineering intervention 1086 independent patient information exchanges were observed. Of the total observed, 270 of the exchanges were coded as missing information, while 816 were coded as not missing information.

<table>
<thead>
<tr>
<th>2007</th>
<th>January</th>
<th>February</th>
<th>Total</th>
<th>RIE</th>
<th>August</th>
<th>September</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td># of exchanges with missing information</td>
<td>134</td>
<td>207</td>
<td>341</td>
<td></td>
<td>154</td>
<td>116</td>
<td>270</td>
</tr>
<tr>
<td># of exchanges without missing information</td>
<td>260</td>
<td>161</td>
<td>421</td>
<td></td>
<td>392</td>
<td>424</td>
<td>816</td>
</tr>
<tr>
<td>Total # of exchanges</td>
<td>394</td>
<td>368</td>
<td>762</td>
<td></td>
<td>546</td>
<td>540</td>
<td>1086</td>
</tr>
<tr>
<td>% of exchanges with missing information</td>
<td>34%</td>
<td>56%</td>
<td>45%</td>
<td></td>
<td>28%</td>
<td>21%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Table 6: Nurse-Physician Patient Information Exchanges with Missing Information in Bullet Rounds - Pre and Post the Process Engineering Intervention

The results show that although an increase in the total number of exchanges occurred after the process engineering intervention, reflecting a larger patient population, there was a decrease in the overall number of exchanges where information loss occurred, from
45% of the total to 25% of the total. The increase in the number of exchanges was not therefore accompanied by an increase in information loss; in fact the reverse occurred.

Table 7 shows how the results from the coding of the patient information exchanges described above were used to calculate the significance of the change using a chi-square analysis. The column headings “No” and “Yes” refer to prior to the process engineering intervention (No) and after it (Yes). The “Totals” column contains the total numbers of independent patient information exchanges observed, broken down into those coded as missing or not missing information; these numbers are the same as those shown above in Table 6. The row headings “No” and “Yes” refer to whether there is missing information (Yes) or not (No).

<table>
<thead>
<tr>
<th></th>
<th>Intervention (RIE)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td>TOTALS</td>
</tr>
<tr>
<td>Missing Information</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>421</td>
<td>816</td>
<td>1237</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>341</td>
<td>270</td>
<td>611</td>
</tr>
<tr>
<td></td>
<td>762</td>
<td>1086</td>
<td>1848</td>
</tr>
</tbody>
</table>

Table 7: Contingency Table for Missing Information

There was a significant association between the occurrence of the process engineering intervention and the amount of information lost in patient information exchanges $\chi^2 (1) = 79.92$, p < .001. This seems to represent the fact that based on the Odds Ratio after the process engineering intervention patient information exchanges were 2.45 times less likely to have missing information (Calculations are shown in Appendix 18 a).

The second series of calculations omitting the replacement days resulted in similar findings: the total number of days with missing information pre the process engineering intervention was 47% of the total, and post the process engineering intervention it was 28% of the total. There was a still significant association between the occurrence of the
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process engineering intervention and the amount of information lost in patient information exchanges $\chi^2 (1) = 55.88, p< .001$. The second Odds Ratio calculation produced a similar likelihood of 2.25 times (Calculations are shown in Appendix 18 b).

7.2.1.2. **Frequencies of Information Categories**

Table 8 below shows the results of the coding of independent patient information exchanges into information categories used by nurses and physicians in Bullet Rounds, and the frequency analysis with ranking order done on the results. A patient information exchange may be coded into more than one information category; hence the frequency counts total more than the total number of patient information exchanges used in the previous calculation. The frequencies shown are of the use of each information category as a proportion of the total exchanges pre and post the process engineering intervention, with percentage and rank added.

<table>
<thead>
<tr>
<th>Info Type</th>
<th>Jan</th>
<th>Feb</th>
<th>Total</th>
<th>%</th>
<th>Rank</th>
<th>RIE</th>
<th>Aug</th>
<th>Sept</th>
<th>Totals</th>
<th>%</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vitals</td>
<td>29</td>
<td>51</td>
<td>80</td>
<td>10</td>
<td>4</td>
<td>70</td>
<td>53</td>
<td>123</td>
<td>9</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2. O2 sats/electrolytes/blood</td>
<td>13</td>
<td>14</td>
<td>27</td>
<td>3</td>
<td></td>
<td>24</td>
<td>60</td>
<td>84</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Pain</td>
<td>7</td>
<td>8</td>
<td>15</td>
<td>2</td>
<td></td>
<td>15</td>
<td>20</td>
<td>35</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Bodily Functions</td>
<td>13</td>
<td>20</td>
<td>33</td>
<td>4</td>
<td></td>
<td>37</td>
<td>41</td>
<td>78</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Meds</td>
<td>11</td>
<td>9</td>
<td>20</td>
<td>2</td>
<td></td>
<td>26</td>
<td>33</td>
<td>59</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Tests/treatment/consult</td>
<td>125</td>
<td>142</td>
<td>267</td>
<td>32</td>
<td>1</td>
<td>159</td>
<td>132</td>
<td>291</td>
<td>22</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7. Foley/IV</td>
<td>7</td>
<td>10</td>
<td>17</td>
<td>2</td>
<td></td>
<td>32</td>
<td>27</td>
<td>59</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. O2</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td></td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Mental/emotional</td>
<td>18</td>
<td>15</td>
<td>33</td>
<td>4</td>
<td></td>
<td>33</td>
<td>36</td>
<td>69</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Family</td>
<td>15</td>
<td>24</td>
<td>39</td>
<td>5</td>
<td></td>
<td>33</td>
<td>23</td>
<td>56</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Placement</td>
<td>139</td>
<td>66</td>
<td>205</td>
<td>24</td>
<td>2</td>
<td>127</td>
<td>92</td>
<td>219</td>
<td>16</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>12. Discharge</td>
<td>47</td>
<td>47</td>
<td>94</td>
<td>11</td>
<td>3</td>
<td>114</td>
<td>158</td>
<td>272</td>
<td>20</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Total of all Information Types</td>
<td>428</td>
<td>409</td>
<td>837</td>
<td>100</td>
<td></td>
<td>674</td>
<td>679</td>
<td>1353</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8: Frequencies of Information Category (Nurse - Physician) as % of Total

The main four categories used have been highlighted; they are category 1 – Vitals, category 6 - Tests, treatment and consults, Category 11 – Placement and category 12 – Discharge. Although these categories remain the group used the most frequently over time, the comparative rankings order changes before and after the process engineering
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intervention. The amount of time spent discussing category 6 – Tests appears to decline over time, particularly after the process engineering intervention, although at 22% it still ranks number 1. Category 1 - Vitals remained consistently at rank 4 and fairly stable as a category over time. The relative ranking of categories 11- Placement and 12 -Discharge switch after the process engineering intervention: Placement goes from second place to third while discharge goes from third place to second.

Table 9 shows how the results from the coding of the patient information exchanges described above were used to calculate the significance of the change using a chi-square analysis. The column headings “No” and “Yes” refer to prior to the process engineering intervention (No) and after it (Yes). The “Totals” column contains the total numbers of independent patient information exchanges observed that were coded into either the Placement or Discharge categories; these numbers are the same as those shown in Table 8 above. The row headings “Discharge” and “Placement” refer to the frequency with which each of these categories is in rank 2 based on the coding results shown in Table 8 above.

<table>
<thead>
<tr>
<th>CONTINGENCY TABLE showing Rank 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Intervention (RIE)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Rank 2</td>
</tr>
<tr>
<td>Discharge</td>
</tr>
<tr>
<td>Placement</td>
</tr>
<tr>
<td>299</td>
</tr>
</tbody>
</table>

Table 9: Contingency Table for Discharge as Rank 2

There was a significant association between the occurrence of the process engineering intervention and the change in rank between categories 11- Placement and 12 – Discharge at $\chi^2 (1) = 43.23$, $p < .001$. (Calculations are shown in Appendix 19 a). This seems to represent the fact that based on the Odds Ratio after the process engineering intervention category 12- Discharge was 2.71 times more likely than Placement to be in the second place rank. Assumptions used in this calculation were that Categories 11- Placement and
12- Discharge alternate between second and third ranking and that Category 12-Discharge can only be ranked second or third. This may relate to a changing focus of the discussions in Bullet Rounds after the, process engineering intervention which is explored in the next study. Patients cannot be discharged if there is nowhere appropriate for them to go: the link between categories 11 and 12 is explored in discussions with the nurses and physicians in the next study. The second series of calculations omitting the replacement days produced the same result in the rank order. There was a significant association between the occurrence of the process engineering intervention and the change in rank between categories 11- Placement and 12 – Discharge \( \chi^2 (1) = 27.85, p<.001 \). The second Odds Ratio calculation produced a similar likelihood of 2.37 times (Calculations are shown in Appendix 19 b).

### 7.2.1.3. Categories of Information Loss

Table 8 below shows the categories where information gaps occur most frequently, expressed as a proportion of the total information exchanged in that category pre and post process engineering intervention (RIE).

<table>
<thead>
<tr>
<th>Info Category</th>
<th>Total Exchanged</th>
<th>Total Lost</th>
<th>%</th>
<th>RIE</th>
<th>Total Exchanged</th>
<th>Total Lost</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Vitals</td>
<td>80</td>
<td>47</td>
<td>59%</td>
<td>123</td>
<td>37</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>2 - O2 sats/electrolytes/blood</td>
<td>27</td>
<td>10</td>
<td>37%</td>
<td>84</td>
<td>15</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>3 - Pain</td>
<td>15</td>
<td>7</td>
<td>47%</td>
<td>35</td>
<td>4</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>4- Bodily Functions</td>
<td>33</td>
<td>15</td>
<td>45%</td>
<td>78</td>
<td>17</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>5 - Meds</td>
<td>20</td>
<td>5</td>
<td>25%</td>
<td>59</td>
<td>8</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>6 - Tests/treatment/consult</td>
<td>267</td>
<td>112</td>
<td>42%</td>
<td>291</td>
<td>65</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>7 - Foley/IV</td>
<td>17</td>
<td>0</td>
<td>0%</td>
<td>59</td>
<td>8</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>8 - O2</td>
<td>7</td>
<td>1</td>
<td>14%</td>
<td>8</td>
<td>0</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>9 - Mental/emotional</td>
<td>33</td>
<td>10</td>
<td>30%</td>
<td>69</td>
<td>7</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>10- Family</td>
<td>39</td>
<td>11</td>
<td>28%</td>
<td>56</td>
<td>15</td>
<td>27%</td>
<td></td>
</tr>
<tr>
<td>11 - Placement</td>
<td>205</td>
<td>80</td>
<td>39%</td>
<td>219</td>
<td>57</td>
<td>26%</td>
<td></td>
</tr>
<tr>
<td>12- Discharge</td>
<td>94</td>
<td>43</td>
<td>46%</td>
<td>272</td>
<td>37</td>
<td>14%</td>
<td></td>
</tr>
</tbody>
</table>

Table 10: Missing Information as % of Total Information Exchange
Focusing on the four categories where the majority of the information exchange occurs, it appears that all four categories followed the overall trend of decreased information loss after the process engineering intervention. The most substantial drop appears in category 12- Discharge, followed by category 6 – Tests, treatment, consults. Comparing these results to those in Table 7, it appears that category 6 decreased in absolute frequency (Table 7) and loss frequency (Table 8) while category 12 increased in absolute frequency (Table 7) but still decreased in loss frequency (Table 8). The second series of calculations omitting the replacement days produced the same effect. This suggests that an absolute decrease in the frequency with which a category of information was discussed was not necessarily responsible for a decrease in information loss in that category. While the spread of information loss was fairly even over the four main categories pre the process engineering intervention, post the process engineering intervention it was similar in all categories but 12- Discharge, which was much lower.

### 7.2.1.4. Source of Information Loss

Table 9 below shows the source of the information gaps documented.

| Breakdown of Patient Information Exchanges with Information Gaps by Practitioner Pre and Post Process Engineering Intervention (Rapid Improvement Event - RIE) |
|---|---|---|---|---|---|---|
| | 2007 | January | February | Total | RIE | August | September | Total |
| # of exchanges with missing information | | 134 | 207 | 341 | | 154 | 116 | 270 |
| # of Gaps by Nurses | | 121 | 207 | 328 | | 153 | 114 | 267 |
| % Total | | 90% | 100% | 96% | | 99% | 98% | 99% |
| # of Gaps by Physicians | | 13 | 0 | 13 | | 1 | 2 | 3 |
| % Total | | 10% | 0% | 4% | | 1% | 2% | 1% |

Table 11: Sources of Information Gaps
The great majority of the gaps are seen as originating with the nurses, and there was no evidence of any change over time. The second series of calculations omitting the replacement days produced the same effect.

7.2.1.5. Discussion

The post process engineering intervention results are contemporaneous with the changes in Bullet Rounds made during the process engineering intervention. For example, representatives from a Bridgepoint Nursing Home, Toronto Rehabilitation Institute and the CCAC (Home Care) attended Bullet Rounds to speed up placement, since these facilities were commonly needed by patients being discharged from General Internal Medicine. A standardized process flow had been posted on the walls of the Bullet Rounds room. Physicians wrote orders in Bullet Rounds to reduce delays, and the new physician orientation was implemented.

Changes in the Bullet Rounds process were evident, as shown by the researcher’s observations, and comments made by the Patient Care Coordinator nurses documented throughout the observation period. Before the process engineering intervention in January and February the Patient Care Coordinator nurses were new to their positions, and were not always present owing to the outbreak of Cdifficil; this resulted in a good deal of variability in the way the nurses’ side dealt with the Bullet Rounds process. The overall impression was of a disorganised process with no clear leader, and in terms of Script Theory the Patient Care Coordinator nurses appeared frustrated because their goals for Bullet Rounds were not being met by the physicians’ script.

In August and September they appeared to take charge of the meetings more; one of the Patient Care Coordinator nurses “ran the list” meaning she called out each patient’s name in turn and would move the meeting along very quickly, cutting off "personal" discussions and keeping the focus on the (medical) "plan" and discharge. During this period they asked about discharge for every patient, and tended to cut short any discussion of medical issues. This may account for decreases shown in Table 7 in category 1 – Vitals and category 6 – tests, treatment and consults; that is, they were
guiding the discussions away from medical issues and towards discharge issues. The Patient Care Coordinator nurses appeared to concentrate more on managing the process than providing information; they commented to each other that the process was still not as tight as they would like but was certainly improved. In Script Theory terms they were reinforcing a Bullet Rounds script of their creation based on their goal, which appeared to be increasing efficiency around discharge, which had become their main emphasis of information exchange in Bullet Rounds. Their more proactive approach made the difference when they were replaced more noticeable; then the process tended to revert back to a less organised model with less emphasis on discharge, probably because this is not the focus or the responsibility of the floor nurse who replaced them.

This discharge focus after the process engineering intervention is reflected in Table 7, and may have enabled the decrease in loss of information in category 12 – Discharge even while it took up a higher proportion of the discussion time; that is, the Patient Care Coordinator nurses focused more on information in this category. One apparent anomaly in Table 7 is in category 11- Placement, which appears to decrease in frequency post the process engineering intervention. Discharge is closely linked to placement for most of the patients in General Internal Medicine so it might be expected that these two categories would be similar in frequency. However, the Patient Care Coordinator nurses tended to steer the conversation away from discussions of placement difficulties, which could take place outside of Bullet Rounds, and towards the management of discharge issues. For patients with placement issues the Patient Care Coordinator nurses would move immediately to the next patient, which may explain why category 11- Placement, appeared to be less of a focus during this period.

Since nurses do not always speak during bullet rounds, and based on the definition used of an information gap, the number of information gaps attributed to them is understandably higher. The nurses may however view their lack of contribution to an individual patient information exchange as a process issue rather than an information gap. This behaviour may reflect the nurses’ belief that the flow of information at Bullet Rounds should be predominantly unidirectional, from the physicians to the nurses,
documented in interviews and the focus group. It may also reflect the actual process of Bullet Rounds; during the meetings, the physicians typically begin the process and always speak, while nurses do not, and only some physicians prompt the nurses to speak. Hence there are no patient information exchanges where physicians fail to contribute; the gaps attributed to them occur when they are asked a question and do not have the appropriate information.

The goals and the associated script of the Patient Care Coordinator nurses were reinforced in the resident physician orientation presentation that had been created during the process engineering intervention, and which the researcher observed. During the process engineering intervention the Patient Care Coordinator nurses created a resident physician orientation presentation that dealt only with Bullet Rounds and would be presented by the allied health personnel (OT, PT Social Work etc) and themselves.

The presentation was very focused on discharge and the responsibilities of the physicians around this. It included a request of the resident physicians to provide in Bullet Rounds the plan of care for the patient and discharge date. For new patients they requested more information, including key issues, the primary contact, estimated discharge date and destination; for continuing patients they asked for the key issues only. They were not, however, specific as to what those key issues were. They advised that patients to be discharged on a weekend must be identified by the previous Thursday, discharge summaries must be completed by 11 am on the day before discharge, and that if the resident physicians discharged a patient after Bullet Rounds he/she should let them know.

The Bullet Rounds orientation presentation prepared for the resident physicians was clearly intended to guide their behaviour in Bullet Rounds. In Script Theory terms the intent was to clarify the goal of Bullet Rounds based on what the Patient Care Coordinator nurses perceived it to be, and the script that accompanied it. During this period after the process engineering intervention the physicians did appear to adapt to the new script; they mentioned discharge more, discussed the plan and what was missing for discharge and a date when it might occur. This is consistent with the analysis of the data.
on information categories in Table 7, which shows more discussion occurring around category 12 - Discharge after the process engineering intervention. (Although physicians were not always able to provide a precise discharge date this was not coded as missing information unless missing data was clearly responsible for the inability to provide a date; generally it reflected an unclear diagnosis or illness trajectory and was opinion rather than data based.)

7.2.1.6. Conclusion

The decrease in information loss from the pre to the post the process engineering intervention periods may be tied to changes at Bullet Rounds that were put in place after the process engineering intervention. The results of the data analysis have shown not only that there was a decrease in information loss, but also a decline in the amount of time spent discussing patient treatment in favour of discharge, as compared to both pre the process engineering intervention and indeed to the initial Bullet Rounds study where the results showed the majority of patient information exchanges were about clinical issues. The increased proactivity of the Patient Care Coordinator nurses during the same period suggests that in Bullet Rounds the leadership role is significant in determining the goals and script at Bullet Rounds. The purpose and goals of the leader(s) shape the information and process agenda whether or not they are shared by other participants.

7.2.2. The Physicians’ Script

7.2.2.1. The Process Engineering Intervention

The staff physicians felt the goal of the process engineering intervention was to improve Bullet Rounds and that the process was good (TR 1), although difficult to fit into their schedules; they prefer the project format with weekly meeting better (TR 2). The staff physician who represented the staff physician group with respect to administrative issues in the department attended the process engineering intervention but was present only about half the time. He indicated that he had felt able to represent his peers; indeed during the process engineering intervention he argued more than once against the proposed plans and indicated they would not be acceptable to his peer group (TR 3). He also commented
that the tools (charts, pocket cards etc) produced during the process engineering intervention had not been exploited (TR 4); the other two staff physicians seemed to be unaware of the tools and said that no one had pointed them out or talked about them and one of them asked who owned the tools (TR 5). The resident physicians were asked post the process engineering intervention if they had noticed the tools in the room; their responses were that they had not noticed them nor had they been brought to their attention.

