Characterizing the Interruptive and Inefficient Nature of Clinical Communication on the Medical Wards: A Mixed-Methods Study

by

Sherman Quan
BSc, University of Victoria, 2003

A Thesis Submitted in Partial Fulfillment
of the Requirements for the Degree of

MASTER OF SCIENCE

In the School of Health Information Science

Supervisory Committee

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Abstract

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Clinical communication on the medical wards can be interruptive and inefficient. However, effective communication is critical to the safety and quality of patient care. Studies to understand the problem found that many of the issues stemmed from the reliance on numeric paging technology. The University Health Network (UHN) began to address these issues by implementing a number of technology solutions. Although successful, these solutions created new issues that need to be understood and addressed. The purpose of this study was to evaluate the interprofessional communication tool (IP Tool) used to send electronic messages, uncover the new and unintended consequences of implementing this technology, and to better understand the gap between what physicians and nurses perceive as an urgent issue. This was a mixed-methods study utilizing semi-structured interviews to obtain feedback on the impact of the IP Tool, followed by the distribution of a survey to specifically explore the gap in what physicians

and nurses perceive as an urgent issue. The semi-structure interviews uncovered 5 main themes; accountability; increase in communication; perception of urgency; knowledge of inappropriate use; and gaps in the tool or workflow. The electronic format of the messages sent using the IP Tool facilitated the use of the system to create accountability and at times absolve oneself of responsibility. Removing some of the barriers to communicating seen previously with paging increased the amount of communication and interruptions, which led to features of the IP Tool being leveraged and other tactics being used to elicit responses and improve personal productivity. Other workflow issues and gaps in the tool such as policy preventing the use of the electronic communication to clarify medication orders were identified. The perceptions of urgency survey found that there is not a significant gap between physicians and nurses in terms of how each discipline defines the clinical urgency of an issue. The gap exists when the element of time is used to determine urgency. There was also variation within disciplines and across disciplines in regards to how an urgent and non-urgent issue is defined.

Clinical communication is complex. Technology has the potential to resolve many of the issues but some of the issues relate to the interprofessional nature of healthcare and not easily resolvable with technology. In fact, technology can accentuate these interprofessional issues and create new problems that need to be addressed. In exploring one of these interprofessional issues, specifically the gap between what physicians and nurses perceive to be an urgent issue, it was found that both disciplines generally agree on what constitutes a clinically urgent issue. The element of time is the primary sources of disagreement. More work to improve clinical communication is necessary and must be conducted within the context of continuous quality improvement as the healthcare environment is constantly changing.

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Acknowledgments

This thesis represents the work of an interdisciplinary team committed to improving clinical communication in healthcare. There were key individuals that not only helped contribute to the completion of this thesis, but also contributed to the work conducted over the past 6 years that this thesis built upon.

The Sunnybrook Team: This includes Drs. Brian Wong, Edward Etchells, and Mark Cheung. It was working with this group where the journey to solve problems with communication began, particularly, implementation of the first physician sign-out tool in the Greater Toronto Area (GTA). Then came the work to understand the problems with numeric paging and the numerous solutions that followed. I will never forget the daylong sessions Brian and I spent going through all the paging data. There was also the Canadian Patient Safety Institute (CPSI) grant that allowed us to collaborate with the team from UHN and allowed us to start all the work enabled through smartphones.

The UHN Team: This includes Drs. Peter Rossos (my co-supervisor), Robert Wu, and Dante Morra. This group has and continues to pioneer work with smartphones to change how clinicians on the medical wards communicate. It is through their leadership that I have matured as a health informatics professional at the University Health Network (UHN).

Dr. Francis Lau: Francis is my supervisor and has been my thought leader throughout the thesis journey. I have gained considerable knowledge with evaluation under his mentorship that will help form the foundation in the next phase of my career.

Dedication

This thesis is dedicated to the memory of the late Dr. William J. Sibbald (1946 – 2006). His mentorship shaped me into the professional I am today. He challenged me and pushed me to reach new heights. He created opportunities for me and left it in my hands to succeed or fail. When I succeeded, he was there to congratulate me. When I failed, he was there to support me and ensured I learned from my mistakes. He was a true inspiration and a leader of the highest calibre. This thesis represents my final promise to him before he passed away, to complete my Master's degree.

Chapter 1: Introduction

Problem Definition

Clinical communication among healthcare providers is important and accounts for the majority of information exchange in healthcare (Coiera, 2000) (Edwards et al., 2009). Breakdowns in communication have therefore been identified as the primary contributor to medical errors (Leape et al., 1991) (Sutcliffe, Lewton, & Rosenthal, 2004) (The Joint Commission, 2007), and recognized as an area that can significantly improve patient safety and quality of care (Wilson, Harrison, Gibberd, & Hamilton, 1999) (Baker et al., 2004). Advancements in technology have been identified as potential enablers to providing more efficient and higher quality of care. Unfortunately, clinical communication is complex; not all the issues can be addressed with technology solutions since many of them relate to the interprofessional and interpersonal aspects of healthcare. In fact, technology can accentuate the issues and has been seen to create new problems in the process (Maslove, Rizk, & Lowe, 2011). One specific issue that has been accentuated with the implementation of technology is the gap between what physicians and nurses perceive to be urgent. Therefore, it is necessary to evaluate these technology solutions so the new and unintended consequences can be understood and addressed.

Purpose

This study was an evaluation of an advanced communication system with the intent to determine its impact on reducing disruptions and improving workflow efficiency, uncovering the new and unintended consequences of implementing this technology, and to better understand the gap between what physicians and nurses perceive as an urgent issue. This will form a better

understanding of the issues that need to be addressed and identify how the communication system and process can be improved to address these new issues.

Organization of Thesis

In chapter 2, a review of the literature will be provided to further highlight the issues around clinical communication, along with other approaches to resolving these issues that others have implemented. The communications theory framework will be introduced in order to provide some theoretical context as to why these issues are encountered. Chapter 3 will describe the research approach, providing details on the project for implementing the communication solution, the design of the research study, the participants involved in the study, and how the study data was collected and analyzed. Chapter 4 will describe the results in detail followed by chapter 5, which will discuss the insights gained from interpreting the results and to describe the next steps in the journey to resolve communication issues in healthcare.

Clinical Communication Initiatives

Information technology holds the potential for providing frontline clinicians the tools necessary to improve clinical communication. The University Health Network (UHN) recognized this and began an effort to transform how clinicians communicated on the medical wards. This started with providing all the physicians on the General Internal Medicine (GIM) service with smartphone devices to communicate with one another via phone and email. This dramatically changed how they communicated and coordinated care, greatly improving their efficiency. Building on this momentum, the next change was creating a web-based application that allowed nurses, pharmacists, and other allied health staff to send electronic messages to the physicians rather than paging them. While these initiatives have been successful and created much

efficiency, they have also uncovered how complex clinical communication is, particularly when the interprofessional nature of healthcare is considered. In resolving certain issues, the nature of communication on the wards was changed and this created unintended consequences. For example, the ease of electronic communication increased the volume of messages resulting in more physician interruptions. It also uncovered an underlying issue with communication with regards to the gap between what physicians and nurses perceive to be an urgent issue. While initially numeric pagers were identified as a main contributor to the problem, it is clear that the work to improve clinical communication requires more than just device substitution. A fundamental shift in approach and further research is necessary to improve clinical communication.

Chapter 2: Literature Review

Numeric Paging

Many breakdowns in communication stem from the fact that the primary communication device clinicians are equipped with is the numeric pager, a technology developed more than 50 years ago. The problem with numeric paging is that it only delivers a number but cannot convey important information such as the reason for the page, urgency of the page, or the sender's name (Wong, Quan, Shadowitz, & Etchells, 2009). Therefore, the clinician receiving the page must interrupt their activity to call back right away since they may not know whether the issue relates to a medical emergency or simply notification of normal lab results. Since there is no context, the clinician being paged is unable to prioritize tasks, which affects their ability to dedicate time to providing patient care. Numeric paging forces the use of synchronous communication and interruption of the current task, which reduces work efficiency and contributes to higher stress (Alvarez & Coiera, 2006). While paging provides a rapid means for communicating information that may require urgent attention, they also frequently interrupt patient care or educational activities. One study found that 41% of all communication events were classified as an interruption (Woloshynowych, Davis, Brown, & Vincent, 2007). In an academic teaching hospital, most of the physicians are resident physicians in training and for some issues they need to consult with their senior staff before they can address it. Therefore, many instances of communication are simply to relay information, requiring a follow up communication to address the issue, which again reduces efficiency. In terms of the paging process, the person sending the page must wait by the phone, not knowing how long or even if the person they paged will call back. The person receiving a page must find a phone and hope that the person who paged them,

who they don't know, is still by the phone. If not, they hang up just to be paged back to the same number 10 minutes later. The inefficiencies, disruptions to workflow and gaps in communication caused by numeric pagers are well documented (Cerimele, Markella, & Simon, 2011; Patel et al., 2010) (Fitzpatrick, Melnikas, Weathers, & Kachnowski, 2008).

Interruptions

One of the consequences of inefficient communication is the amount of interruptions it generates. An interruption can be defined as a break in the performance of an initial task initiated by a request from another person to perform an alternate task. This break results in the suspension of the initial task in order to begin work on performing the alternate task, with the assumption that the initial task will be resumed (Brixey, Robinson, Turley, & Zhang, 2010). Often though, the recipient of the interruption will multitask by continuing to work on the initial task while simultaneously performing work on the alternate task. Interruptions and multitasking have been identified as a major cause of inefficiencies and medical error (Westbrook et al., 2010). The Joint Commission for Accreditation of Healthcare Organizations (JCAHO), the Institute of Medicine (IOM) and Morbidity and Mortality all report that interruptions contribute to preventable medical errors (Brixey et al., 2010). The reason is that interruptions inherently add to cognitive load, leading to increase stress and anxiety that inhibit an individual's ability to make decisions, ultimately increasing task errors (Bailey & Konstan, 2006; Monsell, 2003). Interruptions also hamper performance of clinical duties and cause a constant challenge to prioritization, jeopardizing the quality of patient care provided (Jett & George, 2003; Weigl, Müller, Zupanc, Glaser, & Angerer, 2011). Figure 1 outlines many of the sources of interruptions identified in various studies but it generally breaks down to the telephone, pager, and other clinicians (Rivera-Rodriguez & Karsh, 2010).