The sustainability of the changes brought about by the process engineering intervention was questioned by the staff physicians. Their suggestions on how to sustain the changes included the importance of stakeholder perceptions of them as practical and useful (TR 7), stakeholder “buy in” (TR 8), incentives for use (TR 9) and training (TR 12).

The staff physician who participated in the process engineering intervention indicated that there was no benchmarking or evaluation of the results at the administrative bi-monthly meetings that he attends with the Patient Care Coordinator nurses (TR 10). He clearly felt that feedback was a critical component of changes that are made, but that there was neither ownership of it nor any process “intrinsic to the system to re-evaluate what’s going on” (TR 11).

**7.2.2.2. Information Exchange with Nurses: Overview**

Prior to and after the process engineering intervention resident physicians were asked in interviews what information they needed from nursing. They were fairly consistent in focusing on their need to know about issues that had arisen during the previous night, particularly new or acute issues or changes in status, unusual events, and vitals, with the addition of nursing concerns, clarification or requests and family issues. In the physician focus group they added the patient’s activity level, what has and has not been done, and the mainly non-medical issues needed for discharge.
When asked prior to the process engineering intervention whether they were getting that information they were non-committal (“more or less”, “in general”) and indicated they felt they had to prompt the nurses for it, but after the process engineering intervention they were more positive. They felt that the meetings were useful in that they alerted them to patient issues (TR 17) but still felt they had to ask for the information they need and indicated they felt that in Bullet Rounds the information flow was unidirectional, from the physicians to the nurses (TR 13). There was a perception they were only getting part of the information they needed (TR 14) because of the emphasis put on discharge by the nurses (TR 15), and because important information is buried in documentation (TR 16).

When asked what information the nurses needed from them, prior to the process engineering intervention the resident physician responses were varied, with answers ranging from “I don’t know - you should ask them” and “No idea” to family issues, discharge and the general plan. After the process engineering intervention there was a clear emphasis on planning and discharge – in 16 out of 17 responses the word discharge or plan was mentioned, which was reinforced in the focus group (TR 18).

Staff physicians saw the nurse-physician information exchange as critical (TR 19, TR 24). They emphasised the importance of nurses highlighting changes in the patient’s medical status, family matters and procedures (TR 25), and when interpreters will be present (TR 26) with discharge issues as secondary considerations (TR 20). One staff physician commented that he felt the nurses were generally effective in doing this although they occasionally bring what he called “trivia” to the table. He saw the information flow as bi-directional (TR 21), although the others saw it as more unidirectional, and that the nurses needed information on patient status but specifically for discharge planning (TR 22). One commented that he was not sure what happened to that information, which may in some sense get lost (TR 23). All felt that the information exchange had improved because it was more “formalized” but could still be further improved (TR 27).
7.2.2.3. Barriers to Information Exchange

In interviews resident physicians did not comment on environmental barriers they experienced that were unhelpful to Bullet Rounds, although in the post the process engineering intervention focus group they commented that the environment of a teaching hospital is not suitable for all nurses. They felt the more experienced nurses were more comfortable with it than the less experienced (TR 28).

They felt their efficiency was reduced by not knowing the nurses by sight (TR 29), and the way the nurses are scheduled (TR 30). The resulting loss of consistency and continuity was also seen as detracting from the level of patient care offered (TR 31). There was however acknowledgement that the constantly changing flow of resident physicians must be difficult for the nurses also (TR 32).

The staff physicians looked at the notion of the environment in a different way. With respect to Bullet Rounds they felt that the lack of an “owner” of Bullet Rounds was detrimental to process issues and improvements (TR 33, 34), and loss of information as well, such as when people are absent (TR 35). Barriers to discharge were unanimously seen as system issues, either at the level of the hospital (TR 36) or as a function of the larger political system (TR 37).

7.2.2.4. The Goal of Bullet Rounds

At the time of the February 2007 interviews the resident physicians had been attending Bullet Rounds anywhere from 2 to 6 weeks, their rotation having begun either at the beginning of January or the beginning of February. At that time, prior to the process engineering intervention, they were unclear as to the purpose and goal of Bullet Rounds. The responses of the residents were inconsistent and included; communication of information, the plan of care or concerns, discharge or in some cases an acknowledgement that they had no idea and had never been told.
Post the process engineering intervention the resident physicians’ responses in interviews were more consistent and “discharge” was mentioned by half the respondents in interviews in June 2007, although the other half perceived communication between the team to be the purpose, and one thought they were a “nursing tool”. However, unlike earlier, no respondent indicated they did not know. In a focus group discussion in August 2007 resident physicians felt that the nurses were pushing discharge as the main goal of Bullet Rounds (TR 38). The results of the questionnaire question “Doctors and Nurses are mutually aware of each others goals and objectives during Bullet Rounds” showed that most resident physicians felt that this was not the case (Appendix 16).

The three staff physicians interviewed in late 2007 and early 2008 responded in a more consistent way and all mentioned both patient care and discharge as the purpose of Bullet Rounds (TR 39).

### 7.2.2.5. Bullet Rounds Process: Help or Hindrance?

Resident physicians responding in interviews prior to the process engineering intervention commented that for them frequency and speed were positive characteristics of Bullet Rounds. Post the process engineering intervention their responses suggested they found Bullet Rounds efficient and useful, and that they liked having the order forms at the meetings, but did not make detailed comments or suggestions about how they were or should be run. In the focus groups residents commented that Bullet Rounds were a useful construct because they help with patient management, and were an efficiency aid (TR 46) particularly because the orders were in the room (TR 47) and because Bullet Rounds saved them time by reducing time spent going through documentation (TR 48). They felt that by having the ALC representatives present it increased the speed of placement (TR 49), and liked the daily format even though it meant not hearing directly from the floor nurse (TR 50).

On the negative side the resident physicians saw Bullet Rounds as a nursing tool that is less beneficial for them than the nurses, particularly because of lack of information. They
were concerned that information gets lost as a result of both handover gaps and poor documentation (TR 52). One suggestion was to establish a process to focus on future information needs, and they suggested separate documentation for nurses and physicians and a paper chart tool specifically for nurse-physician communication to address these gaps (TR 56). They also commented that the structure of Bullet Rounds was not sharp (TR 40), that the process was inconsistent and person dependent (TR 41), and that perhaps a facilitator might help.

One staff physician agreed with this perception and commented that one person (rather than 3 Patient Care Coordinator nurses) should be running the meetings (TR 42), and that the process was inefficient when the Patient Care Coordinator nurses were not present but had a substitute nurse (TR 43). Another staff physician indicated that he felt the Bullet Rounds process was “fine tuned” as much as it could be (TR 44), and that within the constraints Bullet Rounds had been optimised (TR 55), which he attributed to the nurses whom he felt had assumed the role of keeping the Bullet Rounds on track (TR 45). All of the staff physicians felt that the Bullet Rounds process had improved over time (TR 51) although they still felt there was room for further improvement (TR 53). They also thought the addition of facilitators to run the meetings might be helpful, because one person needs to have the full overview of the process (TR 57).

The role of the nurses was questioned by one staff physician; he felt that their goals for Bullet Rounds were not clear (TR 54), and that the nurses’ role both in Bullet Rounds and in general was unclear (TR 58). His suggestion was to make the nurses’ roles and responsibilities more parallel to those of the physicians (TR 59).

The staff physician involved in the process engineering intervention suggested Bullet Rounds could be improved by a speaker phone to enable post call teams to report to Bullet Rounds from emergency to save time (TR 60), and a laptop to enable immediate provision of test results etc. (TR 61).
7.2.2.6. Resident Physician Orientation

Resident physicians in interviews commented they had not been oriented to the White Board or the visual tools in the Bullet Rounds room. Staff physicians supported the idea of Bullet Rounds orientation as they felt they were central to the functioning of the unit (TR 62), but questioned whose responsibility it was to train the resident physicians on Bullet Rounds (TR 63). One felt the nurses should orient the new resident physicians to the tools and commented that if the nurses did not train the resident physicians on Bullet Rounds processes the physicians would do it according to their (medical) model of practice and script (TR 64). Another commented that no feedback was given to resident physicians or to their staff physicians about their behaviour in Bullet Rounds, but did not say why (TR 65) and added that such feedback is not given to the other disciplines either, including the nurses, and that the current approach was to let people learn by doing (TR 66). When asked what kind of training might be appropriate, he suggested modeling Bullet Rounds might be a good idea, but also that they should be guided in Bullet Rounds (by the Patient Care Coordinator nurses) which was not happening (TR 67). He seemed to feel the Patient Care Coordinator nurses were the best people to take on the training of new resident physicians, because they are the only ones who attend the full Bullet Rounds every day (TR 68), but saw a role for the staff physicians as well (TR 69). When asked why this does not happen he referred to the fear of upsetting the residents, the fact that they are there for only a short period, and the fact that the Patient Care Coordinator nurses may be shy.

7.2.3. The Nurses’ Script

7.2.3.1. The Process Engineering Intervention

The Patient Care Coordinator nurses liked the process engineering intervention; they felt it had a future orientation that focused on trying things and it helped them learn processes in what was then a new role. They also commented favourably on the effective communication around the process engineering intervention. They did however question
whether the expectation that in one week the Bullet Rounds process could be turned around and perfected was obtainable (TR 70).

They felt that the process engineering intervention helped create a common vision and understanding of their role between themselves, and felt they “came together as a team” and “work great as a team”. Prior to the process engineering intervention the Patient Care Coordinator nurses expressed uncertainty about how to manage the Bullet Rounds process: they had been told they run meetings but indicated that they felt they had no control, that the other participants all talked amongst themselves and ignored them. Overall they were unsure of what was supposed to happen, but thought that the physicians should start the discussion for each patient, that it was their job to do that. However in the focus group after the process engineering intervention they commented that it had had a big impact on how they approached Bullet Rounds; as a result of it they underwent a behaviour change and took control of Bullet Rounds (TR 72, 73, 99) and acted in a more consistent way (TR 71).

One output from the process engineering intervention was a series of tools in the form of charts and cards to guide the content and format of Bullet Rounds. The Patient Care Coordinator nurses acknowledged that the consultant had emphasize the importance of using them (the use of visual controls is a facet of “Process engineering” philosophy that is viewed as important) but they had not in fact continued to do so because they had “internalized” the tools and therefore did not need to use them any longer: there was no reference to how anyone else might have found them useful (TR 74). The Patient Care Coordinator nurses felt that the best result that came out of the process engineering intervention was having the order sheets in Bullet Rounds for the physicians to fill in immediately (TR-6), (a perception that was shared by the resident physicians).

One negative repercussion of the process engineering intervention evolved over time. The Patient Care Coordinator nurses felt that the responsibility for discharging patients had been assigned to them despite the fact that they had no control over the many system barriers to discharge that exist. They used terms like a “sense of blame” and a feeling like
“daggers are being thrown at you” at bed meetings where the number of beds available is discussed. They indicated the “daggers” were coming from the medicine, nursing and administrative leaders, and acknowledged a feeling of pressure on them to produce discharges (TR 75). They speculated that the perception was that the problems in General Internal Medicine had been “solved” by the process engineering intervention (TR 76). The Patient Care Coordinator nurses indicated they had devised a workaround to cope with this pressure: they would estimate discharges at bed meetings before going to Bullet Rounds and almost promise to find more at Bullet Rounds (TR 77). The subtlety was around the play between having to go to the meetings with some planned discharges and not falling into the trap of over promising discharges which later do not actually happen (TR 78).

The Patient Care Coordinator nurses agreed that revisiting Bullet Rounds should be a priority, but felt the review should be of the purpose of Bullet Rounds rather than an evaluation the effectiveness of the changes overall (TR 79). They had clearly evaluated the results of the process engineering intervention and found that despite the changes the system constraints were still the main determinant of discharge efficiency (TR 80). In hindsight they suggested that the focus had been on the “wrong concept” and agreed with the staff physicians that despite the “fine tuning” of the process there were still problems around definition of the agreed upon purpose and content (TR 81).

### 7.2.3.2. Information Exchange with Physicians: Overview

In the interviews prior to the process engineering intervention the Patient Care Coordinator nurses indicated that they saw Bullet Rounds as a forum for nursing to receive information, not to provide it. In addition they felt that the information they did provide was not helpful. They indicated that they thought the quality of information in Bullet Rounds had improved post process engineering intervention because they asked better questions (TR 82), because they had a clearer idea of the purpose of Bullet Rounds (TR 83), and more control over the process (TR 84), but there was no indication that their
perception of the what the information was that they needed to provide in Bullet Rounds had changed as a result of the process engineering intervention.

### 7.2.3.3. Barriers to Information Exchange

The Patient Care Coordinator nurses felt that many system constraints that slow down discharge were not in their control (TR 85). They contrasted General Internal Medicine to surgery where the time lines can be more easily predicted (TR 86), and suggested that this complexity made standardization, which would improve the process, very difficult (TR 87), but that improvement was possible (TR 88). The issues they raised included lack of personnel – CCAC, OTs and PTs, and highly overworked physicians who are “overwhelmed” with over 30 patients on a team, and as a result could not get paperwork done on time causing delays in discharge (TR 89). They corroborated the staff physicians’ view of a generally overloaded department that was coping with 130 medical patients when the institutional maximum is 76, and an emergency department that was so full patients were being sent up to the medicine wards to wait in the corridor until a bed was available. They felt the situation was running in “crisis” mode because of discharge delays caused by lack of places for patients to be discharged to (TR 91), and by families exercising their choice of placement: (TR 92). While they acknowledged that this had made the physicians more focused on discharge they were concerned that at a given point “crisis” mode would become the norm (TR 90).

### 7.2.3.4. The Goal of Bullet Rounds

At the time of the Patient Care Coordinator nurse interviews in December 2006 they were new to their positions. They indicated that first they were told that the purpose of Bullet Rounds was to get the care plan, find out what was going on, and then it became to see what they could do to speed up the discharge of the patient. They added that the physicians needed to know what the purpose of Bullet Rounds was, which they did not feel was the case.
In a focus group discussion in January 2008 the Patient Care Coordinator nurses referred to the changing focus of Bullet Rounds. It was clear that post the process engineering intervention they had accepted discharge as the purpose of Bullet Rounds, but felt that was now becoming unclear again (TR 93) because other groups were attempting to impose additional goals into the process. They commented on the variability of the interprofessional relationship, which is dependent on the person involved (TR 94), and that the physicians did not feel the same pressure as they did for discharge because they could always find a medical reason to keep a patient in hospital. They commented on the difficulties they had in maintaining a focus on discharge with physicians pushing back on discharge issues (TR 98) and that they needed to be assertive to keep the physicians on task (TR 97).

It was clear they felt the goals of the two groups were not consistent (TR 95). They acknowledged that they have a dual role in Bullet Rounds (TR 96), but that their approach was balanced; while they were assertive in advancing the discharge process in Bullet Rounds, they were also conscious of patient safety.

7.2.3.5. **Bullet Rounds Process: Help or Hindrance?**

The Patient Care Coordinator nurses commented that Bullet Rounds were useful because they were the only time they saw the physicians as a group; they also saw all the disciplines as playing an important role (TR 100). However they also saw problems in the process, describing Bullet Rounds as “loosy goosy” with the physicians providing no plan, or a plan with no specific details or dates provided that was constantly changing, and even post the process engineering intervention did not feel this problem had been solved (TR 101).

They highlighted lack of a shared vision and a silo mentality as causing problems in the process (TR 102) and felt that new goals for Bullet Rounds were being introduced that would cause the process to change (TR 103), suggesting there was a need to revisit Bullet Rounds as a process (TR 104). They viewed the Bullet Rounds process as part of the
overall discharge process and suggested there were problems earlier in the process as well (TR 106), and proposed that a new model involving two sets of rounds, one to focus on patient care management and one to focus on discharge might be necessary, and/or the addition of case workers (TR 105). They saw the support of the staff physicians as key to their success (TR 108), and felt that without a consistent approach the whole process would be undermined (TR 109).

7.3. Discussion

The responses of the two groups of physicians suggest that their Bullet Rounds scripts are somewhat different from each other, which may result from their differing roles and levels of experience with the process. With respect to information exchange with the nurses, for example, the staff physicians tended to see the “bigger picture” and understood the administrative concerns around patient flow, while the resident physicians were concerned about the details of patient status. The fact that neither group was satisfied with the overall process of information exchange with nursing even after the process engineering intervention suggests that the changes made as a result of it did not incorporate the full spectrum of physician requirements. The resident physicians appeared to be almost more concerned with their relationship with the floor nurses, which they viewed as problematic, than with Bullet Rounds, perhaps because they saw them as unhelpful.

It was surprising how little the physicians appeared to know about the Patient Care Coordinator nurses’ roles and responsibilities, although they made assumptions about what they were or should be based on their own goals and scripts. This did not appear to have been affected by the process engineering intervention. The comments by the staff physicians suggest there are gaps in General Internal Medicine around roles and responsibilities and processes, and no forum where they are discussed, which is not conducive to script convergence.
What emerges from the discussions with both physicians and Patient Care Coordinator nurses is that while both groups felt Bullet Rounds are a useful and important structure, they did not have a shared understanding of their purpose or their respective goals and roles in them. This may be because they have never been made explicit.

The physicians appeared to have a clearer view of what they perceived their role and responsibilities to be, but were unclear about that of the Patient Care Coordinator nurses, while the Patient Care Coordinator nurses had to some extent created their own role, which was not clear to the physicians. The dual clinical and administrative hierarchies may have a bearing on this; decisions are made higher up the administrative ladder and must be coordinated between medicine and nursing, but there does not appear to be a structure or process for this. Physician “buy in” is always perceived to be a problem, but in this case only one physician represented the group; the concerns of resident physicians appeared to differ from those of the staff physicians and this individual may not necessarily reflect or represent the needs of the whole group of physicians.

The Patient Care Coordinator nurses appeared to feel they were assertive in Bullet Rounds while the physicians questioned whether they were assertive enough. Similarly the Patient Care Coordinator nurses rely heavily on the support of the staff physicians but did not appear to have articulated this to them. The role, if any, of the staff physicians in orienting resident physicians to Bullet Rounds was not clear and they were assuming the Patient Care Coordinator nurses were or should be taking charge of this. There did not appear to be a jointly evolved agreement on whether information flow should be uni or bidirectional between them, nor what information should be exchanged. This was part of the process engineering intervention planning process as shown by the tools produced, but since they were not well communicated their effects may have decreased or disappeared over time.

Both groups agreed that many of the changes that arose out of the process engineering intervention had a positive impact on the efficiency of Bullet Rounds, but the Patient
Care Coordinator nurses also highlighted some unexpected negative results as well. To some extent both groups were aware of the lack of shared goals, and 7 suggested that there is a need to revisit Bullet Rounds and establish clear roles and responsibilities. However, there is no structure or process for them to achieve this.