Figure 1: Sources of interruptions

Study	Sources of interruptions
Brixey *et al*[15]	Telephone, pager, other people and self
Dearden *et al*[20]	Phone, forms/prescriptions and other
Friedman *et al*[12]	Patient, family, nurses, consulting doctors, emergency department students and house staff, clinical other, technical, administration/page, non-clinical other and personal
Healey, Primus *et al*[33]	Conversation, phone, bleeper, equipment, procedure, environment and monitor
Healey, Sevdalis *et al*[34]	Phone, bleeper, radio, anaesthetists' case-irrelevant conversation, surgeons' case-irrelevant conversation, nurses' case-irrelevant conversation, communication, external staff, equipment, procedural, environment, movement behind video display monitor and movement in front of video display monitor
Hedberg and Larsson[10]	Patient, family, assistant nurse, registered nurse, ward physician, ward secretary and noise
Laxmisan *et al*[55]	Patients, other staff (attending physicians, nurses, residents, patient, hospital employee, etc), telephone and pagers
Pape[16]	Medical doctor,[61] other person, phone call, other patient, visitor, missing medication, wrong dose medication, emergency situation, external talking or nurse talked and loud noise
*Pape *et al*[17]	Physician/nurse practitioner/physicians assistant, other nurse, visitor, other personnel, medication missing or wrong dose present, problem with computer, external conversation or nurse conversed and loud noise
Paxton *et al*[22]	Phone and person
Peleg *et al*[18]	Telephone calls, entrance of nursing staff, unscheduled patients, physician leaves room, house visits and other
Potter *et al*[1]	Telephone call, medication/medical procedure related, inquiries/informs (from unit clerk, registered nurse, doctor, family, nursing office, dietician, staff, general), patient rounds, staff/ items/equipment not available or missing, and staff conflict
Shvartzman and Antonovsky[57]	Nurse, student, physician, patient, maintenance worker, clerical worker and telephone
Tucker and Spear[41]	Medication, supply items (including food), medical orders, equipment, insufficient staffing, patient related and other

Source: (Rivera-Rodriguez & Karsh, 2010)

In one study, clinicians were interrupted on average 6.6 times per hour (Westbrook et al., 2010). In another study, 25.19% of all physician activities were interrupted, accounting for 10.58 interruptions per hour (Brixey et al., 2010). One interesting finding was that some clinicians preferred using synchronous modes of communication, which led to multitasking and a highly interruptive workflow. In this environment, clinicians were constantly multitasking and shifting their priorities in order to manage the various tasks that came up. This is likely because synchronous communication can provide a richer exchange of information (Edwards et al., 2009). The fact remains that there are many situations where interruptions are actually necessary for safe, high-quality care. However, it is a balance as there are also times where there are tasks

requiring undivided attention so interruptions need to be limited to those that are clearly needed (Rivera-Rodriguez & Karsh, 2010).

Identifying the Right Physician to Page

Another issue relates to how difficult it can be to identify the right physician to page. Resident physicians in teaching hospitals are very transient in that they frequently rotate among different services and hospitals throughout the year. They have regularly scheduled academic half-days for education where they are out of hospital for an entire morning or afternoon and also have vacations scheduled where they can be absent for an entire week or more. Physicians in both the teaching and non-teaching setting operate under complex call schedules where they cover other teams overnight (on-call) and are not available most of the next day (post-call). Asking clinicians to decipher these schedules every time they need to page a physician for their patient can be daunting and simply trying is quite inefficient and often ineffective. This leads to errant pages being sent, requiring further paging to try and track down the right physician. A paper published in the Archives of Internal Medicine found that during the study period, 14% of all pages were sent to the wrong physician. Of these, 47% were either emergent or urgent in nature (WONG et al., 2009).

Coordinating Care among Multiple Specialties and Disciplines

Poor interprofessional or interdisciplinary collaboration can negatively affect the delivery of health care services and impact patient outcomes (Fewster-Thuente & Velsor-Friedrich, 2008) (Zwarenstein, Goldman, & Reeves, 2009). Much of the literature focuses on the interaction of physicians and nurses as this is the primary interaction on the wards for providing patient care. Some of the literature discusses concepts such as the doctor-nurse game (Reeves, Nelson, &

Zwarenstein, 2008) and dive into social aspects such as hierarchy and role within the hospital and care team (Lingard et al., 2004) (Lindeke & Sieckert, 2005). However, the inability to efficiently and effectively communicate information remains at the root of the problem and leads to medical errors, frustration, and poorer care (Burke, Boal, & Mitchell, 2004) (Lingard et al., 2006). It was discussed how paging contributes to this but another underlying issue is that physicians and nurses are taught to communicate in different ways. Nurses are taught to be narrative when communicating and to "paint the picture", whereas physicians learn to be very concise and get to the point quite quickly (Leonard, Graham, & Bonacum, 2004). These differing styles will inevitably lead to conflicts when patient volumes are high and the environment is stressful. There are also differing perspectives between nurses and physicians regarding what information should be communicated (Mascioli, Laskowski-Jones, Urban, & Moran, 2009) and a gap between what nurses and physicians feel are urgent matters.

Perceptions of Urgency

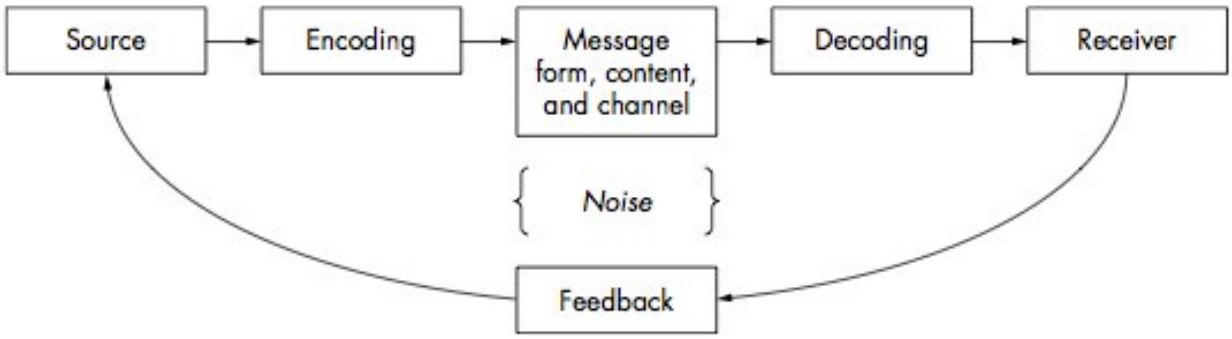
When looking at the interaction between physicians and nurses, we often observe a lack of agreement on clinical priorities. In one study, nurses and physicians were found to not agree on important aspects of the care plan, which can be of particular concern when these relate to medications or planned procedures (O'Leary et al., 2010). Disagreement has been observed in various clinical settings, including the intensive care unit (Caswell D; Cryer HG, n.d.) and the obstetrics environment (Lyndon, Zlatnik, & Wachter, 2011) where disagreement encompasses aspects of what is considered safe care, how to manage pain, and even decisions around end of life. If we look specifically at clinical communication to coordinate care, the issue encountered most often is the difference in what clinical situations are considered urgent and require immediate attention. Studies have found that situations judged to be non-urgent by nurses have

been shown to be urgent and require immediate medical assessment (Coiera & Tombs, 1998). In another study, nearly half of the calls the physicians received that resulted in them coming to assess the patient were considered routine or non-urgent (Beebe, 1995). These differences in perceived urgency can arise from a number of factors, including differences in experience level, training, scope of practice and agenda. Physicians are accustomed to being the clinical decision maker but nurses spend the most time with the patient and their families so are often in a better position to know the patient's overall status (Caswell D; Cryer HG, n.d.). Nurses and physicians also differ in their perspectives on time and punctuality. Nurses look at time as if it is spread out linearly in order to divide it and control the use of it. Physicians look at time in terms of tasks so therefore don't portion it but rather prioritize it in terms of tasks in order of urgency. This different conceptualization of time is often the basis for the perceived differences in urgency (Skjørshammer, 2001).

Communications Theory

While it is easy to simply say our reliance on traditional paging technology is the source of our communication problems, it doesn't account for all the problems so it is necessary to examine the underlying issues. An analysis of communications theory can assist with this. In the process of communication, there is a sender or message source, who encodes information into a message and sends it through a channel to a receiver, who decodes the message and responds with feedback (Anderson & Helms, 1998). Noise can disrupt this process at any point and is defined as any distraction that diminishes the effectiveness of the communication process (Anderson, Dewhirst, & Ling, 2006). Figure 2 provides a visual representation of the traditional communication process.

Figure 2: Traditional communication process



Source: (Anderson et al., 2006)

While conceptually this process is fairly simple, there is much evidence that the messages received by health professionals do not get through to them as originally intended. Even when the message is heard or read, it is selectively perceived or remembered and even more selectively acted upon (Simonds, 1995). Often times, there are misaligned goals and perceived priority of the communication. This can be explained from the fact that different professions use different jargon and are taught to communicate quite differently (Odell, 1996). Figure 2 depicts communication as a point-to-point interaction between two individuals but we know healthcare is complex and often requires coordination across a team of individuals. Therefore, many messages need to be sent to multiple individuals whose activities as a whole must be aligned, which adds even more complexity to the communication process. Feedback is the final step in the process and involves the receiver providing the sender a response confirming the message has been received and understood, then providing an action where appropriate (Odell, 1996). This feedback is often the most important and sought after result of a communication, but it is also most often the missing piece. Another aspect of communication that must be considered is Coiera's distinction between conversation and computation. This view emphasizes that the informal conversations that traditionally facilitated communication tasks can't be simply replaced with formal computation or information systems without losing richness of information.