7.4. Conclusion

The results in all themes suggest that after the process engineering intervention there was a perception that Bullet Rounds became more efficient due to process improvement, but this did not result in an improvement in the fulfillment of the information needs of the resident physicians. The results have highlighted some areas of goal and script discrepancy that should be addressed if Bullet Rounds are to be a useful tool of patient care. One area is the non-congruence of goals and scripts between the two groups of physicians with respect to Bullet Rounds, and the non-alignment of perceived roles and responsibilities between physicians and Patient Care Coordinator nurses. Another is in the lack of a process for communicating or addressing these issues within General Internal Medicine. These issues are significant in that they impact on the quality of care provided in General Internal Medicine.
Chapter 8 – Discussion

8.1. Congruence of Script Theory with Multidisciplinary Teams

Narrative inquiry in research is an approach based on human interaction in relationships using the examination of stories, and is useful to explore how individuals determine what situations or events mean and make sense of them. Boje (in Clandinin 2007) suggest that one type of story is the story whose purpose is to organize in order to solve a problem at hand, much like Bullet Rounds. An organization may have its own story, but it may not correspond to the stories of the individuals that comprise it, which can be problematical, as this study has revealed. Mattingly (in Clandinin 2007) studied occupational therapists and argues that storytelling is fundamental to professional decision making. White (2005) studied multidisciplinary team meetings in paediatric healthcare using ethnographic investigation; she suggests that geriatrics is a similar field because there is such a necessarily strong emphasis on the social aspects of patient care as well as the medical. She argues that multidisciplinary team meetings are a form of professional storytelling where professionals try to render their formulation recognizable and accountable to members on the team. She cites the notion of the medical “case history”, a story constituted through its telling that tends to start with the medical but evolves gradually to what she calls a “not just medical” but psychosocial formation through “formal and informal crosstalk between professionals” (White 2002), which is much like the patient information exchanges in Bullet Rounds. This notion of crosstalk may suggest how scripts evolve in Bullet Rounds, and explain the process of knowledge creation through the meetings. She notes that this professional “crosstalk” may end up dominating the discussion, and that there may potentially be alternative readings of the case, which has been observed at Bullet Rounds; the efficiency and effectiveness of this process at Bullet Rounds has been the focus of this study.
Bullet Rounds appear to be part of both the formal and informal communication structure of the organizational unit. White uses the notion of “backstage” (informal) and “front stage” (formal) discussions, and suggests that meetings like Bullet Rounds, although more formal than conversations in the hallway, are a forum for healthcare professionals to “rehearse” for their encounters with patients and their families. She refers to “professional identities” that have associated ritualized roles and “narratives”, corresponding to a script, and that are acted out in everyday contexts. She studied the impact of these identities on communication processes, looking at how different professions have different interpretations of the same events based on their tacit assumptions, and suggests that healthcare professionals need to explore their professional narratives and those of other professions in order to understand each other. The study described in this thesis has revealed a number of areas where the narratives of the nurses, physicians and administration are not synchronized.

The goal of communication is transparency; that is, there must be shared attribution of a shared meaning. Script Theory is a way of understanding human communication at the individual level; that is, the possession of common or similar scripts enables individuals to understand each other. In work contexts formal structures and processes include meetings, training courses, and presentations. The underlying processes of a meeting that enable understanding are the individuals’ scripts, and Script Theory can therefore be very helpful in evaluating the effectiveness of meetings. Meetings are more efficient and effective if the individuals involved both understand and share the goals. Meeting participants use, modify or create scripts based on what they understand (or want) the goals of the meeting to be, but also on their pre-existing store of scripts. Quoting Reder and Duncan (2003), White suggests that it may be important to interrupt “established mindsets” (White 2005) and adjust organization structures to achieve this.

Multidisciplinary Team Meetings are more complex in this regard since they involve multiple individuals who may have very different goals and stored scripts. Mere collocation of healthcare professionals does not by definition create good communication between them. In the literature on Multidisciplinary Teams a number of factors have been
shown to make them more effective, including good communication. Since communication is based on understanding, Script Theory provides a useful way of analyzing it.

Although focused on process, process engineering interventions such as the one that occurred in General Internal Medicine are based on goal alignment using interdepartmental (or interdisciplinary) communication and learning. Script Theory is therefore a useful approach to use in the evaluation and evolution of such interventions in multidisciplinary contexts such as General Internal Medicine and Bullet Rounds.

8.2. The Concept of Role in Script Theory and its Application to Bullet Rounds

Script Theory refers to three kinds of goals; role goals are those predicted by a given role, interpersonal goals are based on social relationships, and life goals are those that reflect what a person wants from life. There is an interaction between role behaviour, part of the formal structure, and interpersonal behaviour, part of the informal structure, although the second is more difficult to make inferences about. Participants in Bullet Rounds tend to behave according to their role goals, probably because time is limited. When a role member performs a unique function or “mandated acts”, other actors will respond in a predictable way if the mandate is familiar to them; an interlocking mandate is defined as a situational script. Although the participants in Bullet Rounds generally appear to want a cooperative model of social relations (Deutsch 2007) conflicts do arise; this study has shown that the Bullet Rounds situational script is not fully formed and the causes for this have been examined.

Scripts are written from a particular role’s point of view; since roles incorporate goals, scripts are goal-oriented, although their goals may or may not be known to other actors. Ambiguity can occur when actors assume that other actors have the script available to them when they do not, or when actors have different roles in the same script; both of these situations occur at Bullet Rounds. The first describes the situation of the new
resident unfamiliar with Bullet Rounds and the second describes the situation between the nurses and physicians.

The methodology of the study attempts to understand the roles of the actors through examination for their goals. Neither the role goals nor the potential need for changing them have been explicitly defined and shared between actors. Bullet Rounds are not “owned” by any group and have been treated somewhat as “one stop shopping” for a variety of potentially unrelated purposes.

Roles that overlap the clinical and administrative hierarchies may cause role confusion or dissonance both for the individual themselves and those around them. This may affect participants of Bullet Rounds since it is a process that is not explicitly either a clinical or administrative tool. At Bullet Rounds the roles of the Patient Care Coordinator nurses moved over time towards more of an administrative one. The Patient Care Coordinator nurses had their own perception of what the responsibilities of this administrative role are, and this has been communicated to Bullet Rounds participants through their behaviour and to some extent the orientation provided to new resident physicians. They saw their role as helping the resident physicians to provide the information they need for discharge planning, with the help of the staff physicians, although it was not clear whether or how this had been communicated to them.

8.3. **Study Methodology**

The Bullet Rounds study involved the advantages and disadvantages of “action” research. While the study conditions could not be controlled experimentally, the content is rich and dense, which made the case study approach the most appropriate and productive. The complexity of the environment with its regularly changing actors causes a variability that requires a long study to appreciate and understand, and creating models of the environment contributed to the understanding of it. Analyzing the content of Bullet Rounds was necessary to get the unit of analysis small enough to isolate the dimension of interpersonal communication that was the focus of the study and that can be explained
with Script Theory. The changing landscape of resident physicians meant that while it was impossible to follow most individual physicians over the longer run, there was a larger sample size to draw from.

8.4. Evaluation

8.4.1. Impact of the Process Engineering Intervention on Information Exchange

8.4.1.1. Content

The results of the first exploratory field study of Bullet Rounds showed that information loss between nurses and physicians was a problem. In terms of Script Theory the goals of both parties were undefined and misaligned, which was accompanied by a misalignment of scripts between them. This initial study gave rise to the research questions for the evaluation; that is, to identify how the process engineering intervention affected the information exchange between nurses and physicians in Bullet Rounds.

Bullet Rounds are a communication space in a complex environment of actors with differing scripts that may not overlap. The results of the content analysis and those of the physician and Patient Care Coordinator nurse interviews and focus groups were somewhat inconsistent in a paradoxical way. The process engineering intervention had a major impact on the Patient Care Coordinator nurses whose behaviour change in Bullet Rounds post the intervention was apparent to themselves and to the physicians. A decrease in information loss was shown to have occurred after the process engineering intervention which may be attributable to the Patient Care Coordinator nurses being more proactive in Bullet Rounds and to the resident physicians adapting their scripts to the Patient Care Coordinator nurses’ script. The decrease was not, however, accompanied by increased satisfaction with information exchange for either stakeholder group. That is; despite the improved efficiency in Bullet Rounds the resident physicians wanted more information, generally of a clinical nature, that they felt was not being provided by the Patient Care Coordinator nurses, who in turn felt were still not getting the plan of care
from the physicians. The process improvements alone were not enough to fulfill the information needs of the parties.

The results suggest that where a clear goal has been defined a process engineering intervention can help in reducing information loss between physicians and nurses, by improving the processes in multidisciplinary team meetings such as Bullet Rounds. However if the goal does not reflect the needs of all stakeholders, the information exchange will not be perceived as effective and will not result in broad acceptance and satisfaction. Defining the goal will determine what information is provided and sought, and the goal definition process is therefore very important as the driver of the results; generally this is achieved by identifying stakeholder needs.

8.4.1.2. Goal and Script Alignment

In healthcare the clinical and administrative authority hierarchies operate simultaneously, with what could be called “metascripts” based on meta goals, which may clash at times. Physicians are part of the clinical hierarchy, while the Patient Care Coordinator nurses are part of both. The goal for Bullet Rounds that was operationalised through the process engineering intervention was discharge planning, an operations focus typical of process engineering interventions that was defined by the administrative hierarchy and implemented by the Patient Care Coordinator nurses. The stated goals of enhancing the quality of patient centred care, and clinician satisfaction and morale, disappeared by the time of the planning exercise. Interestingly, the issue of nurse morale was never at issue, perhaps because they are part of the administrative hierarchy.

The participation in the process engineering intervention itself was not broad; medicine was represented by one staff physician who sits on the committee that meets bi-monthly in General Internal Medicine to discuss administrative issues and whose attendance was sporadic. Resident physicians were not represented as a separate group although this study has suggested they should be considered as such. More stakeholders at the process engineering intervention would perhaps have resulted in broader acceptance of what was
proposed. It was clear during the process mapping phase that the participants did not have a picture of the overall process of discharge, which is typical of health organizations (Radnor 2008). The process could therefore be described as “unstable” because its current state was unknown and had to be described step by step (Radnor and Walley 2008). However the exercise of mapping the process was useful in that it promoted a bigger picture view which was helpful in situating Bullet Rounds in a broader context.

The intent of a process engineering intervention is that it should be a process of negotiation between groups with potentially disparate goals. It was clear during the process engineering intervention process that the groups present did have different goals and scripts; the physician and the Patient Care Coordinator nurses tended to engage in heated debate around what process changes in Bullet Rounds should be made, which revealed the extent of the differences in their scripts. Unfortunately the resolution of differences in goals and the negotiation of an agreed upon process was not fully completed during the process engineering intervention; the physician representative did not attend the final presentation to the hospital administration, although it was not clear why. He may have been on service at that time and unable to attend. As a result, although a Bullet Rounds process was designed there was never a sense of shared ownership between the physician(s) and the Patient Care Coordinator nurses of the decisions made either at the process engineering intervention or over time. This may have resulted in the perception of Bullet Rounds as a “nursing tool” and that the nurses have sole responsibility for the success or failure of Bullet Rounds without explicit authority over them.

The process engineering intervention failed to achieve goal alignment, at least between the resident physicians and the Patient Care Coordinator nurses. This can be depicted by their respective scripts shown below in Tables 10 and 11, which are based on those presented in Chapter 4 but now additionally populated with examples from the transcripts of the focus groups. The contrast between them illustrates the lack of alignment in their perception of what should be, and was, happening at Bullet Rounds.
<table>
<thead>
<tr>
<th><strong>Script Component</strong></th>
<th><strong>Example from Transcript (speaker)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter room, find chair, sit down</td>
<td></td>
</tr>
<tr>
<td>Hear patient name</td>
<td></td>
</tr>
<tr>
<td>Give patient age, symptoms, diagnosis, current treatment and tests (if new)</td>
<td>“It’s all about information, and getting that information and being able to use the information to produce a better plan etc. (staff physician)”</td>
</tr>
<tr>
<td>Give current status, treatment and tests</td>
<td>I think usually we are giving information to nurses regarding the patient. (resident physician)</td>
</tr>
<tr>
<td>Ask about patient overnight</td>
<td>If they also can give more information about what happened with the patient about what happened during the night so it can be more helpful (resident physician)</td>
</tr>
<tr>
<td>Hear nurse’s response</td>
<td>they must bring to the attention of the medical staff any significant change in the patient’s medical status (staff physician)</td>
</tr>
<tr>
<td>Ask nurse to provide certain information</td>
<td>Another is to be aware of big things like making a note of when a family member is coming in to let the whole team at BRs know: “I’m just letting you know that so and so’s daughter is going to be in between 3 and 5 today”, so that way the team knows if there is anything to discuss (staff physician)</td>
</tr>
<tr>
<td></td>
<td>And also to know if a patient is going for a procedure, so the physio and OT know not to go in to a room where nobody is there (staff physician)</td>
</tr>
<tr>
<td></td>
<td>So it’s about trying to get useful information into there…in terms of what’s available (staff physician)</td>
</tr>
<tr>
<td>Hear nurse’s question</td>
<td>But I think it has improved because the quality of questions that we are asking has improved..right? (nurse)</td>
</tr>
<tr>
<td></td>
<td>The information exchange is better because it’s more formalised but it’s still not, there’s a lot of work that could be done to improve it (staff physician)</td>
</tr>
<tr>
<td>Respond to nurse’s question with treatment plan, estimated discharge schedule</td>
<td>They know what the important issue if for every patient but in BRs they just want to hear from us when the patient will be discharged.(resident physician)</td>
</tr>
<tr>
<td></td>
<td>They can’t use the rounds completely as a discussion of how we’re going to get this guy out of here as early as possible and get our LOS down and satisfy the big wigs and the administrative part (staff physician)</td>
</tr>
<tr>
<td>Agrees to certain actions – write order, follow up with CCAC, meet with family etc</td>
<td>I actually think, well sometimes the ALC people (TRI, Bridgepoint) are there and it’s really good when they’re there because when we talk about it the patient gets seen by CCAC that day that’s great and when they’re not there and it’s the call in it goes through like three people. It happens slower so I actually think it’s really good when they’re there. (staff physician)</td>
</tr>
</tbody>
</table>

**Table 12: Example of a script used in Bullet Rounds by an experienced physician**
<table>
<thead>
<tr>
<th>Script Component</th>
<th>Example from Transcript (speaker)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Read out name (new patient)</td>
<td>on the physician side we’ve been asked to participate to try and improve communication and so we try to give as much of a report as possible on the status (staff physician)</td>
</tr>
<tr>
<td>• Wait for physician to talk</td>
<td>we actually do control that information that we don’t need, so when they are having those off-line conversations we say well ok you can take that outside so I think that we actually do get a better quality of information crossing over (nurse)</td>
</tr>
<tr>
<td>• Give vitals or other “relevant” information from previous night</td>
<td>If they also can give more information about what happened with the patient about what happened during the night so it can be more helpful (resident physician)</td>
</tr>
<tr>
<td>• Wait for treatment plan</td>
<td>I’m still not sure what the goals are from the nursing point of view for BRs (staff physician)</td>
</tr>
<tr>
<td></td>
<td>I know that they do feel pressured. I overheard one senior telling his resident “don’t let anyone bully you to be discharging patients (nurse)</td>
</tr>
<tr>
<td>• Interrupt discussion between physicians and other disciplines</td>
<td>… If there’s no flow what happens, do the PCCs, well again because there’s no ownership, if there’s no flow then what do the PCCS do? If they notice a team is taking too long, or is disorganised or bringing the wrong information, then what is the recourse? I don’t think that has been clearly mapped out (staff physician)</td>
</tr>
<tr>
<td></td>
<td>because prior to that (Process Engineering Intervention) there was a lot of off-line conversations, of private discussions, PT, OT, dietitian, doctor..well certain doctors are certain doctors, well or else they’ll go off chatting, but we try to keep them on-line but you know I think that we, because we’ve taken on the responsibility and accountability of running it then we have more say – like if we say ok that’s enough, now the next patient people will tend to follow us now (nurse)</td>
</tr>
<tr>
<td>• Ask for treatment plan</td>
<td>and we outline next plan is this and discharge but generally they just want to see if they can be discharged (resident physician)</td>
</tr>
<tr>
<td>• Ask when patient will be discharged</td>
<td>in BRs they just want to hear from us when the patient will be discharged. (resident physician)</td>
</tr>
<tr>
<td></td>
<td>we can plan discharges and we can have all the things in place to make a discharge ideal but if the patient has nowhere to go – for instance I would say that greater than 40% of our patients are waiting to go to either rehab or nursing home and we can plan plan plan, but if the beds are not available out there what are we to do? (1)</td>
</tr>
<tr>
<td></td>
<td>I think we’re much better at you know identifying discharges (nurse)</td>
</tr>
<tr>
<td>• Ask what needs to be done for discharge</td>
<td>And really the expectation too is if I’ve only got one discharge and I can’t come up with any potential discharges for the day in bed meeting then I’m, I sort of feel bound to say we’ll wait until Rounds to find some more..because I can’t sit there and say I have one confirmed discharge for the day (nurse)</td>
</tr>
</tbody>
</table>
Table 13: Example of a script used in Bullet Rounds by an experienced nurse

While it was clearer to the resident physicians after the process engineering intervention what the goal of Bullet Rounds was, that is, discharge, they did not feel that goal reflected their information needs. The name of Bullet Rounds was changed to “Patient Care Rounds” in mid 2007 around the time of the resident physician focus group, but their comments showed they still saw them as a nursing tool and not helpful to resolving the difficulties they face in accomplishing what they perceive to be their professional responsibilities, and one of the reasons given for this was insufficient information. Since their interest in clinical information is not congruent with the Patient Care Coordinator nurses’ goals this is not surprising. The staff physicians appeared to understand why the Patient Care Coordinator nurses focused on the discharge goal, even if they did not entirely agree with it, a perspective that may reflect their longer experience and broader perspective. Post the process engineering intervention both physician groups and the Patient Care Coordinator nurses clearly understood that their goals were not congruent and that this was causing problems in the relationship. However the process engineering intervention may have provided a potential benefit by highlighting the misalignment, which might not otherwise have become as clear and in so doing may have indirectly assisted in future Bullet Rounds improvements.
A structure and process for continuous improvement in General Internal Medicine may have been helpful in addressing these issues. The lack of measurement of the goals articulated in the process engineering intervention and the under use of the tools produced has been commented on and speak to the failure to provide a structure or plan for the sustainability of the results. The project management office in charge of the project acknowledged that there were problems around physician engagement and sustainability. However, since there had been no explicit plan for physician engagement or sustainability, it perhaps not surprising that these elements were failures; perhaps more explicit identification of measurement criteria would have helped identify these gaps.