While some tasks can be appropriately replaced with computation, others still require the face-to-face conversation for its ability to provide immediate feedback and clarification and ensure hand-over of the task to reduce cognitive load (Coiera, 2000).

Solutions for Addressing Issues with Communication

Significant investment in healthcare information technology is transforming the way we deliver patient care. Canada Health Infoway is a Federal organization responsible for leading a $2 Billion+ investment to advance the adoption of information technology in Canada for improving patient care (Canada Health Infoway, 2009). President Obama in the United States has announced that $634 Billion will be invested in healthcare over the next 10 years, with a large proportion of that commitment to be spent on information technology (US Office of Management and Budget, 2009). In addition to electronic health records, many healthcare organizations are turning to technology solutions to improve the efficiency and safety of clinical communication.

There are times when disruptive and synchronous communication is required, as this alerts clinicians to priority or dangerous conditions that demand their immediate attention (Alvarez & Coiera, 2006). To facilitate non-disruptive communication that provides context and prioritization there have been initiatives to build processes around the use of smartphone technology and email (Quan et al., 2008) (O'Connor, Friedrich, Scales, & Adhikari, 2009). These initiatives have allowed nurses to text message physicians by email to smartphones with the intent to reduce unnecessary disruptions and improve efficiency of communication for both the nurses and physicians.

Standardization of teamwork and communication has been used in industries such as aviation where 70% of commercial flight accidents stemmed from communication failures among crew members (Leonard et al., 2004). These lessons have been adopted in healthcare where standardized checklists are being used to improve team communication and reduce errors (Lingard et al., 2005) (Haynes et al., 2009). A popular method for standardizing how patient information is transferred is the SBAR method, which stands for situation, background, assessment, and recommendation. The use of SBAR as a standardized communication approach has been demonstrated to be a potential solution for breakdowns in communication (Woodhall, Vertacnik, & McLaughlin, 2008) (Haig, Sutton, & Whittington, 2006). A similar method adopted from the U.S Forest Service is the STICC protocol, which stands for situation, task, intent, concern, and calibrate, and is another attempt to standardize communication in healthcare (Sutcliffe et al., 2004).

Traditional approaches for facilitating physician sign-out involved the use of paper or Word processing documents that were stored in a file folder or on a local PC so weren't easily accessible. A workaround was to email the Word documents, which obviously posed risks to privacy and security of patient information. Building on the benefits of standardization and information technology, a number of organizations have developed electronic physician sign-out tools to facilitate the physician handover process (Kushniruk, Karson, Moore, & Kannry, 2003; Quan, 2005; Van Eaton, Horvath, Lober, & Pellegrini, 2004). These electronic physician sign-out tools have been shown to reduce communication errors by providing standardization that minimizes the omission of critical information during handover (Campion, Denny, Weinberg, Lorenzi, & Waitman, 2007; Van Eaton, Horvath, Lober, Rossini, & Pellegrini, 2005). The

practicality of the physician sign-out systems led to unintended uses of these systems. Physicians started using them for day-to-day management of their patients to keep track of to-do lists, given the lack of any other tool for this purpose (Arora, Johnson, Lovinger, Humphrey, & Meltzer, 2005). Nurses and other clinicians also accessed the tool and printed off the list as it provided a very good snapshot of the patient (Campion et al., 2007). This led to one organization developing a communication tool to triage urgent and non-urgent messages between nurses and physicians (Locke, Duffey-Rosenstein, De Lio, Morra, & Hariton, 2009).

A technology solution that has been used to improve interprofessional communication was the development of an electronic inpatient whiteboard that displayed relevant information in a traditional whiteboard format (Wong, Caesar, Bandali, Agnew, & Abrams, 2009). Through the use of surveys, it was found that approximately 71% of survey participants believed the whiteboard improved and standardized communication within the care team. Further, approximately 62% of the participants agreed that the whiteboard saves them time when searching for information on a patient and their care plan. A process change that has been used to improve interprofessional communication has been the implementation of daily interdisciplinary rounds. One study conducted at an acute care hospital in the US found a positive impact on hospital length of stay and total costs (Curley, McEachern, & Speroff, 1998).

Gaps in the Literature

While many aspects of clinical communication are described in the literature, there are still many issues that have not be described. Closing the loop on communication is an important aspect of day-to-day clinical communication but little work has been done to determine its impact on patient care. Often times there are less urgent items such as a patient requesting a sleep

medication that fall through the cracks. This is not an immediate priority for the physician as it does not impact patient safety but it still needs to be addressed at some point. This leads to repeat communication that requires time and energy from both the nurse and the physician, reducing their efficiency and leading to more interruptions. The nurse also has medico-legal requirements to for example communicate an abnormal result to the physician. While it is necessary on the nurse's end to continually page until they reach the physician in order to close the loop on communication, this again can be disruptive and reduces the efficiency of the nurse and the physician, as well as negatively impacting this important relationship.

The issues that exist with communicating across medical specialties and other disciplines such as allied health and pharmacy is an important aspect of clinical communication. These interactions are very important given that patients are being admitted with multiple complex conditions that require the expertise of multiple specialties and disciplines. The General Internal Medicine (GIM) service is one specialty that manages this diverse and complex patient population and has been identified as a critical environment where more empirical studies describing and analyzing interprofessional communication is needed (Conn et al., 2009). For example, new clinical results may require the General Internist to coordinate a new care plan with the Cardiologist and Gastroenterologist where the difference in care plan could be that the Cardiologist sees no issues and feels the patient is ready to go home, but the Gastroenterologist needs the patient to go to the operating room due to a perforation. Another example is the team could decide that a patient is medically stable enough to be discharged home but the physiotherapist feels that given the patient's mobility, they should be discharged to a long-term care facility. Unfortunately, the social worker was not aware of this plan so had not made arrangements with a long term care

facility, delaying discharge for two days, meaning the bed isn't available for a patient currently waiting in the Emergency Department. Ensuring everyone in the patient's circle of care is on the same page regarding the goals of the patient can be time consuming and challenging, but breakdowns in this communication can have a significant impact across the system.

Much of the literature on clinical communication also provides high-level recommendations that communication needs to be improved but don't get into the details of what the specific communication issues are and don't provide actionable guidance on how to improve communication (Kuziemsky et al., 2009).

Summary of Key Findings

The current literature describes communication in healthcare as interruptive, inefficient, and complex. Many of the problems stem from the reliance on numeric paging technology that provides no context on urgency and forces synchronous communication. Some organizations have begun addressing these communication issues with the implementation of technology solutions such as smartphones and providing applications to send text messages. While the literature describes many of the problems and some of the solutions implemented, there are still many issues not described, particularly the new ones created with the implementation of technology. Therefore, further work to fill these knowledge gaps in the literature is necessary.

Chapter 4: Research Approach

Research Questions

The overall aim of this study was to evaluate the Interprofessional Communication Tool's impact on reducing disruptions and improving workflow efficiency, uncover the new and unintended consequences of implementing this technology, and to better understand the gap between what physicians and nurses perceive as an urgent issue. Specifically, this study aimed to answer the following research questions.

1. How has the introduction of the Interprofessional Communication Tool (IP Tool) impacted clinical communication on the medical wards?
2. Is there a gap between what physicians and nurses perceive as an urgent issue?

Research Method

This was a mixed-methods study utilizing both qualitative and quantitative methods. Semi-structured interviews were used for the qualitative component and a survey tool was developed for the quantitative component. Thematic analysis was used to uncover themes from the semi-structured interviews and frequency tabulation and testing for proportional differences were used to characterize the gap between what physicians and nurses perceive to be an urgent issue. This study received ethics approval from the University of Victoria ethics review board (10-363) and the University Health Network ethics review board (09-0363-BE).

Intervention

Beginning in March 2008, each resident on the General Internal Medicine (GIM) service at the University Health Network (UHN) received an individual smartphone to use for clinical

communication typically within or among the medical teams. In addition, each team also had a "team smartphone" that was designated as the primary point of contact for nurses, pharmacists and allied health staff to communicate with the teams. The team smartphone was typically carried during the day by the senior resident and then given to the covering junior resident during sign-over. For the most urgent of issues, clinicians had the ability to call the team smartphone directly for immediate assistance. For all other issues, communication was initiated using the interprofessional communication tool (IP Tool).

The IP Tool represents messaging functionality that was built on the existing physician sign-out tool that was being used by the residents to facilitate hand-over. The medical teams managed the patient list (Figure 3) and when a nurse, pharmacist, or allied health member wanted to message the team, they would first choose the appropriate patient. They were then able to select the messaging feature and begin formulating the message (Figure 4). The clinician's name is automatically populated by the system and then the sender must enter the following information: (1) Contact Info; (2) Urgency (Urgent or Non-Urgent); (3) Response Type (Callback, Respond within IP Too, Unit Visit, Information Only); (4) Requested Within (Earliest preset time (07:30, 13:00, or 21:00), 1 hour, 2 hours, 4 hours); (5) Task; (6) Additional Info. Many of the options chosen guide the logic built into the system to ensure the loop on the communication is closed. The urgency chosen not only defines for the physicians if it is an urgent or non-urgent request, it also determines how the system handles the message. If urgent is chosen, the message is sent immediately to the team smartphone, interrupting the physician. The physician then has 15 minutes to electronically respond to the message either from the web-based application (Figure 5) or from their smartphone (Figure 6). If they do not respond within 15 minutes, the system will