One of the potential benefits of the process engineering intervention process is a sense of empowerment which makes it appealing, and the process engineering intervention helped the Patient Care Coordinator nurses create a role for themselves. The Patient Care Coordinator nurses have tacitly assumed certain roles behaviours, but the responsibilities of the role have not been made explicit (“codified”), which may result in a different interpretation of the role by others, with unexpected consequences. The nurses initially experienced a sense of gaining control through taking charge of the process, but it was not sustained, and they have commented in retrospect that not only do they not feel empowered by the Bullet Rounds process, they also feel they have shouldered the blame for any and all problems related to discharge, which are largely due to factors beyond their control. They related that members of the administration were “throwing daggers” at them if they cannot produce any discharges, which they countered by creating a balance between implying discharges will occur and controlling expectations. It would appear that the process engineering intervention was seen by administration as a quick fix to discharge problems, although according to "Process engineering methodology it should be part of an ongoing improvement process.

The lack of a clear boundary around the Patient Care Coordinator nurses’ administrative role and responsibilities in Bullet Rounds has resulted in role confusion for them and the physicians. For example, no training on Bullet Rounds is provided to the resident physicians by the staff physicians; while they appeared to understand that it is difficult
for new resident physicians entering Bullet Rounds to understand the goals of the process and the process itself, they felt it was the Patient Care Coordinator nurses job to address this, and did not appear to view themselves as part of that process. One new resident physician commented that on the first day of the rotation she was told by the staff physician that Bullet Rounds was a multidisciplinary team meeting not a medical round, and that it occurred at 9 am. There was an assumption that she understood the difference, and what her role was, but when she arrived at Bullet Rounds she had no script to fall back on and was lost. The scripts shown below in Table 11 and 12 are based on those presented in Chapter 4 and additionally populated with examples from the transcripts of the focus groups. They show that the scripts of inexperienced resident physicians and replacement nurses are much more basic until they have been developed through experience or training.

<table>
<thead>
<tr>
<th>Script Component</th>
<th>Example from Transcript (speaker)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enter room, find chair, sit down</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Hear patient name</strong></td>
<td>Right now you’re just hoping they pick it up but as we’ve been saying it sound like people aren’t picking up on it (laughs) and if so the other choice is to be a little more proactive. Getting them to change their – it’s all behaviour modification, right (staff physician)</td>
</tr>
<tr>
<td><strong>Notice all participants looking at you</strong></td>
<td>I think there’s big issues with feedback. So if you don’t get the information you want it just keeps happening because who’s sitting down with the residents to give them feedback on that – we don’t spend a lot of time on BRs we don’t give feedback on how BRs are (staff physician)</td>
</tr>
<tr>
<td><strong>Check to see if name is your patient</strong></td>
<td>the structure that I understand is that we just go down the list patient by patient by ward and see if there are any updates. There doesn’t seem to be too much of a structure within the topic of each patient (resident physician)</td>
</tr>
<tr>
<td><strong>Say you have not seen patient yet, or</strong></td>
<td>Because if it’s left to us without any specific instruction to the contrary we will orient them to do it the way WE do it (staff physician)</td>
</tr>
<tr>
<td><strong>Give patient age, symptoms, diagnosis, current treatment and tests</strong></td>
<td>It’s (the goals of BRs) certainly not enunciated and elaborated in the meeting (staff physician)</td>
</tr>
<tr>
<td></td>
<td>I think that (orientation) helps….so I think it’s useful…they have a really large demand they really are key - probably the centre of this whole pod. So yeah any instruction that helps them to make the BRs more structured and appropriate sure that’s good stuff (staff physician)</td>
</tr>
<tr>
<td></td>
<td>You know we have staff that come in for just a month, residents switch every month or two, unless it’s brought up in the very first BR, and I don’t know if it is, you know the very first time when all the new teams come and they’re given a little spiel about how to conduct it, if that</td>
</tr>
</tbody>
</table>
### Table 14: Example of a script used in Bullet Rounds by an inexperienced physician
(day 1 – basic script)

<table>
<thead>
<tr>
<th>Script Component</th>
<th>Example from Transcript (speaker)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait for next patient name</td>
<td></td>
</tr>
</tbody>
</table>
| Hear nurses’ question | if I have an issue with BRs who do I speak to? We don’t have anything (staff physician)  
But I think it has improved because the quality of questions that we are asking has improved..right? (nurse) |
| Ask questions about discharge planning | Where in nursing is the similar assigned person such that if you question the d/c of a particular patient and said Mr Smith - who on the nursing side is looking in specifically on the d/c issues in a longitudinal and comprehensive way? (staff physician)  
What I’m saying is you can’t just let them (residents/clerks) talk, there has to be someone in control who would say “PLAN!” which is not what’s going on (staff physician)  
Well it requires ongoing education on the part of us telling them what we want in BRs (nurse) |
| Wait for next patient name |  |

### Table 15: Example of a script used in Bullet Rounds by an inexperienced nurse

The staff physicians have an understanding of their role at Bullet Rounds, while the resident physicians must develop one and the degree to which they will have done that
depends on where they are in their rotation. Experienced people (versus inexperienced) have a bias towards why things work the way they do (Esain 2008). Without a Bullet Rounds script the resident physicians will tend to fall back on the medical model of rounds, the script they are familiar with. Post the process engineering intervention their understanding had evolved to be more congruent with that of the Patient Care Coordinator nurses, but was very dependent on the behaviour of the nurses, which was somewhat inconsistent, and made their script acquisition more difficult.

The results of the evaluation of the impacts of the process engineering intervention have shown that both clear process and goal alignment are necessary in Bullet Rounds; good process can create efficiency but without goal alignment Bullet Rounds are not effective. Similarly, goal alignment without good process would not lead to effective Bullet Rounds. The challenges in General Internal Medicine are to align the goals for Bullet Rounds between these groups, create a standard Bullet Rounds script based on congruent goals, and assist the resident physicians in acquiring the Bullet Rounds script as quickly as possible. One of the questions around Bullet Rounds is where the ownership of Bullet Rounds lies, and whether the goals of patient care and discharge planning can be achieved simultaneously within Bullet Rounds, or are mutually exclusive and require separate fora.

**8.4.2. Implications for Script Theory**

The research applied Script Theory in a healthcare setting not previously considered. This new application suggests potential extensions to the theory that may make it more useful. For example, one of the issues that became apparent from the research was the need to create mechanisms for physicians unfamiliar with Bullet Rounds to acquire the script more quickly. To achieve this it would be helpful to understand how scripts by different members of the health care team are acquired and how these scripts change as their training progresses and as they become staff physicians. It appears that script acquisition does not follow a linear path, and no time frames are associated with it: presumably some people acquire scripts more quickly than others. While we understand that scripts are
built through experience, the type of experience that is most influential is not specified, nor whether this process varies from person to person. The impact of education and training or role modelling may have just as important an impact as hands on experience, or may be complementary, and there may also be other ways in which script acquisition can be achieved. Similarly, the relationship between discourse and action in script building may be important: do we build common scripts more quickly through dialogue or through activity?

Building common scripts and common ground has been shown in the literature and the research to be important for interprofessional collaboration. There are similarities between the concept of building scripts and building common ground, and the exploration of the relationship may be useful. For example, the creation of common ground resides in the sharing of information, and this may have an impact on script acquisition as well. Scripts are associated with roles and these roles have specific types of information associated with them, particularly if we include the content of the knowledge and training necessary to the role. Healthcare roles tend to be learned in isolation from each other and the research showed that the nurses and physicians made assumptions about each others’ roles and the responsibilities associated with them, but that the assumptions were not always shared, which may have been the result of lack of information. If scripts are the expected sequences of actions that occur in a given situation, and are role-related, there will inevitably be information associated with them, and this may be the mechanism for building common ground. Alternatively, the sharing of common information through education and training may lead to or assist in the acquisition of common scripts. An understanding of the relationship between the information necessary to or inherent in a role and script acquisition would potentially suggest approaches to effective shared training of healthcare professionals.

Chapter 9 - Recommendations for Communication
Repair
One of the benefits of research is that it provides evidence that increases the knowledge base around a given phenomenon. However translating this benefit into practice is a crucial component of making research useful in the real world; this process is described in different ways, one of which is knowledge translation. In the healthcare domain in Canada knowledge translation is defined as:

“a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system.

(Canadian Institutes for Health Research 2008)

A plan for the translation or transfer of the research evidence from the case study has therefore been created. It is based on recent work done in the field of knowledge translation and uses the “problem-solving” model in conjunction with the five stages of diffusion of innovation model (Estabrooks et al 2006) and the Framework suggested by Lavis et al (2003). There are four identified target groups: administration, the nurses, the staff physicians and the resident physicians. They are at different stages in the diffusion of innovation cycle and the strategy and tactics envisaged for each are therefore somewhat different. The nurses for example have a greater degree of awareness of the need for change than the administration or the new resident physicians. Hence the strategy for the administration would be to increase their awareness of the research results and persuade them of the need for change. Similarly, incoming resident physicians would be unaware of the research and its results and the strategy would therefore focus on building their awareness. The nurses and staff physicians, however, are more familiar with Bullet Rounds and the research done; the focus would therefore be more on persuading them to move to the decision and implementation stages for addressing some of the issues documented. The outline of the knowledge translation plan is shown in Appendix 20.

As part of the potential implementation stage of any changes made in Bullet Rounds, Figure 9 below shows an input-output diagram with the link between the problems identified by the evaluation of the process engineering intervention and potential
recommendations of how/what further improvements could be made, and outputs associated with each.

Figure 9: Recommendations for Communication Repair in Bullet Rounds – Inputs and Outputs

More detailed content is shown in the Recommendations Table in Appendix 21.
Examples from the focus group transcripts that illustrate the problems are shown below:

**Problem 1. Resident Physician and Patient Care Coordinator Nurse Information Needs not Met:**
- You get that a lot too – like how does he look compared to yesterday they can’t really say (resident physician)
- and we outline next plan is this and discharge but generally they just want to see if they can be discharged (resident physician)

**Problem 2: Who is in Charge?**
- … If there’s no flow what happens, do the PCCs, well again because there’s no ownership, if there’s no flow then what do the PCCs do? If they notice a team is taking too long, or is disorganised or bringing the wrong information, then what is the recourse? I don’t think that has been clearly mapped out (staff physician)

**Problem 3: What are we Trying to do here?**
- There’s a few thing, you know, we have to go back to identify what Bullet Rounds is about. I’m still not sure what the goals are from the nursing point of view for BRs (staff physician)
- Each side had definite ideas about what it should look like and expectations for it, and I think we had an idea of what it should like, medicine had a different way of looking at it, allied heath looks at it differently

**Problem 4: Resident physicians and replacement nurses have no scripts**
- You know we have staff that come in for just a month, residents switch every month or two, unless it’s brought up in the very first BR, and I don’t know if it is, you know the very first time when all the new teams come and they’re given a little spiel about how to conduct it, if that doesn’t happen how do they know what to do and how to do it? Or is it supposed to be the nurse’s role to guide that and make sure that happens (staff physician)

**Problem 5: What is Supposed to Happen?**
- If there’s no flow what happens, do the PCCs, well again because there’s no ownership, if there’s no flow then what do the PCCs do? If they notice a team is taking too long, or is disorganised or bringing
the wrong information, then what is the recourse? I don’t think that has been clearly mapped out (staff physician)

Problem 6: What do we want to achieve and are we doing it?
– But in terms of who’s evaluating, what feedback have you gotten, are you happy, is there anyone in charge of this..if I have an issue with BRs who do I speak to? We don’t have anything.
– it would be really worth it if we could get together and hash out Bullet Rounds again

Problem 7: The nurse-physician relationship
– And it all depends on them as individuals, their personality, because some doctors will listen to nurses, take nurses opinion, value it and move forward, and other doctors will say well, this is MY opinion and that’s when you get the breakdown in communication

The evaluation revealed areas of goal and script misalignment Bullet Rounds that should be addressed if they are to meet the needs of the Patient Care Coordinator nurses and physicians. The basic mechanism for communication repair should be the creation of a forum for continuous improvement to address the problems shown in Figure 9. The Patient Care Coordinator nurses and one staff physician have regular bi-monthly meetings that can be the mechanism used. In addition the hospital Project Management Office that ran the original intervention should be re-engaged to help in this process, with the support of both organizational hierarchies.

To repair information exchange the content and process of Bullet Rounds should be addressed, as these were both found to be lacking. To address gaps in content, it should be identified that there are three stakeholder groups not two, and their information requirements identified in a joint planning session that includes representation from each group. The planning could include discussion around use of the White Board to make it more effective. The White Board is an electronic database that is displayed on monitors at various locations in General Internal Medicine and is updated in Bullet Rounds. Most resident physicians indicated they had received no training on it and were not sure what its purpose was. However, its current functionality could be used in the following ways:
Tracking patient history – each entry is dated and saved and can be reviewed – for example, how long has the patient had a foley or ng tube, is OT/PT/SW engaged etc. This would enable the entire focus of Bullet Rounds to be on current issues.

Data warehousing – the application stores data that can be used for statistical analysis of data of interest, for example, Length of Stay, most commonly used tests, number and frequency of family meetings etc

Education tool – new residents could review the board before starting their rotation to become up to date with the patient’s history.

Communication:
- Bullet Rounds - the board could be used in conjunction with applications that enable remote synchronous communication, to enable remote attendance of Bullet Rounds.
- Physician to Physician Updates – if kept updated, the board could be consulted by physicians in the morning to see what changes have occurred overnight

The process of information exchange can also be improved through the use of tools that improve synchronous information exchange; examples are a laptop to show test results and getting vitals put on line, to reduce the need for follow up outside the meetings. An individual to act as a SPOC (single point of contact) for IT requests may be helpful.

The discussion around information needs will flow from the definition of the purpose of Bullet Rounds, and who the process “owners” are, in the sense of being responsible for how they run. Again a joint meeting perhaps in the form of another process engineering Intervention will need to engage both hierarchies if a joint clinical/administrative focus is desired, in order to decide how best to achieve a synthesis or whether separate meetings are preferable. The output should be shared documentation that spells out the decisions made, and will include information on all aspects of Bullet Rounds.

Definition of the goals of Bullet Rounds will depend on their purpose, and will include definition and documentation of the roles and responsibilities of all three interest groups. Creation of an information web for each role will be used as input for the output. The output will include written materials, and visuals to post in the Bullet Rounds room.
To enable new resident physicians and replacement nurses to acquire the Bullet Rounds script quickly and effectively a communication and training plan should be created. This should include revising the resident physician orientation, creating a role play scenario for Bullet Rounds and explicit engagement of staff physicians, to provide feedback to resident physicians. Outputs will include materials such as the revised resident physician orientation package. A third possibility is the wearing of name tags that have the individual’s name and role.

The Bullet Rounds process should be revisited to identify improvements on the original design; a process engineering intervention would be appropriate for this since the participants would mainly be familiar with process design. However this could also be done over time at weekly meetings. The improvement process should include a plan for process standardization and consistency. For example, the Patient Care Coordinator nurses should receive reinforcement training on how to run the meetings (this is preferred to the use of a facilitator which may blur the lines of ownership of Bullet Rounds) and regular use of the visual tools created regularly. The output would be a Bullet Rounds script based on an adapted structured language format. **Figure 10** below is an example of a redesigned Bullet Rounds process which incorporates both clinical and administrative concerns. Combining these in one meeting should be possible if the process is adhered to, since one of the research findings has been the importance of standardization and consistency.
Figure 10: Future State Process for Bullet Rounds Communication Space

Figure 11 below shows a future state Bullet Rounds script that could be used to align understanding around the goals and purpose of Bullet Rounds to assist the building of a common script.
SUPPORTING COMMUNICATION BETWEEN NURSES AND PHYSICIANS

Figure 11: Future State Script for Bullet Rounds Communication Space

The forum created for continuous improvement will identify goals for Bullet Rounds and define measurement targets. For example level of feedback to resident physicians, level of satisfaction etc, and tracking sheets for these measures should be created and used. To
ensure sustainability of change the regular bi-monthly meeting will need to revisit: purpose, goals, and processes of Bullet Rounds regularly. The outputs will be the materials and visuals created for use in Bullet Rounds, regularly maintained and used.

The problems in the nurse-physician relationship identified by the physicians were mainly those between the resident physicians and the floor nurses, rather than the Patient Care Coordinator nurses. Information exchange was identified, and suggestions to improve this have been made. Another issue was that the resident physicians do not know the nurses by sight or name. Since the process engineering intervention this has been addressed by posting photos of the nurses on the wards, suggested by a resident physician in a focus group, and another possibility is the use of name tags for physicians and nurses.
Chapter 10 – Conclusion

The thesis contributes to the design of multidisciplinary communication spaces by evaluating a particular instance of one such space, Bullet Rounds. Contributions include a theoretical approach to understanding and incorporating the differing motivations of the participants, models of the space, documentation of requirements and constraints around its design, and recommendations for a new design.

10.1. Contributions of the Research

10.1.1. Theoretical

- The application of Script Theory to the problem of communication between members of multidisciplinary teams, which was a novel application. It provided a framework to understand and explain differences in communication styles between nurses and physicians, and suggested that for different professional groups these processes need to intersect if effective collaboration is to occur.

- The evaluation of a process engineering intervention carried out in a hospital General Internal Medicine setting. This application of Script Theory could be reused in process engineering interventions because it was useful in interpreting the impacts and may be a helpful addition to the process.

10.1.2. Empirical

- Identification of three problem areas for future review: measurement of impacts, physician engagement, and sustainability of change.

- Empirical demonstration that information loss decreased when processes were better defined, but that the improvement was dependent on the goals of the
process owner, in this case the nurses, who steered the focus of Bullet Rounds on to discharge issues

– A finding that the physicians had different goals from the nurses and that this was affecting their satisfaction with Bullet Rounds

– A finding that there are two distinct physician groups in Bullet Rounds with goals and experience that partially overlap but that are not the same. Their perceived information requirements are different and should be considered separately

10.1.3. Contributions with respect to recommendations for future practice

– For Bullet Rounds to be perceived as useful by resident physicians they must include more focus and information on patient status and care, rather than purely discharge issues.

– A detailed set of recommendations concerning the conduct of bullet rounds (including suggestions for the use of information technologies, including a laptop and electronic whiteboard)

10.2. Limitations

There are three main limitations of the research described in this thesis; lack of experimental control, difficulties around measurement and potential generalisability.

Lack of experimental control

The research described in the thesis took place in a real healthcare context which was very complex and subject to variability and change, and this limited the experimental control that was possible. The intervention itself was part of the context rather than an
outside force and could not therefore be manipulated. However, the use of the case study methodology enabled the systematic evaluation of the intervention which yielded useful and relevant results.

**Measurement**

Measurement difficulties included establishing a baseline for measurement, and isolation of variables from known confounders, but were addressed by using a longitudinal approach and correcting for potential bias. Establishing causal links required triangulation with other results; for example, the results of the content analysis were paradoxical, but could be understood and interpreted using qualitative inquiry.

**Generalisability**

The context of the evaluation is novel and site specific idiosyncrasies must be taken into account. However, the results and recommendations of the evaluation are applicable to other healthcare contexts where multidisciplinary team work occurs or process engineering interventions are being implemented.