send another message every 15 minutes until they respond. If non-urgent is chosen, the user will then also be asked to choose a requested within timeframe. Non-urgent messages get posted to the IP Tool and do not get sent immediately to the team smartphone. The intention is that physicians will access the IP Tool on a regular basis and address these non-urgent issues in batch. However, if they do not access the IP Tool and address these messages by the requested within timeframe, the message escalates and becomes an urgent message. The system then proceeds to send messages to the team smartphone every 15 minutes until the physicians respond. The response type chosen indicates to the physician what type of response the clinician sending the message would like back. The task acts like a subject line to quickly identify the message and the additional info allows the clinician to input the details of the issue and message. An interprofessional team of clinicians who represent the leadership group for the GIM service developed this logic, which enforces the standard operating protocol for communicating on the wards.

Figure 3: Patient List

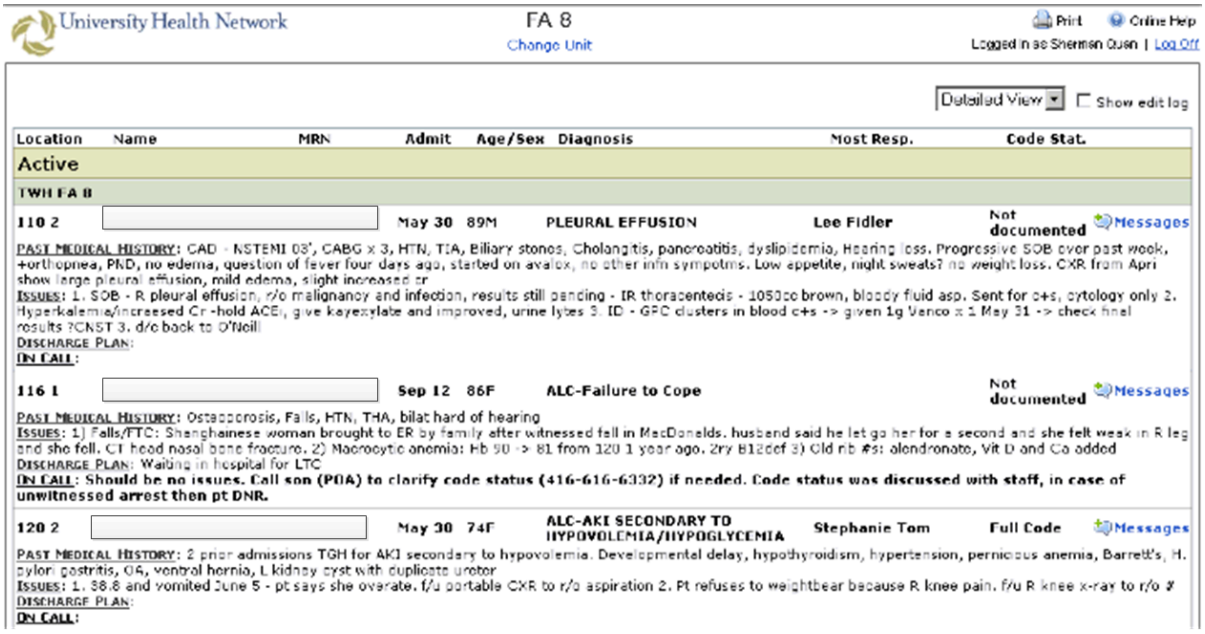


Figure 4: Sending a message

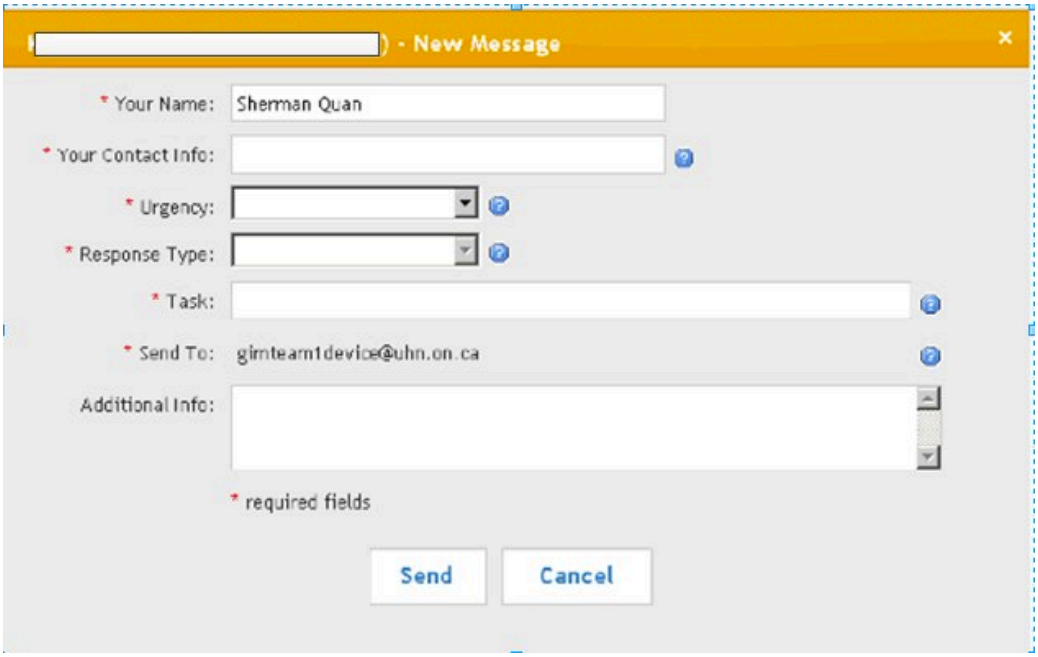


Figure 5: Reading and replying to a message

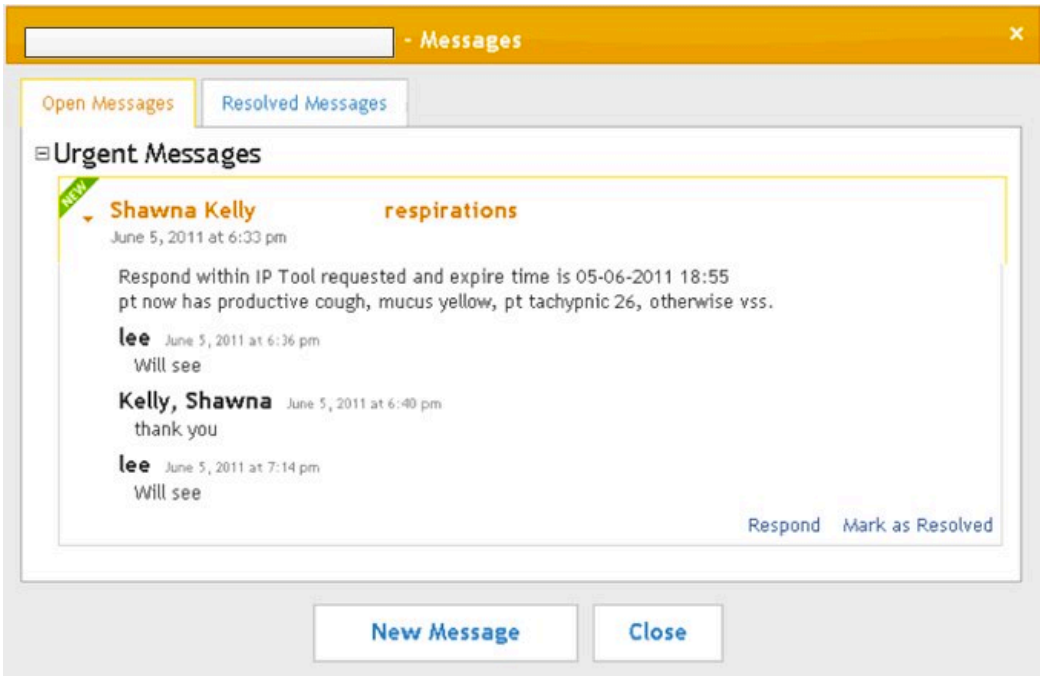


Figure 6: Message on smartphone

Study Design

Setting and Participants

This research was conducted on the General Internal Medicine (GIM) service at the University Health Network (UHN) in Toronto Ontario. UHN is a tertiary care academic teaching hospital fully affiliated with the University of Toronto. It is comprised of the Toronto General, Toronto Western, and Princess Margaret hospitals. The