**10.3. Implications for Further Research**

Future research might compare the results from this site with one or several others that have used process engineering interventions to design processes, especially with a focus on the UK that seems to be more advanced in their use of process engineering approaches in healthcare. The goal would be to assess the usefulness of process engineering interventions in improving communication

A further area of research offering potential would be to test the results of this case, using Script Theory to design and implement one or some of the suggested knowledge translation strategies and recommendations. The impacts on information exchange, stakeholder satisfaction and sustainability, or other relevant dimensions could be measured through a process engineering intervention. For example, a process engineering
intervention could be implemented at a different location to compare results when the process incorporates a mechanism for continuous improvement.

Identifying resident physicians as a separate stakeholder group was central to the research, and a better understanding of their specific issues and concerns would be relevant to improving Bullet Rounds. For example, an entry/exit survey of resident physicians in General Internal Medicine would be helpful in understanding their information requirements and what tools would be helpful, as well as their perceptions on a number of dimensions including their own learning process in Bullet Rounds.

Since the Bullet Rounds study focuses on the behaviours of nurses and physicians it would also be useful to examine the degree of congruence between what they say and their actual practice. This could be achieved with a further field study that identifies their work patterns outside of Bullet Rounds.

10.4. Final Word

The research into communication between nurses and physicians in Bullet Rounds has provided an inside view of a key process that shapes patient care every day in General Internal Medicine. It will benefit process design and can be used to continue efforts to improve communication in this and similar contexts. It has also shown the potential benefits of using Script Theory in this context for the design of interventions and educational materials in healthcare.
REFERENCES


TRANSCRIPT REFERENCES

Legend:
(BL#) = staff physician interview with initials and page # (e.g. BL8)
(#) = Focus Group page # (e.g. 100)

Shown in text as TR-# e.g TR- 10

Section 1: Physicians

1. It’s always good to go through the processes in terms of what’s going on, you know the ideal state and the current state (BL-8)

2. But we spent 2 and a half days, it was good to have everybody there. Did we need everybody that was there? It’s hard to say – I think we needed just a core group and any questions we could have asked who it was did we need to keep everyone there for the whole 2 and half days for the couple of things we needed from them – I don’t know. Does it make it work better (to have everyone there) – I don’t know (BL 7-8)

It gets into the lingo of basically projects versus..things you can do in a week. Basically it’s very hard to do the week things. Everything now becomes weekly – meeting every week or every couple of weeks, which works better for us (BL 9)

3. Did you feel you were able to represent medicine?
   BL: Oh yeah, oh yeah. But I know the system quite well. You would have to be aware of how things work to be able to input and see the effects and so on, and the flow. To be able to say well that’s great (laughs) but doctors just aren’t going to, they’re just not going to do that, it’s not worth their time etc (BL 8)

4. They are not emphasized enough: like no one says “let’s look at the card, let’s go through that list of things” so I think they’re there, they’re good, it’s the information you want but I don’t know how often they’re being referenced, in terms of “there’s the list, there’s the card”, look at it and go through it. So I think there’s issues in using those as reinforcement: you know, pointing to those and saying, you know, the information you need to give (BL 2)

5. So how do the residents get to know about these tools or is it the nurses who know about the tools? (DP 2)

6. half the stuff we decided in that RIE was alleviated by having those orders in there, in Bullet Rounds, they really were (10)

7. Interventions that convince everyone that they are practical and useful and convince everyone it will enhance the process then that’s one reason why you use the intervention because it’s efficient and maintains efficiency and therefore is sustainable because it is an effective tool
   But tools that are there sort of artificially, or do not have a big impact, and if they require memory or aren’t a natural part of the flow of things, then it’s artificial and requires additional input and education and is it worth it? And so then things will revert back.(DP 2)

8. Yes there’s no point instilling a change if you know it’s not going to – if you get no buy in from one of the users (BL 9)
9. And the other thing about sustainability is incentives: so what’s the incentive to use the tool (DP 2)

10. Well there’s no ongoing efforts right now to benchmark or see how we’re doing. It’s all about feedback and improvement and this was a highlight and we’re doing it but we can only sit down once a month or once every two months so it’s really fallen off the map (BL 4)

11. But in terms of who’s evaluating, what feedback have you gotten, are you happy, is there anyone in charge of this..if I have an issue with BRs who do I speak to? We don’t have anything.

I think a lot of these meetings are just new things to work on – we don’t do a lot of evaluation of previous – we did this, how is it going, is everyone happy. We don’t look back on stuff we’ve done before (BL 10)

12. Right now you’re just hoping they pick it up but as we’ve been saying it sound like people aren’t picking up on it (laughs) and if so the other choice is to be a little more proactive. Getting them to change their – it’s all behaviour modification, right? (BL 9)

13. So generally I think it’s a useful thing – but I think usually we are giving information to nurses regarding the patient. If they also can give more information about what happened with the patient about what happened during the night so it can be more helpful (15)

14. I think that because the information is being passed on to someone who doesn’t know the patient we’re only getting we’re only getting a snippet of the information we need and sometimes it may not be that accurate, so it has come up for example that patient I mentioned that nurse said was confused and I wanted a little more information but the person giving the information had nothing more to offer so it was left in the air.(96)

15. They know what the important issue if for every patient but in BRs they just want to hear from us when the patient will be discharged.(22)

16. And sometimes it’s scribbled and that important information isn’t really that visible and it doesn’t get charted elsewhere as it should be on a graph or something.(281)

But I agree that having something that would pull out the important parts of their full assessment would be nice – even a highlighter (333)

17. And in that sense at least they’re giving us something to look for and a reason to go see the patient and topic to discuss with the patient. I guess in that sense it does help at least they’re giving us something to discuss with the patients. To bring up that issue. (102)

18. in BRs they just want to hear from us when the patient will be discharged. and we outline next plan is this and discharge but generally they just want to see if they can be discharged (123)

19. the most important interactions that bear on the treatments and disposition of the patient are the interactions between the nurses and physicians. (McN 1)

20. the first thing is and that’s top drawer and can never change - they must bring to the attention of the medical staff any significant change in the patient’s medical status. They can’t use the rounds completely as a discussion of how we’re going to get this guy out of here as early as possible and get our LOS down and satisfy the big wigs and the administrative part (McN 3)

21. it really is in most circumstances a decisioning that goes on between the senior nursing staff and the physician. (McN 1)
22. on the physician side we’ve been asked to participate to try and improve communication and so we try
to give as much of a report as possible on the status (DP 3)

23. the status of each patient with the focus being d/c planning so we communicate that info in a general
way (DP 5)

I’m not exactly sure what is done with that information (DP 3)

24. It’s all about bringing information into BRs, so we’re trying to improve the flow of information into
BRs so it can be presented. It’s all about information, and getting that information and being able to
use the information to produce a better plan etc. (BL 4)

25. Another is to be aware of big things like making a note of when a family member is coming in to let
the whole team at BRs know: “I’m just letting you know that so and so’s daughter is going to be in
between 3 and 5 today”, so that way the team knows if there is anything to discuss. And also to know if
a patient is going for a procedure, so the physio and OT know not to go in to a room where nobody is
there (BL 4)

26. If someone else like the social worker has scheduled an interpreter they make that known to everybody
because usually there’s time left over, so if anyone else wants to avail themselves of the interpreter
they can do that. So it’s about trying to get useful information into there…in terms of what’s available
(BL 4)

27. The information exchange is better because it’s more formalised but it’s still not, there’s a lot of work
that could be done to improve it (BL 1)

28. So one of the barriers and we talked about this in our briefing is that some of the nurses have been
here a long time and are very comfortable in the teaching setting and know what to call about and
what not to call about and what can be called in overnight that sort of thing (190)

29. There’s a few nurses on 8A and 8B that I’ve come to know over the course of the last two months so
that when I see that I’m so happy it’s a nurse I know so that I can just look for them without havin
having to go to the ward clerk can you page this person overhead. That’s just the reality of the
system there’s too many nurses….(393)

30. I don’t want to say it I feel bad but they’re always on break!….more than 50% of the time when I’m
looking for a nurse she’s on break so I get the nurse who’s covering (noises of agreement)

31. I: And they don’t want to deal with it…it’s like I’m only on call and I don’t want to deal with it so it
makes the day inefficient. (454)

You get that a lot too – like how does he look compared to yesterday they can’t really say…we have a
lot more continuity than they do with the care of the patients. So that makes their subjective
assessments more difficult.(225)

32. There’s just so much fluctuation – and I ‘m SURE they feel the same way about us. I ‘m sure it’s
frustrating for them when there’s a whole new set of residents. I can only imagine… (440)

33. … If there’s no flow what happens, do the PCCs, well again because there’s no ownership, if there’s
no flow then what do the PCCS do? If they notice a team is taking too long, or is disorganised or
bringing the wrong information, then what is the recourse? I don’t think that has been clearly mapped
out. (BL 5)
if I have an issue with BRs who do I speak to? We don’t have anything. (BL 10)

34. Because I don’t have a strong feel for who’s coordinating issues on their (nursing) side (DP 5)

35. what happens if someone isn’t there? eg from allied health. What happens to the information if that person isn’t there to give it (holiday etc)? We need to have a system to deal with what happens if someone is absent (BL 4)

36. Well you take it piece by piece, you can group a lot of them and you see what’s going on but it’s difficult..(BL 9)

So I’m still not clear on the nursing side what the actual role is with respect to d/c.
I don’t get the feel that there’s that direction there, from the nurses all that directly (DP 4)

37. Because so many of our patients are waiting here for placement or death whichever comes first and there really are no acute or even sub acute medical issues that need to be discussed on a daily basis. We have patients on my team that have been waiting here since last summer for placement (2)

It’s just very difficult to move that number of chronically ill, old, multi system patients in that kind of a fashion and I’m not sure that any amount of fine tuning of BRs is going to allow that (5)

38. They know what the important issue if for every patient but in BRs they just want to hear from us when the patient will be discharged.(122)

but Bullets are really about the non-medical issues, generally, that’s how I feel about it, about discharging mostly (225)

39. Well it’s (goal of BRs) a high level emphasis on the plan but also discharge – discharge planning because obviously the plan is related to discharge.(BL 1)

You know, just top level information, well really just high level information and the plan: what’s the plan and any urgent issues from the nursing standpoint and the doctor’s standpoint to communicate

So you know the main goal of BRs presumably is to facilitate patient flow and discharge (DP 2)

how quickly can we turn this patient around and produce a good outcome and a good outcome in timely fashion. (McN 1)

40. the structure that I understand is that we just go down the list patient by patient by ward and see if there are any updates. There doesn’t seem to be too much of a structure within the topic of each patient (35)

41. So for talking about specific problems with them, it depends on the person (820)

42. it’s hard to divvy it up between the three, one person may not be there; so you don’t have that one person that concentrates on how things are supposed to go.(BL 1)

43. because you know it’s experience, and you’re there only there once every two weeks and the problem is that this, well they’ve never done it before and did it under the old system (BL 1)

44. Within the confines it’s close to as good as it’s going to get (McN 6)

So I think in both directions we are able to recognize among our colleagues when we’ve lost focus and when we’re drifting, and not helping the patient to move to a more rapid and successful d/c (McN 3)
45. They have assumed that role – I don’t know that it’s in their job description, yet, I don’t know that anyone has codified it - you know, this is what you must do, that in BRs or in some other interaction with the medical staff you must encourage them to remain focused on good patient care outcomes in a timely fashion and moving the patient along to the next level of care; but they certainly seem to serve that role. (McN 4)

46. But it is certainly helpful to have everyone touch base in the morning to help us plan our day and prioritise things

47. And it is helpful to have the orders there so if we need to ask for a consultation form occupational or physical therapy we can do it right there on the spot and it gets done instead of having to remember to go back to the chart later on and write it down (28)

48. so it’s be very helpful in BRs to hear from the charge nurse who relays what the issues were. It’s very useful because I hear it and then I don’t have to flip through the chart later to figure out what the nurses wrote down, decipher their writing. (170)

49. I actually think, well sometimes the ALC people (TRI, Bridgepoint) are there and it’s really good when they’re there because when we talk about it the patient gets seen by CCAC that day that’s great and when they’re not there and it’s the call in it goes through like three people. It happens slower so I actually think it’s really good when they’re there. (430)

50. Yes and I don’t think the actual nurse caring for the patient coming in would work in our 10 to 15 minute format. I can’t imagine that would be….efficient…and actually I think daily report is better (210)

51. one thing I did notice is the nurses were more effective at keeping us on track in terms of the issues at hand (DP 1)

I must say it is my impression that compared to a year or two ago that the timelines are being more adhered to

I would definitely think we’re improved. BRs per se are more focused, more patient focused more focused on a patient outcome and a d/c plan so that’s good (McN 2)

What I have noticed is an attempt to have a flow, have an idea of what’s going on and to not let things get out of hand etc (BL 1)

52. So then the person on call would relay that to us – so that’s the medical handover. But then there are things that the nurses don’t call about that they think can wait until the morning but that gets lost..probably

A: Probably a portion of that information gets lost.(236)

And sometimes it’s scribbled and that important information isn’t really that visible and it doesn’t get charted elsewhere as it should be on a graph or something.(281)

It’s (the goals of BRs) certainly not enunciated and elaborated in the meeting (DP 1)

53. That being said, it’s not 100% so you still have situations where things that have been discussed are not going through

sometimes I think it goes on a bit, it’s a little bit uncontrolled

The information exchange is better because it’s more formalised but it’s still not, there’s a lot of work that could be done to improve it (BL 1)
I’m still not sure what the goals are from the nursing point of view for BRs (DP 4)

54. Within the confines it’s close to as good as it’s going to get. There are so many administrative and system structures that are immutable and not ideal for doing what we want to accomplish with this, where do we start (McN 2)

55. if we had a list near the end of pertinent issues we want to address it might be helpful, issues to monitor overnight and things we might want to hear about in the morning from the nurses. (60)

56. would we prefer one person running things, keeping things going, that’s saying “discuss that outside of BRs”. (BL 1)

And this is not the person who’s going to run the list; this is just the person who’s keeping everyone on track and what information needs to be garnered etc. (BL 2)

57. We’ve tried at various times to have moderators; usually a non-medical moderator, unmedical and unbiased who would simply say “I think this conversation is drifting away far from the focus…. So if such a person exists then yes it might be a very significant (McN 5)

58. In my mind on the nursing side I don’t get a clear feel of their tasks and responsibilities in that (Bullet Rounds) (DP 2)

59. Where in nursing is the similar assigned person such that if you question the d/c of a particular patient and said Mr Smith - who on the nursing side is looking in specifically on the d/c issues in a longitudinal and comprehensive way? (DP 3)

60. We said well ok that’s fine we understand that a lot of times it’s tough to leave, so why don’t we try to make it easier for you, why don’t we call you for 5 minutes of your time and you don’t have to physically leave wherever you are and at least get something: something is better than nothing and we’ll have to see how things go (BL 5)

61. We’ve asked for things like a lap top at BRs so we can quickly look things up and we haven’t got anything so..(laughs)

Well yes you know, “has this test been done?” We could quickly look it up, every patient is in front of you - in three clicks you can know. It takes ten seconds, do the next patient then come back.(BL 3)

62. I think that (orientation) helps….so I think it’s useful…they have a really large demand they really are key - probably the centre of this whole pod. So yeah any instruction that helps them to make the BRs more structured and appropriate sure that’s good stuff (McN 3)

63. You know we have staff that come in for just a month, residents switch every month or two, unless it’s brought up in the very first BR, and I don’t know if it is, you know the very first time when all the new teams come and they’re given a little spiel about how to conduct it, if that doesn’t happen how do they know what to do and how to do it? Or is it supposed to be the nurse’s role to guide that and make sure that happens (DP 6)

64. Because if it’s left to us without any specific instruction to the contrary we will orient them to do it the way WE do it (DP 6)

65. I think there’s big issues with feedback. So if you don’t get the information you want it just keeps happening because who’s sitting down with the residents to give them feedback on that – we don’t spend a lot of time on BRs we don’t give feedback on how BRs are. (BL 2).
we don’t really say that our goal is to make BRs efficient and we don’t say (to staff lead) “you’re going to get feedback, someone is going to sit down with your team (BL 3)

66. Right now you’re just hoping they pick it up but as we’ve been saying it sound like people aren’t picking up on it (laughs) and if so the other choice is to be a little more proactive (BL 9)

67. What I’m saying is you can’t just let them (residents/clerks) talk, there has to be someone in control who would say “PLAN!” which is not what’s going on (BL 2)

68. Well yes, like I said if the resident thing is an issue then you have to train the residents so.. which means for the first week it’s going to be tough, it means the PCCs can’t be shy, they have to keep prompting them and eventually they’ll get it (BL 9)

69. And that would be up to you as the staff..
   BL: Yes and the PCCs to say well we’ve done BRs for a week: how are they going, are they catching on? If no, then this team isn’t, so you sit down with this team and say ok, how are BRs going and these are some of the things we have noticed and we’re going to try this, this and this. Or I’ll sit in here and see how things are going. (BL 2)

Section 2 – Nurses

70. I think the expectations of one week and turning it round and coming up with a perfect process was a little..um, a little unobtainable (1)

71. I think overall we do a good job, consistently, which is important and I think, well it may not necessarily have been the projects; they may have guided us but we’ve come together and moved it forward ourselves because we’ve had many conversations (9)

72. and we actually led… because up until then we were all in new roles, we got put into Bullet Rounds and we didn’t really know the expectations except this is how it goes and there was never any main lead and after that BRs RIE definitely the control, well may be control’s not the right word, but we ..we facilitated Bullet Rounds, we ran Bullet Rounds (2)

73. because prior to that (Lean) there was a lot of off-line conversations, of private discussions, PT, OT, dietitian, doctor..well certain doctors are certain doctors, well or else they’ll go off chatting, but we try to keep them on-line but you know I think that we, because we’ve taken on the responsibility and accountability of running it then we have more say – like if we say ok that’s enough, now the next patient will tend to follow us now (11)

74. VV: And would you say you’re still using those?
   CS: No because they became habit: we stopped using those tools because it became habit ..it did become habit but we formed more of a process although we did not do the visuals, and the consultants say if you do not do visuals it’s not going to work, I mean that’s what’s his name Mike (the lean consultant) said (10)

75. It’s from, well from GIM like it’s as if we have the responsibility for having 20 patients in emerg, and 40 on other units, somehow I leave there feeling like it’s..It’s a pressure, it’s definitely a pressure.. (7)

76. and it’s sort of like they’re looking at us and saying you guys are not doing your job properly…because if you were doing your job properly we wouldn’t be here having these off services
   VV: You mean…?
   JP: Yes like this sat round this table now
   VV: But is that any different since the Lean?
   A: Do you know what, I just feel it more now
   VV: Really?
A: I really do
CS: I wonder and just talking about A here, because they’ve invested so much money in all of these projects the expectations might be that much higher, you guys should be doing..
VV: We sorted this problem out..
JP: Yes we paid to sort this out but that’s not the answer and I don’t think they can quite understand that because the put a lot of money into those projects…(8)

77. And really the expectation too is if I’ve only got one discharge and I can’t come up with any potential discharges for the day in bed meeting then I’m, I sort of feel bound to say we’ll wait until Rounds to find some more..because I can’t sit there and say I have one confirmed discharge for the day, (8)

78. CS: And then I have to figure out, I have to come up with an explanation of why they DIDN’T go. 
JP: Yes you have to be careful, it’s a fine line..You can’t over produce then not produce 
CS: That’s right 
A: Yeah 
JP: But you can’t go there with nothing either (7-8)

79. it would be really worth it if we could get together and hash out Bullet Rounds again 
There’s a few thing, you know, we have to go back to identify what Bullet Rounds is about..(5)

80. we can plan discharges and we can have all the things in place to make a discharge ideal but if the patient has nowhere to go – for instance I would say that greater than 40% of our patients are waiting to go to either rehab or nursing home and we can plan plan plan, but if the beds are not available out there what are we to do? (1)

81. The patients are still taking as long, we’re still not able to provide the kind of nursing care anyway …or…. or hospital care that moves them through any faster, you know? (1)

82. But I think it has improved because the quality of questions that we are asking has improved..right? (14)

83. And we, we sort of have like, because we know the purpose of BRs, so we know what questions to ask in order to obtain appropriate answers..(14)

I think we’re much better at you know identifying discharges 
JP: Yes 
CS: and discharge plans we’re much more in tune with that..than we were before 
A: And… 
JP: Yes yes and asking the right questions, like is it long stay or short stay 
A: Yes..

so we’re sort of teasing the information out of them (15)

84. we actually do control that information that we don’t need, so when they are having those off-line conversations we say well ok you can take that outside so I think that we actually do get a better quality of information crossing over (14)

85. it’s very complex and it’s very difficult, um, unless you’re in it people really don’t see the complexity and what it takes to discharge one person.(3)

86. Very few come in with a simple pneumonia take antibiotics and go home.(6)
When you come from a surgical background and emerg background where it’s like, you know, a commitment is made, book the ambulance, patient just goes, it’s very it’s such a much simpler discharge than actual medicine because you have so any components that people don’t understand (3)

87. Can you hammer out a plan of care really and truly because with medicine patients they have so many co-morbidities um that you know, something will happen and you’ll go, oh, I need this test on a daily basis you’re depending on the symptoms and you need another test (3)

88. because we’re an acute medical hospital and I really do think that we need to do a better job of nursing for the elderly on the units and maybe if we increased physio, if we had them up in the chair, we had them walking around, then maybe their length of stay would not be as long, they wouldn’t end up as incontinent, so there’s a piece there that could be researched into (6)

89. I have a patient waiting to go in ambulance and I need the discharge summary written up, and he’s down in emerg, and, you know, I’m coming up when I can, I’m coming up when I can, and I have another patient who’s passed away, well I can’t come up and write the death certificate yet, (12-13)

90. Their staff, their staff had pressure to get patients out from senior leadership and it was a very different tone to it, but you know what, the questions is, can we run in crisis? All the time, like 100% of the time? Like, when does crisis then become the norm? And people just ease off too..(13)

91. there’s a backup out in the community as to where the patients can go - they stay in our hospital and get sicker and have more co-morbidities.(4)

92. the choices that the patients make, and the families make for these patients to go to ….however there are empty beds at two other institutions in the city so I don’t know ethically where we stand on this but what happens is that because the challenge of even if there are beds out there that we can’t access those beds, the back up from the community into the acute acre hospital is really the pressure. Because if we look inside our units, most of the patients are not going home they’re going somewhere else. If they’re going home they’re going home with palliative care..(6)

93. When you now start bringing in how you gonna care, who are the frail, uh OT you are just changing the focus of it: the focus will not become the discharge. (11)

Yes, you see that’s going to change the whole concept of what BRs is about.(5)

Again we have to go back to – what is the purpose of BRs? (11)

94. And it all depends on them as individuals, their personality, because some doctors will listen to nurses, take nurses opinion, value it and move forward, and other doctors will say well, this is MY opinion and that’s when you get the breakdown in communication (8)

95. Each side had definite ideas about what it should look like and expectations for it, and I think we had an idea of what it should like, medicine had a different way of looking at it, allied heath looks at it differently (4)

so you know as a result the information that’s going to be generated is…from allied health’s perspective they are seeing BRs as only a forum to talk about discharge, like where people are going, whereas they want to talk about other things..
VV: The patient..?
CS: Yes the patient the focus for them is not so much where they’re going to go, although that is important but how we’re going to get there, you see (5)

96. because in a sense you have dual roles don’t you, you’re patient care and discharge
JP: Yes
CS: Yes (12)
97. I think we’re very direct with what we want but we would never discharge anyone in to an unsafe environment, or home before their time, so but you know what that I also think we have to be the way we are because we have to make sure the doctors make time to do this because they’re not doing it beforehand (15)

98. I know that they do feel pressured. I overheard one senior telling his resident “don’t let anyone bully you to be discharging patients (13)

But I do know that they feel, when are they going, give us a date, you know..
VV: You mean that you’re doing that to them?
CS: Yes yes and I know that they do feel pressured (13)

99. and we actually led… because up until then we were all in new roles, we got put into Bullet Rounds and we didn’t really know the expectations except this is how it goes and there was never any main lead and after that BRs RIE definitely the control, well may be control’s not the right word, but we ..we facilitated Bullet Rounds, we ran Bullet Rounds (2)

100. this is the only time in the day that you’ve got physicians, allied and nursing staff sat at one table (12)

101. I don’t feel we’ve hammered out really a distinct plan of care for these patients, it’s still sort of pieced together day by day I think (3)

if they’d done the process where the discharge summary is already done, it’s all in the computer it’s just a matter of hitting the print button. Of course they don’t want to do it, when they’ve got to go and see some people in emerg they just want to put it ff and put it off but when they know we’ll commit to a time then they’ll, it sort of pushes their hand..(6)

102. I guess it’s all trying to establish a common goal with everybody’s input and what is best….so again and everybody’s at the table with different agendas and different things to do.(5)

103. the ”flow collaborative“ is suggesting some different things that could be talked about in BRs, that have to do more with the plan of care as opposed to the discharge destination, questions that need to be asked, which is going to slow it down even more.. (11)

104. it would be really worth it if we could get together and hash out Bullet Rounds again

There’s a few thing, you know, we have to go back to identify what Bullet Rounds is about..(5)

Well I would like to see us go back and talk about BRs and really what is the expectation, because as J said they’ve now become an hour and a half long and really what is our responsibility to the off unit patients (11)

105. Well not even a different time frame but a different thing, a different type of rounds..?

The case workers would take on – basically you’d get two case workers, well a case worker for two teams and then let the case worker do the discharge planning (12)

106. Like ideally the discharge should start when the patient is in emerg, it should start down there

You know when the patient is down in emerg you can get the patient information, you can look at the patient on the stretcher and know that this patient is not going to return home but that there is more chance that they may need to go to rehab or long term care.
VV: You mean that you can tell just by looking at them?
JP: Yes, just by looking at them and then their diagnosis. Then give them 24 hours then after that their diagnosis, the social worker should be in there, he may be a potential, talking with them, how do you
feel about that, not ten days later, two days before discharge, now he’s medically stable, and now we have to look for somewhere for him to go. (6)

107. Well it requires ongoing education on the part of us telling them what we want in BRs (14)

108. So we need the staff on board, we definitely need the support of the staff men and we need the staff men to understand the process and you’ll find that if you have the regular rotating staff person they’ll actually get their team on board pretty well, but the fly in staff people, um, their teams are a bit disjointed for a long time. So that’s a point there. (14)

109. Because just because of push back like that from the physicians, it could have a totally negative impact on all the work that we’ve done, because then you’re giving the physicians the power or control to say when they’re going to come or not going to come, and then we’re going to have push down and breakdown and we’re not going to have a productive process (13)

Section 3 – General

110. Vitals – we do so much on-line I can’t believe vitals aren’t online. I would love electronic vitals so one of those things that kills me during the day is that the nurses take the vitals, they put the on their sheet and then they put it in their pocket (others chime in to agree) and they don’t chart it in the chart until their shift is done. I mean it makes sense in that if there was a real abnormality in the vitals then they would have called us but it would be really useful for us to just have those vitals when it comes time for us to do our assessment. It just seems silly for us to duplicate the work of actually doing the vitals assessment ourselves because it’s part of the nursing. (370)

111. You know, there’s a whiteboard that wasn’t there when we did the RIE so how well are we, I mean there’s lots of information there that’s not used that can be used (BL 3)

112. We’ve asked for things like a lap top at BRs so we can quickly look things up and we haven’t got anything so... (laughs)

113. Well yes you know, “has this test been done?” We could quickly look it up, every patient is in front of you - in three clicks you can know. It takes ten seconds, do the next patient then come back. (BL 3)
APPENDIX 1: Process of Content Analysis Research

from The Content Analysis Guidebook, by Kimberly A. Neuendorf

1) **Theory and rationale**  Why content will be examined, and why? Are there certain theories or perspectives that indicate that this particular message content is important to study? (e.g., Studies on violent television have shown that children may be affected, hence, we analyze the amount and type of aggression shown on TV.) Library work is needed here. Will you be using an integrative model, linking content analysis with other data to show relationships with source or receiver characteristics? Do you have research questions? Hypotheses?

2) **Conceptualization decisions**  (Remember, you are the boss! There is no one right way.) What variables will be used in the study, and how do you define them conceptually? You may want to screen some examples of the content you’re going to analyze, in order to make sure you’ve covered everything you want.

3) **Operationalization measures**  Your measures should match your conceptualizations (this is called internal validity). What unit of data collection will you use? You may have more than one unit (e.g., a line-by-line coding scheme and a by-speaker coding scheme). Are the variables measured well (i.e., at a high level of measurement, with categories that are exhaustive and mutually exclusive)? An “a priori” coding scheme describing all measures must be created. Both face validity and content validity may also be assessed at this point.

---

**Human Coding**

**Computer Coding**

4a) **Coding schemes**  You need to create the following materials:

1. **Codebook**  (with all variable measures fully explained)

2. **Coding Form**

4b) **Coding schemes**  With computer text content analysis, you still need a codebook of sorts—a full explanation of your dictionaries and method of applying them. You may use standard dictionaries (e.g., those in Hunt’s program **Dictionary**) or originally created dictionaries. When creating original dictionaries, be sure to first generate a frequencies list from your text sample, and examine for key words and phrases.
5) **Sampling.** Is a census of the content possible? (If yes, go to #6). How will you randomly sample a subset of the content? This could be by time period, by issue, by page, by channel, etc.

6) **Training and initial reliability.** During a training session in which coders work together, find out whether they can agree on the coding of variables. Then, in an independent coding test, note the reliability on each variable. At each stage, revise the codebook/coding form as needed.

7a) **Coding.** Use at least two coders, in order to establish intercoder reliability. Coding should be done independently, with at least 10% overlap for the reliability test.

7b) **Coding.** Apply dictionaries to the sample text to generate per-unit (e.g., per-news story) frequencies for each dictionary. Do some spot checking for validation.

8) **Final reliability.** Calculate a reliability figure (percent agreement, Scott's pi, Spearman's rho, or Pearson's r, for example) for each variable.

9) **Tabulation and reporting.** See various examples of C.A. results to see the ways in which results can be reported. Figures and statistics may be reported one variable at a time (univariate), or variables may be cross-tabulated in different ways (bivariate and multivariate techniques). Over-time trends are also a common reporting method. In the long run, relationships between C.A. variables and other measures may establish criterion and construct validity.
APPENDIX 2: Overview of Script Theory

In Script Theory our knowledge of the world and experience are the same thing because we acquire knowledge through experience. Knowledge is expressed in the form of stories (people do not recite lists of facts for example but relate them as a story) which, when the stories are similar, enable understanding which is necessary for communication between people. This communication takes the form of scripts. These have also been called “structures of expectation” (Deutsch 2007) that help orient the individual cognitively to the situation confronting them. The underlying notion is that people approach their social world actively, with structured expectations about themselves and their social environment; these make it possible for us to interpret and respond quickly to what is going on in specific situations. One important aspect of this process is that if our expectations lead us to inappropriate interpretations and responses they are likely either to be revised on the basis of our experiences in the situation, or influence the form of the situation.

There are different types of script. Situational scripts are based on a common specified situation, such as Bullet Rounds, with multiple participants, and presuppose that they share an understanding of what is supposed to happen and can therefore predict events. This is not always the case in Bullet Rounds, because it is a variable situation with some constant and some changing participants, which necessitates frequent re-alignment of scripts and consistent outside interruptions and pressures which may change the situation and cause misalignment of expectations. Personal scripts are not stylised but unique to the individual and may clash with situational scripts; for example, an individual’s personal experience may be quite different from what they encounter in a different context. Instrumental scripts are similar to situational but much simpler and constant; for example, a recipe.

Scripts are the building blocks of stories and a form of specific knowledge. Knowledge of a script provides connectivity and enables us to leave things out when we are talking and fill in missing detail with little effort, thus reducing cognitive load. One example is the well-known activity of eating in a restaurant to illustrate a basic restaurant script.
are written from a particular role’s point of view; in this case it is that of the customer and has certain characteristics:

- Entering: find a table, sit down
- Ordering: read menu, give order to waiter, waiter leaves
- Eating: food is cooked in kitchen, waiter brings food, food is eaten
- Exiting: ask waiter for bill, waiter brings bill, give money to waiter, leaves restaurant.

Many variations on this script are possible; for example, the customer may have to pay at the exit. In that case the customer will have to integrate this new information into their restaurant script. Similarly, resident physicians who have either no Bullet Rounds script at all or a very basic one, due to their lack of experience, must either create a script or integrate a whole series of new information into their basic script. Variations in scripts are opportunities for misunderstandings and incorrect inferences, but are also the basis for new learning. Just as the customer incorporates the new information into their restaurant script the new resident physician incorporates the new information into their Bullet Rounds script. As they accumulate in a person’s experience, scripts tend to be organised into meta scripts that contain tracks of sub-scripts. One of the issues that the research program has highlighted is what could be called the environmental meta scripts that influenced the communication in Bullet Rounds; that is, the interplay between the dual Clinical and Administrative hierarchies. Each one has its own meta script based on its purpose and goals, which are frequently not congruent. The impacts of the lack of goal congruence between them are explored in the evaluation of the lean intervention.
APPENDIX 3: Patient Calendar

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Status</th>
<th>Tests</th>
<th>Comments</th>
<th>Discharge Date</th>
</tr>
</thead>
</table>

Patient Calendar
## APPENDIX 4: Posters and Pocket Cards

### During Bullet Rounds...

**Order**

1. Medical Team  
2. Nursing  
3. Allied Health  
4. Nursing Summary

### Bullet Round Follow-up Activities

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Orders to be written by (Max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge Orders (in order sheet)</td>
<td>12:00 p.m.</td>
</tr>
<tr>
<td>Telemetry</td>
<td>11:00 a.m.</td>
</tr>
<tr>
<td>OT/PT/AH Orders</td>
<td>10:30 a.m.</td>
</tr>
<tr>
<td>Foley/IV</td>
<td>10:30 a.m.</td>
</tr>
</tbody>
</table>

**If orders are not written on time, you will be contacted by the Charge nurse.**
## Supporting Communication Between Nurses and Physicians

| Start                      | Introduce by nurse **
|                           | MRP cross reference to whiteboard **
|                           | Agenda → Standardized questions/info |
| Patient's name, age, diagnosis **
| MD                        | 
|                           | Language, where they are from, baseline – lives alone or not |
|                           | Key core issues (outlines) **
|                           | Plan of Care **
|                           | TTOC – Estimated Discharge Date **
|                           | Primary contact arranged |
|                           | Substitute present (PT) – Allied Health |
| Allied Health             | Full Risk (OT)**
|                           | Functional Status (OT/RT)**
|                           | Needed Equipment (OT/RT)**
|                           | Cognition (OT/SW)**
|                           | Reimbursement Plan: Discharge (All)**
|                           | Waitlist Status (SW)**
|                           | Paperwork needed (SW)**
|                           | Social Status/Family Dynamics (SW)**
|                           | Swallow Status/Communication (SLP)**
|                           | Diet/Nutritional Status (RD)**
| PCC’s & Charge Nurse     | PCC – make note of teams without patient plan outlined **
|                           | Summary of Report **
|                           | Clarification of timelines **

** For Patients Discussed Day 2 onward
APPENDIX 5: Bullet Rounds Process Flow

Workflow at and Post Bullet Rounds

1. Action Item Promised in Bullet Rounds
2. PCC notes:
   - Clinicians initials
   - Action Items
   - Time
3. By 10:30 am
4. PCC copies info on to visual board and posts info
5. PCC monitors
6. Discipline checks board or communicates with nurse or PCC
   - Verbal – phone OR
   - Written – chart or W/B
7. Action Past Due
8. Action Complete
9. PCC escalates as per escalation process
**APPENDIX 6: Order Control Board**

### Order Tracking Sheet

<table>
<thead>
<tr>
<th>Order</th>
<th>Mon May 7</th>
<th>Tues May 8</th>
<th>Weds May 9</th>
<th>Thurs May 10</th>
<th>Friday May 11</th>
<th>Sat May 12</th>
<th>Sunday May 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge 12 pm</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Telemetry 11 am</td>
<td>✓</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OT/PT/AH 10:30 am</td>
<td>X</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Foley/IV 10:30 am</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Other</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LEGEND**

- **Completed** ✓
- **Completed Late** □
- **Not Completed** X
### APPENDIX 7: Analysis of Potential Threats to Validity

<table>
<thead>
<tr>
<th>Threat</th>
<th>Potential Problem</th>
<th>When to Address</th>
<th>Tactic to Address</th>
<th>Examples From Case Study</th>
</tr>
</thead>
</table>
| **Construct** | Lack of objectivity | Data collection phase | 1. Multiple sources of evidence  
2. Chain of evidence – select and specify what to be studied and appropriate measures  
3. Link variables to potential outcomes of coding framework | 1. Observational, interviews and focus groups  
2. Created proposition statements, operational measures for each (patient information exchanges and profession based individual perceptions)  
3. Variables are defined - eg yes/no variable, outcomes coded by variable type, database entries documented by data type – eg yes/no field, free text. |
| **Internal** | Unclear causal link – some other factor may have caused the results | Data analysis phase | 1. Pattern matching  
2. Explanation building  
3. Address rival explanations  
4. Logic model | 1. Pre and post comparison using Chi-squared and effect size  
2. Case study is explanatory based on theoretical propositions: analyses causal links and builds theory. Uses chronological approach (interrupted time series)  
3. Exploration of potential rivals – see chart  
4. Logic model created – see diagram |
| **External** | Results may not be generalisable – in single case study lack of replication logic | Design phase | Use of theory/hypothesis – generalize to broader theory | Representative or typical case - grounded in theory where context is external domain to which can be generalized through application of SCRIPT theory |
| **Reliability** | Bias/errors – can results be replicated by another investigator | Data collection phase | Document process/procedures  
1. Create case study protocol and database  
2. Operationalise steps | Documentation includes:  
1. Case study protocol and database  
2. Descriptions of steps and processes used in data collection, transcription and storage, coding and analysis, and how database created. |
APPENDIX 8: Case Study Logic Model

Case Study Logic Model

1. Conditions Leading to Change in Bullet Rounds:
   - Slow Discharge
   - Overcapacity in Wards

2. Service to Assist in Change: Consulting Firm

3. Technical Assistance Services:
   - Consulting Firm Specialising in "Lean" Manufacturing Techniques
   - Intervention Occurred: Rapid Improvement Event (RIE)

4. Other Related Initiatives:
   - Researcher Driven Design of Standardised Tools and Process Based on SBAR
   - Review of Tools by Nurses Participating in RIE

5. Tools and Skills Created by Intervention:
   - New Processes
   - New Tools
   - Empowered Nurses to Lead Bullet Rounds

6. Changes in Bullet Rounds Practice After Intervention:
   - Use of Standardised Processes, Scripts and Tools

7. Changed Capability in Bullet Rounds:
   - Nurses Empowered to Lead and Control Bullet Rounds Process

8. Immediate Outcome:
   - Changed Bullet Rounds Performance: Nurses in Charge

9. Intermediate Outcome:
   - Changes in Bullet Rounds:
     - Improved Efficiency of Information Exchange

10. Latent Outcome:
    - Changes in Bullet Rounds:
      - No Increase in Perceived Effectiveness
      - Nurses Sense of Blame
      - Resident Physicians Not Obtaining Information They Want

11. Implementation:
    - Efficiency outcomes in may have been result of Hawthorne Effect
## APPENDIX 9: Analysis of Potential Rival Explanations

<table>
<thead>
<tr>
<th>Type of Rival</th>
<th>Definition</th>
<th>How Dealt With in Case Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CRAFT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Null Hypothesis</td>
<td>Outcome result of chance</td>
<td>– Outcome based on results of systematic data collection, transcription and coding.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Chi-square analysis shows significant correlation, good effect size.</td>
</tr>
<tr>
<td>Validity</td>
<td>Various</td>
<td>– See Chart of Validity Tests</td>
</tr>
<tr>
<td>Bias</td>
<td>Experimenter effect</td>
<td>– Several sources of data used, systematic approach to data collection, transcription, coding and analysis.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(creation of database, logic model, analysis of validity threats and rivals etc)</td>
</tr>
<tr>
<td><strong>REAL-LIFE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct</td>
<td>Outcome result of another intervention</td>
<td>– Used longitudinal interrupted time series approach: no other interventions targeting Bullet Rounds information exchange occurred during time period</td>
</tr>
<tr>
<td>Commingled</td>
<td>Outcome result of a combination of target and outside intervention</td>
<td>– Potential carry over from standardized tools created by researcher that were reviewed by nurses, but no other intervention articulated, planned or carried out.</td>
</tr>
<tr>
<td>Implementation</td>
<td>Outcome result of implementation process itself</td>
<td>– This rival part of explanation of results. Hawthorne effect may have had impact on outcome: nurses felt empowered to take control of Bullet Rounds meetings but this result could potentially have been achieved through a different intervention.</td>
</tr>
<tr>
<td>Rival Theory</td>
<td>Different theory explains results</td>
<td>Script Theory appropriate because:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– is based on communication and focuses on the content of communication which reflects the outcome (information exchange) being investigated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– works at the level of the unit of analysis (verbal exchanges)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– other theories of interpersonal communication focus on individual behaviour (Attribution, Planned Behaviour - Reasoned Action, Social Cognitive), influencing (Argumentation, Contagion, Rhetoric, Language Expectancy Theory, Network), individual beliefs or intentions (Cognitive Dissonance, Expectancy Value, Social/Identity, Speech Action), communication processes (Uncertainty Reduction Theory, Interpretive and Interaction) or are overly complicated and multifaceted (Sensemaking).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Fits the healthcare context because can explain effects of differences in professional training - able to explain the reasons for and impacts of differences in goals and “models” of care including caregiver levels of satisfaction.</td>
</tr>
<tr>
<td>Super Rival</td>
<td>Outcome result of force larger than target intervention in combination with it</td>
<td>– No such outside force was identified during the time boundaries of the case study</td>
</tr>
<tr>
<td>Type of Rival</td>
<td>Definition</td>
<td>How Dealt With in Case Study</td>
</tr>
<tr>
<td>--------------</td>
<td>------------</td>
<td>-----------------------------</td>
</tr>
</tbody>
</table>
| Societal Rival | Outcome result of societal trends | – The case study was based on an internal departmental process and the unit of analysis at the level of information exchanges for individual patients and personal perceptions of individual healthcare workers.  
– While the healthcare system constraints may have contributed to factors present in the context, such as the number of patients in the wards, and even the motivation for the administration to pursue the intervention, the results of the study itself are not in any way dependent on outside trends. |
APPENDIX 10: Overview of the Case Study Approach

Case Study Process

Define and design

Select Participants

Design Data Collection Strategy

Design/Obtain Data Collection Tools
- Checklist
- Interview Questions
- Tape recorder

Prepare, Collect and Analyse

- Observe at Bulletin Rounds
- Fill in Checklist

Conduct/transcribe structured interviews with doctors and nurses after Bulletin Rounds

Create and populate database for structured interview questions and answers

Invite participants to participate in semi-structured interviews

Conduct and record semi-structured interviews

Create and populate database for semi-structured interview questions and answers

Analyse and Conclude

- Identify level of information availability at Bulletin Rounds over time
- Identify trends and implications

Identify changes over time
- Identify research/policy implications

- Identify strengths and weaknesses
- Identify research and policy implications

Write Case Study Report highlighting findings, discussion and conclusion
**APPENDIX 11: Summary of Data Collected**

<table>
<thead>
<tr>
<th>Activity</th>
<th>People or Event</th>
<th>Data Obtained</th>
<th>Dates</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>Bullet Rounds</td>
<td>Field Notes</td>
<td>05 – 09/2005 30 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>01 – 02/2007: 30 hours</td>
<td>Prior to process engineering intervention</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>08 – 09/2007: 30 hours</td>
<td>After process engineering intervention</td>
</tr>
<tr>
<td></td>
<td>Process Engineering</td>
<td>Field Notes</td>
<td>02 – 03/2007: 30 hours</td>
<td></td>
</tr>
<tr>
<td>Engineering Intervention</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interviews</td>
<td>Nurses (PCCs)</td>
<td>Transcript</td>
<td>12/2006: 2 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resident Physicians</td>
<td>Transcript</td>
<td>02, 04, 06/2007: 36 interviews</td>
<td>Before and after process engineering intervention</td>
</tr>
<tr>
<td></td>
<td>Staff Physician 1</td>
<td>Transcript</td>
<td>30/01/08: 1 hour</td>
<td>Participated in the process engineering intervention</td>
</tr>
<tr>
<td></td>
<td>Staff Physician 2</td>
<td>Transcript</td>
<td>15/02/08: 45 minutes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Staff Physician 3</td>
<td>Transcript</td>
<td>19/02/08: 45 minutes</td>
<td></td>
</tr>
<tr>
<td>Focus Groups</td>
<td>Resident Physicians</td>
<td>Transcript</td>
<td>22/08/07: 1 hour</td>
<td>2 Focus Groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23/08/07: 1 hour</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Questionnaires</td>
<td></td>
<td>22/08/07: 1 hour</td>
<td>Given to Focus Group participants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23/08/07: 1 hour</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nurses (PCCs)</td>
<td>Transcript</td>
<td>15/01/08: 1 hour</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX 12: Kappa Inter-rater Coding Agreement Calculation

A: Missing Information

<table>
<thead>
<tr>
<th>Coder Agreement on Missing Information for Patient Information Exchanges - Contingency Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coder</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>CODER 1</td>
</tr>
<tr>
<td>Positive (a)</td>
</tr>
<tr>
<td>Negative (b)</td>
</tr>
<tr>
<td>Total (a + b)</td>
</tr>
</tbody>
</table>

Sum of Missing Information Agreement

<table>
<thead>
<tr>
<th>SUM: 82+87</th>
<th>Total: 169</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Agreement - 169/188</td>
<td>Result 90%</td>
</tr>
</tbody>
</table>

Expected Agreement by Chance

<table>
<thead>
<tr>
<th>Pos/Pos</th>
<th>Neg/Neg</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>44.52128</td>
<td>49.52128</td>
</tr>
<tr>
<td>94.04255</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

KAPPA CALCULATION

<table>
<thead>
<tr>
<th>Total Agreement-Ex Frequency by Chance/N-ExFrequency by Chance</th>
</tr>
</thead>
<tbody>
<tr>
<td>169-94.04/188-94.04</td>
</tr>
<tr>
<td>0.797786</td>
</tr>
</tbody>
</table>
### B: Allocation of Information Categories

#### Coder Agreement on Category Allocation for Patient Information Exchanges - Contingency Table

<table>
<thead>
<tr>
<th>Categories</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>TOTAL</th>
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<tr>
<td>CODER #1</td>
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<td>2</td>
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<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>CODER #2</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
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<td></td>
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<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>32</td>
<td>33</td>
</tr>
<tr>
<td>TOTAL</td>
<td>20</td>
<td>6</td>
<td>3</td>
<td>9</td>
<td>3</td>
<td>47</td>
<td>7</td>
<td>0</td>
<td>6</td>
<td>7</td>
<td>41</td>
<td>39</td>
<td>188</td>
</tr>
</tbody>
</table>

#### Sum of Category Agreements

**SUM:**

\[
15 + 3 + 2 + 6 + 2 + 34 + 6 + 5 + 6 + 35 + 32
\]

Total: 146

% Agreement - 146/188

Result: 78%

#### Expected Agreement by Chance

<table>
<thead>
<tr>
<th>Category</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(20*26)/188</td>
</tr>
<tr>
<td>2</td>
<td>(6*6)/188</td>
</tr>
<tr>
<td>3</td>
<td>(3*2)/188</td>
</tr>
<tr>
<td>4</td>
<td>(9*6)/188</td>
</tr>
<tr>
<td>5</td>
<td>(3*4)/188</td>
</tr>
<tr>
<td>6</td>
<td>(47*47)/188</td>
</tr>
<tr>
<td>7</td>
<td>(7*8)/188</td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>(6*8)/188</td>
</tr>
<tr>
<td>10</td>
<td>(7*8)/188</td>
</tr>
<tr>
<td></td>
<td>(40*41)/188</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>12</td>
<td>(33*39)/188</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
</tr>
</tbody>
</table>

KAPPA CALCULATION

<table>
<thead>
<tr>
<th>Total Agreement-Ex Frequency by Chance/N-ExFrequency by Chance</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>146-31.51/188-31.51</td>
<td></td>
<td></td>
<td></td>
<td>0.731612</td>
</tr>
</tbody>
</table>
### APPENDIX 13: Structured Interviews with Physicians: Questions and Results (Feb, April, June 2007)

- What is your understanding of the purpose of Bullet Rounds?
- What INFO do you need from Nursing in Bullet Rounds? Are you getting it?
- What info do you think you need to provide to nurses in Bullet Rounds?
- General comments about Bullet Rounds – how to improve, are they good
- Have you noticed the posters on the wall in Bullet Rounds? Do you know what they are? Has anyone explained them to you?
- Do you use the White Board? If so how?
- Is the White Board helpful in BRs? If so, how?

**Sample Results for questions 1-3 shown below.**

<table>
<thead>
<tr>
<th></th>
<th>Feb 2007</th>
<th>April 2007</th>
<th>June 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>What do you think is the purpose of Bullet Rounds?</td>
<td>Multidisciplinary communication, up to date concerns, sharing with OT/PT – more convenient, can’t get hold of them during the day.</td>
<td>Communication for better care between medicine and nursing. Hectic atmosphere, can’t always find each other, small issues may not be discussed, gives opportunity to fill gaps (4 weeks in GIM)</td>
<td>Discharge Planning</td>
</tr>
<tr>
<td>Respondent 1</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Respondent 2</td>
<td>Liaise with nurses, emphasise ideas, communicate m/ment plan to nurses</td>
<td>Discuss issues with team (i.e. all involved with care). Progress report (5 weeks in GIM)</td>
<td>Discharge Planning. Education, clarification</td>
</tr>
<tr>
<td>Respondent 3</td>
<td>More or less but needs supplementing during the day.</td>
<td>Y</td>
<td>Interprofesional communication, continuum of care</td>
</tr>
<tr>
<td>Respondent 4</td>
<td>Usually bring issues (had to think about it for a minute)</td>
<td>Is variable</td>
<td></td>
</tr>
<tr>
<td>Respondent 5</td>
<td>Not always…actually emphatic NO!</td>
<td>Mostly get it</td>
<td>Not all the time. Drs are focus of giving info rather than receiving</td>
</tr>
</tbody>
</table>
**APPENDIX 14: Staff Physician Interview Themes**

Since the RIE (process engineering intervention) what changes have you noticed in the information exchange between nurses and doctors?

During the RIE (process engineering intervention) you created some tools and processes: which of these are still used and/or have been helpful to the residents?

Tell me about your experience of the RIE (process engineering intervention)

What are the issues now at Bullet Rounds and how could they be improved?

Anything you would like to add?
APPENDIX 15: Focus Group Discussion Questions

Physicians

Think back over your experience with Bullet Rounds. Tell me about some things you like/don’t like about them

What is your impression of the communication between yourselves and nurses at Bullet Rounds – is it better or worse than with other groups?

Tell me about what information nurses have recently provided to you at Bullet Rounds

Tell me about what information you have recently provided to nurses at Bullet Rounds

What are your suggestions for improvements to Bullet Rounds (Think about how we might use IT, how meetings are run, who attends, when and where they’re held etc)

Nurses

What were your experiences and perceptions of the lean management process?

How has your role in bullet rounds changed in the last 12 months? Why?

What other changes in bullet rounds have there been in the last 12 months?

What suggestions do you have for improvements in bullet rounds?
### APPENDIX 16: Resident Physician Questionnaire Questions and Results

Questionnaire to Resident Physicians in General Internal Medicine at Toronto Western Hospital August 22 2007

*Questionnaire Scale
1=Strongly Disagree
2=Disagree
3=Neither Agree nor Disagree
4=Agree
5=Strongly Agree

<table>
<thead>
<tr>
<th>Question</th>
<th>Results (n=6)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>The process of Bullet Rounds helps me manage patient care better</td>
<td>4 Agreed</td>
<td>67% Agreed</td>
</tr>
<tr>
<td></td>
<td>2 Strongly agreed</td>
<td>33% Strongly agreed</td>
</tr>
<tr>
<td>The process of Bullet Rounds meetings encourages interdisciplinary collaboration</td>
<td>3 Agreed</td>
<td>50% Agreed</td>
</tr>
<tr>
<td></td>
<td>3 Strongly Agreed</td>
<td>50% Strongly Agreed</td>
</tr>
<tr>
<td>Nurses always have the information I need at Bullet Rounds meetings</td>
<td>3 Agreed</td>
<td>50% Agreed</td>
</tr>
<tr>
<td></td>
<td>3 Neither agreed nor disagreed</td>
<td>50% Neither agreed nor disagreed</td>
</tr>
<tr>
<td>Doctors and Nurses are mutually aware of each others goals and objectives during Bullet Rounds</td>
<td>3 Disagreed</td>
<td>50% Disagreed</td>
</tr>
<tr>
<td></td>
<td>2 Agreed</td>
<td>33% Agreed</td>
</tr>
<tr>
<td></td>
<td>1 Neither agreed nor disagreed</td>
<td>17% Neither agreed nor disagreed</td>
</tr>
<tr>
<td>I would not like to attend Bullet Rounds remotely (using information technology)</td>
<td>3 Agreed</td>
<td>50% Agreed</td>
</tr>
<tr>
<td></td>
<td>2 Disagreed</td>
<td>33% Disagreed</td>
</tr>
<tr>
<td></td>
<td>1 Neither Agreed nor Disagreed</td>
<td>17% Neither Agreed nor Disagreed</td>
</tr>
<tr>
<td>I think everyone has to be physically present at Bullet Rounds for the meetings to be helpful to me in my job</td>
<td>4 Agreed</td>
<td>67% Agreed</td>
</tr>
<tr>
<td></td>
<td>1 Strongly agreed</td>
<td>17% Strongly agreed</td>
</tr>
<tr>
<td></td>
<td>1 Strongly disagreed</td>
<td>17% Strongly disagreed</td>
</tr>
</tbody>
</table>
# APPENDIX 17: Comparison Table of Results from Nurse and Physician Interviews and Focus Groups

Legend: RIE = Rapid Improvement Event (process engineering intervention)

<table>
<thead>
<tr>
<th>Theme (Re: Bullet Rounds)</th>
<th>Res Phys Interviews- Pre and Post RIE</th>
<th>Res Phys Focus Group – Post RIE</th>
<th>Staff Phys 1 Interview – Post RIE</th>
<th>Staff Phys 2 Interview – Post RIE</th>
<th>Staff Phys 3 Interview – Post RIE</th>
<th>PCC Nurse Interview – Pre RIE</th>
<th>PCC Nurse Focus Group – post RIE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phys-Nurse Info Exchange</strong></td>
<td>Pre: need overnight status and changes Post: same but not getting it</td>
<td>More phys to nurse Not bad but not getting all they need Info should focus on changes</td>
<td>Still working on perfecting it</td>
<td>Tries to report on status Not sure where info goes</td>
<td>Nurse info the most important Generally pretty good</td>
<td>PCCs receive info in Bullet Rounds not provide it</td>
<td>After RIE the quality of info has improved because they ask better questions</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Pre: varied responses Post: D/ch planning and management</td>
<td>Phys and nurses have different focus and goals</td>
<td>Care Plan and Discharge</td>
<td>Facilitate patient flow and discharge</td>
<td>Produce good patient outcome and fast</td>
<td>Unclear</td>
<td>Was discharge Focus has changed, unclear again Confused about role</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>Pre: speed is good Post: communication problems Facilitator?</td>
<td>Lack of structure Inconsistent Person dependent</td>
<td>No one person running it but 3 PCCs Problems when they are absent; replacements not trained</td>
<td>PCCs seem better at keeping on track better</td>
<td>Has been fine tuned Is more focused</td>
<td>No control Not sure about what supposed to happen, their role Phys should start discussion</td>
<td>After RIE led meetings More consistency, had tools More in control of process</td>
</tr>
<tr>
<td><strong>Good/Bad Points</strong></td>
<td>Pre: good in principle – need more info from nurses Post: seem efficient (quick) but nursing focused</td>
<td>Efficient Good heads up Time saving Frequent Need better info</td>
<td>Better but not ideal</td>
<td>Ok Some improvement in process</td>
<td>Have improved Timelines are better</td>
<td>Useful because only time all disciplines together Too loozy goosy, changes daily, no plan</td>
<td>Useful because only time all disciplines together Still not getting plan of care</td>
</tr>
<tr>
<td><strong>Improvements Needed</strong></td>
<td>Pre: not sure, too slow, too much one way from phys to nurses Post: faster? Communication problems continue</td>
<td>Need to plug gaps in info exchange Predictive approach Separate docs Chart tool</td>
<td>Need someone with full view Facilitator could be good</td>
<td>Need to clarify goal and R &amp; Rs D/ch coordinator could be good</td>
<td>Evolutionary process Facilitator could be good</td>
<td>Care Plans – tell you what process is Phys need to understand process, need proactive plans and timelines Should be real d/ch process Phys need to be more forthcoming about plan Need clear R &amp; Rs</td>
<td>Need to revisit Bullet Rounds Need to predict info better D/ch process should start in emergency Need Case Workers?</td>
</tr>
<tr>
<td><strong>Training</strong></td>
<td>Pre: not clear how White Board used Post: not trained on White Board</td>
<td>N/A</td>
<td>No training or feedback given to resident phys – is a problem</td>
<td>No training given to resident phys on Bullet Rounds Revert to</td>
<td>Orientation (or anything else) is good idea because resident phys</td>
<td>N/A</td>
<td>They need to educate resident phys Staff phys key to this</td>
</tr>
</tbody>
</table>
## SUPPORTING COMMUNICATION BETWEEN NURSES AND PHYSICIANS

<table>
<thead>
<tr>
<th>Theme (Re: Bullet Rounds)</th>
<th>Res Phys Interviews- Pre and Post RIE</th>
<th>Res Phys Focus Group – Post RIE</th>
<th>Staff Phys 1 Interview – Post RIE</th>
<th>Staff Phys 2 Interview – Post RIE</th>
<th>Staff Phys 3 Interview – Post RIE</th>
<th>PCC Nurse Interview – Pre RIE</th>
<th>PCC Nurse Focus Group – post RIE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT</td>
<td>Pre: White Board useful for patient location and nurse name</td>
<td>Vitals should be online</td>
<td>Who should train?</td>
<td>medical model</td>
<td>overwhelmed.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Phys/Nurse Relationship</td>
<td>Pre: gaps in info</td>
<td>Have different goals</td>
<td>Phys not good at engaging nurses</td>
<td>Not clear what nursing goals and R &amp; Rs are</td>
<td>Is of fundamental importance</td>
<td>Phys do not feel same d/ch pressures</td>
<td>Different agendas</td>
</tr>
<tr>
<td>Lean</td>
<td>N/A</td>
<td>N/A</td>
<td>Goal to improve Bullet Rounds process</td>
<td>Not sure - so many interventions</td>
<td>Goal was to put focus on what matters, improve efficiency</td>
<td>N/A</td>
<td>Focused on wrong concept – should have been system delays</td>
</tr>
<tr>
<td>System Barriers and Issues</td>
<td>N/A</td>
<td>Different scope of practice</td>
<td>Barriers to D/ch</td>
<td>Placement issues System blockages</td>
<td>Lack of placement spots Non-medical delays</td>
<td>Blame on PCCs for low d/ch rate</td>
<td></td>
</tr>
</tbody>
</table>

### IT
- Pre: White Board useful for patient location and nurse name
- Post: same

### Phys/Nurse Relationship
- Pre: gaps in info
- Post: same

### Lean
- N/A
- N/A

### System Barriers and Issues
- N/A
- Different scope of practice
- Nurse turn over
- Don’t know nurses
APPENDIX 18 a: Calculation of Significance of Relationship between Process Engineering Intervention and Information Lost in Patient Information Exchanges

*Legend: RIE = Rapid Improvement Event (process engineering intervention)

<table>
<thead>
<tr>
<th>CONTINGENCY TABLE showing # of Patient Information Exchanges with Missing Information Before and After the RIE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missing Information</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Missing Information</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**Expected Value Calculations**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Expected Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Int/Yes Missing</td>
<td>251.9383</td>
</tr>
<tr>
<td>No Int/No Missing</td>
<td>510.0617</td>
</tr>
<tr>
<td>Int/Yes Missing</td>
<td>359.0617</td>
</tr>
<tr>
<td>Int/No Missing</td>
<td>726.9383</td>
</tr>
</tbody>
</table>

**CHI Square Calculation**

<table>
<thead>
<tr>
<th>Step</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(270-359)<em>(270-359)/359+(816-727)</em>(816-727)/727+(341-252)<em>(341-252)/252+(421-510)</em>(421-510)/510</td>
</tr>
<tr>
<td>2</td>
<td>22.06+10.895+31.43+15.53</td>
</tr>
<tr>
<td>3</td>
<td>79.915</td>
</tr>
<tr>
<td>4</td>
<td>79.03</td>
</tr>
</tbody>
</table>

**RESULTS**

At 1df significant values are:
p=.05 = 3.84  
p=.01 = 6.63

Result > 6.63 so significant at p < .01 (or less)

There is a significant association between the occurrence of the process engineering intervention and the amount of information lost in patient information exchanges.
### ODDS RATIO CALCULATION

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds of No Missing after Int (RIE)</td>
<td>816/270</td>
</tr>
<tr>
<td>That is:</td>
<td>3.022222</td>
</tr>
<tr>
<td>Odds of No Missing after No Int (RIE)</td>
<td>421/341</td>
</tr>
<tr>
<td>That is:</td>
<td>1.234604</td>
</tr>
<tr>
<td>Odds Ratio (odds of having no missing information after the Int (RIE) versus before the Int (RIE))</td>
<td>2.447928</td>
</tr>
</tbody>
</table>

### RESULTS

Based on the Odds Ratio, after the process engineering intervention patient information exchanges were 2.45 times less likely to have missing information.
APPENDIX 18 b: Revised Calculation of Significance of Relationship between Process Engineering Intervention and Information Lost in Patient Information Exchanges

*Legend: RIE = Rapid Improvement Event (process engineering intervention)

CONTINGENCY TABLE showing # of Patient Information Exchanges with Missing Information Before and After the Process Engineering Intervention

<table>
<thead>
<tr>
<th>Missing Information</th>
<th>Intervention (RIE)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Missing Information</td>
<td>No</td>
<td>328</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>287</td>
</tr>
<tr>
<td></td>
<td></td>
<td>615</td>
</tr>
</tbody>
</table>

Expected Value Calculations
- MODEL No Int/Yes Missing: 396.3065
- MODEL No Int/No Missing: 218.6935
- MODEL Int/Yes Missing: 587.6935
- MODEL Int/No Missing: 324.3065

CHI Square Calculation with Yates's Correction

<table>
<thead>
<tr>
<th>X2</th>
<th>Step 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(328-396)<em>(328-396)/396+(287-218)</em>(287-218)/218+(656-587)<em>(656-587)/587+256-324</em>(256-324)/324</td>
</tr>
<tr>
<td></td>
<td>(69-.5)*(69-.5)/396+(69-.5)/(69-.5/218+(69-.5)*587+(69-.5)/(69-.5)/324</td>
</tr>
<tr>
<td></td>
<td>11.84+21.52+7.99+14.48</td>
</tr>
<tr>
<td></td>
<td>55.83</td>
</tr>
</tbody>
</table>

RESULTS

At 1df significant values are:
- p=.05 = 3.84
- p=.01 = 6.63

Result > 6.63 so significant at p < .01 (or less)

There is a significant association between the occurrence of the process engineering intervention and the amount of information lost in patient information exchanges.
### Odds Ratio Calculation

<table>
<thead>
<tr>
<th>Odds of No Missing after Int (RIE)</th>
<th>656/256</th>
</tr>
</thead>
<tbody>
<tr>
<td>That is:</td>
<td>2.5625</td>
</tr>
<tr>
<td>Odds of No Missing after No Int (RIE)</td>
<td>328/287</td>
</tr>
<tr>
<td>That is:</td>
<td>1.142857</td>
</tr>
<tr>
<td>Odds Ratio (odds of having no missing information after the Int (RIE) versus before the Int (RIE))</td>
<td>2.242188</td>
</tr>
</tbody>
</table>

### Results
Based on the Odds Ratio, after the process engineering intervention patient information exchanges were 2.24 times less likely to have missing information.
APPENDIX 19 a: Calculation of Significance of Relationship between Process Engineering Intervention and Category 12 - Discharge Ranked Second in Frequency

Assumptions:
- Categories 11- Placement and 12- Discharge alternate between second and third ranking
- Category 12- Discharge can only be ranked second or third.

*Legend: RIE = Rapid Improvement Event (process engineering intervention)

<table>
<thead>
<tr>
<th>CONTINGENCY TABLE showing Rank 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Rank</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Expected Value Calculations
MODEL No/D/ch 138.5241
MODEL Yes/D/ch 227.4759
MODEL No/Placement 160.4759
MODEL Yes/Placement 263.5241

<table>
<thead>
<tr>
<th>CHI Square Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>X2  Step 1 (94-138.5)<em>(94-138.5)/138.5+(272-227)</em>(272-227)/227+(205-160)<em>(205-160)/160+(219-263)</em>(219-263)/263</td>
</tr>
<tr>
<td>Step 2 14.30+8.92+12.65+7.36</td>
</tr>
<tr>
<td>Step 3 43.23</td>
</tr>
</tbody>
</table>

Yates’ Correction
Step 4 42.32

Results
At 1 df significant values are:
p=.05=3.84
p=.01=6.63
Result >6.63 so significant at p<.01 or less
There is a significant association between the occurrence of the process engineering intervention and whether Discharge is ranked second in information frequency.
ODDS RATIO CALCULATION

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds of Discharge after Int (RIE)</td>
<td>272/219</td>
<td>1.242009</td>
</tr>
<tr>
<td>That is:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odds of Discharge after No Int (RIE)</td>
<td>94/205</td>
<td>0.458537</td>
</tr>
<tr>
<td>Odds Ratio (odds of having discharge ranked second)</td>
<td>2.708637</td>
<td></td>
</tr>
</tbody>
</table>

RESULTS

Based on the Odds Ratio, after the process engineering intervention Category 12 - Discharge was 2.71 times more likely to ranked second in frequency.
APPENDIX 19 b: Revised Calculation of Significance of Relationship between Process Engineering Intervention and Category 12 - Discharge Ranked Second in Frequency

*Legend: RIE = Rapid Improvement Event (process engineering intervention)

CONTINGENCY TABLE showing Rank 2

<table>
<thead>
<tr>
<th>Rank</th>
<th>Intervention (RIE)</th>
<th>No</th>
<th>Yes</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank</td>
<td>Discharge</td>
<td>80</td>
<td>243</td>
<td>323</td>
</tr>
<tr>
<td></td>
<td>Placement</td>
<td>169</td>
<td>217</td>
<td>386</td>
</tr>
<tr>
<td></td>
<td></td>
<td>249</td>
<td>460</td>
<td>709</td>
</tr>
</tbody>
</table>

Expected Value Calculations

<table>
<thead>
<tr>
<th>MODEL No/D/ch</th>
<th>113.4372</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL Yes/D/ch</td>
<td>135.5628</td>
</tr>
<tr>
<td>MODEL No/Placement</td>
<td>209.5628</td>
</tr>
<tr>
<td>MODEL Yes/Placement</td>
<td>250.4372</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHI Square Calculation with Yates's Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>X2 Step 1</td>
</tr>
<tr>
<td>X2 Step 2</td>
</tr>
<tr>
<td>Step 3</td>
</tr>
<tr>
<td>Step 4</td>
</tr>
</tbody>
</table>

Results

At 1 df significancy values are:
p=.05=3.84
p=.01=6.63

Result >6.63 so significant at p<.01 or less

There is a significant association between the occurrence of the process engineering intervention and whether Discharge or Placement are ranked second in information frequency.
### ODDS RATIO CALCULATION

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds of Discharge after Int (RIE)</td>
<td>243/217</td>
</tr>
<tr>
<td>That is:</td>
<td>1.119816</td>
</tr>
<tr>
<td>Odds of Discharge after No Int (RIE)</td>
<td>80/169</td>
</tr>
<tr>
<td>That is:</td>
<td>0.473373</td>
</tr>
<tr>
<td>Odds Ratio (odds of having discharge ranked second)</td>
<td>2.365611</td>
</tr>
</tbody>
</table>

### RESULTS

Based on the Odds Ratio, after the process engineering intervention Discharge was 2.36 times more likely to rank second in frequency over Placement.
### APPENDIX 20: Knowledge Translation/Transfer Plan

Based on the “Problem-Solving” Model of Knowledge Translation and the 5 stages of diffusion of innovation – awareness, persuasion, decision, implementation, adoption (Estabrooks 2006) and John Lavis’ framework for KT; identify message, target audience, messenger, processes and evaluation (Lavis 2003)

<table>
<thead>
<tr>
<th>Target Audience</th>
<th>Stage of Innovation Diffusion</th>
<th>Strategy</th>
<th>Key Messages)</th>
<th>Implementation Strategy</th>
<th>Evaluation Focus on Instrumental use of Research i.e. behaviour change</th>
</tr>
</thead>
</table>
| Administration  | Increase Awareness and Persuade | Dissemination of knowledge | – Participants at Bullet Rounds appear to have conflicting goals which may decaese their effectiveness: PCCs understand them to be to facilitate discharge while resident physicians value Bullet Rounds as a forum for discussing medical issues, not just discharge  
– PCC nurses feel they are blamed for discharge delays that are not within their control | – Researcher organizes interactive workshop comprising short presentation with longer facilitated discussion (as per Lavis 2003) | Evaluation questionnaire to establish:  
– if workshop useful  
– whether their understanding/attitudes have changed  
– ideas for change  
– Self report on whether they plan to change their behaviour around constraints experienced by nurses  
Focus group with nurses to obtain their perception of whether there is less of a feeling of blame towards them |
| Nurses          | Persuade, Decision            | Knowledge Exchange | – Staff and resident physicians appreciate the work they do in providing information at Bullet Rounds  
– Staff physicians feel that Bullet Rounds are more efficient when the PCCs take charge and that their replacements are not effective.  
– Staff physicians expect them to train resident physicians around Bullet Rounds  
– Resident physicians want more discussion of medical issues at Bullet Rounds  
– Communication with staff physicians and administration to define roles and responsibilities would help | To encourage interactivity (as per Lavis 2003) researcher organizes Informal discussion:  
– Provides overview of research findings and their role as opinion leaders and champions  
– Suggests taking research findings to interprofessional forum (with physicians)  
– Suggests their role in education of resident physicians - introduces idea of role play of Bullet Rounds  
– Suggests their role in education of replacement nurses | – Self reported willingness to explore ideas suggested  
– Creation of plan of what they will do  
– Observation of resident physicians orientation and Bullet Rounds to assess whether changes have occurred and/or are being maintained |
<table>
<thead>
<tr>
<th>Target Audience</th>
<th>Stage of Innovation Diffusion</th>
<th>Strategy</th>
<th>Key Messages</th>
<th>Implementation Strategy</th>
<th>Focus on Evaluation</th>
</tr>
</thead>
</table>
| **Staff Physicians** | Persuade, Decision | Knowledge Exchange (linking stakeholders) | – PCC nurses are counting on them to assist in training resident physicians around Bullet Rounds, both through orientation and providing feedback.  
– Resident physicians need to understand the purpose, process and value of Bullet Rounds from the start of their rotation.  
– Communication with PCC nurses and administration to define roles and responsibilities would help effectiveness of Bullet Rounds | To encourage interactivity (as per Lavis 2003):  
– Researcher presents project findings informally to joint Nurse/Staff physician forum that includes broader staff physicians group  
– Negotiates shared roles and responsibilities, including resident physician education and feedback on Bullet Rounds  
– Introduces idea of role play of Bullet Rounds | – Observation and document analysis of ongoing meetings between nurses and physicians to assess whether joint planning of Bullet Rounds is taking place  
– Focus groups with staff physicians to assess whether they are satisfied with the changes made |
| **Resident Physicians** | Increase Awareness and Persuade | Dissemination of knowledge | – They should express their needs for Bullet Rounds to staff physicians and PCC nurses  
– Adherence to process guidelines for Bullet Rounds would assist in discharge planning | Staff physicians and PCC nurses present at resident physician orientation:  
– overview of project and findings  
– overview of what being done to address issues and how they can contribute  
– Ongoing - requests for feedback and reminders to resident physicians | In and out survey to:  
– evaluate their understanding of Bullet Rounds  
– evaluate their perception of effectiveness of Bullet Rounds  
– determine whether staff physicians are providing feedback to them  
Monitor amount of feedback to staff physicians from resident physicians re:  
– orientation, processes, satisfaction levels, |
## APPENDIX 21: Table of Recommendations

<table>
<thead>
<tr>
<th>Problem</th>
<th>Recommendation</th>
<th>Who</th>
<th>Tool/Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Info Exchange</strong></td>
<td>Resident physicians information needs not met</td>
<td>Joint Planning Session to map information requirements</td>
<td>Engage PMO to organise Stakeholder reps - include resident physicians</td>
</tr>
<tr>
<td></td>
<td>PCC information needs not met</td>
<td>Take extra half hour on Bullet Rounds one day to show larger group</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>IT - Laptops in meetings</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Create structured language tool and post</td>
<td></td>
</tr>
<tr>
<td><strong>Ownership/Purpose</strong></td>
<td>Who’s in charge?</td>
<td>Define process “owners”</td>
<td>Engage PMO to assist Representatives of both hierarchies who are decision makers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Revisit Rapid Improvement Event process and decide on purpose (must not abandon until agree)</td>
<td></td>
</tr>
<tr>
<td><strong>Goals</strong></td>
<td>What are we trying to do here?</td>
<td>Define goal(s) – what do all the stakeholders want? Is it possible in one meeting?</td>
<td>Engage PMO to organise Stakeholder reps - include resident physicians</td>
</tr>
<tr>
<td></td>
<td>Why aren’t physicians engaged?</td>
<td>Roles and Responsibilities of stakeholders defined and documented</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Create information web for each role</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Create poster</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post poster</td>
<td></td>
</tr>
<tr>
<td><strong>Scripts</strong></td>
<td>Resident physicians have no script</td>
<td>Communication Plan – what is needed?</td>
<td>Engage PMO to organise Stakeholder reps - include resident physicians</td>
</tr>
<tr>
<td></td>
<td>Replacement nurses have no script</td>
<td>Training; revise orientation; must be tight, clear consistent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Role play Bullet Rounds</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Staff physicians must engage and provide regular feedback to resident physicians</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Training on White Board for resident physicians</td>
<td></td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>What is supposed to happen?</td>
<td>Revisit Rapid Improvement Event process and map process</td>
<td>Engage PMO to organise Stakeholder reps - include resident physicians</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PCCs training on how to run meeting or facilitator</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refer to tools created</td>
<td></td>
</tr>
<tr>
<td><strong>Measurement and Sustainability</strong></td>
<td>What do we want to achieve?</td>
<td>Define performance measures based on goals of Bullet Rounds – e.g. regular feedback to resident physicians, physicians satisfaction, use of visuals etc</td>
<td>PCCs</td>
</tr>
<tr>
<td></td>
<td>Is it happening/being sustained?</td>
<td>Create process and structure for regular revisiting of Bullet Rounds process</td>
<td>Staff physicians</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Report on measure at each meeting, revise processes etc as needed</td>
<td>Resident physicians</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Create process for communicating to staff and resident physicians not involved in planning process</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Create tracking sheets for measures identified – document at meetings part of Policy Manual</td>
<td></td>
</tr>
<tr>
<td><strong>Nurse-Physician Relationship</strong></td>
<td>They don’t know each other</td>
<td>Create name tags with photo and role</td>
<td>Physicians and nurses (include floor nurses)</td>
</tr>
<tr>
<td></td>
<td>Their goals are not congruent</td>
<td>Revisit Rapid Improvement Event process and decide on purpose (must not abandon until agree)</td>
<td></td>
</tr>
</tbody>
</table>