GIM service operates from both the Toronto General and Toronto Western sites and in 2008/2009, there were approximately 80,000 emergency department visits and approximately 224,000 inpatient days across UHN. UHN is a fairly technologically advanced hospital system and was among the first hospitals in North

America to deploy computerized provider order entry (CPOE) (Wu, Abrams, Baker, & Rossos, 2006). The participants involved with this research include staff physicians, medical residents, nurses, pharmacists, and allied health staff on the GIM service.

Semi-Structured Interviews

To determine how the introduction of the IP Tool impacted clinical communication on the medical wards, semi-structured interviews were used. A research coordinator sent emails to potential participants inviting them to be part of this study. The principal investigator contacted those who responded and agreed to participate to arrange the interviews. Individual interviews were conducted with medical residents (physicians), nurses, pharmacists, and allied health staff using a set of open-ended questions (Appendix A). Participants were provided a $30 gift certificate to compensate him or her for their time. The open-ended questions served as a guide to highlight key themes of interest and based on the participants' responses, further questions were asked to drill into more detail on the topic. Participants were encouraged to speak freely, to raise issues that were important to them, and to support their responses with examples. All interviews were conducted by the principal investigator and taped with an audio recorder. The interviews were transcribed verbatim and assigned a unique identifier for each participant. Interviews ranged from approximately 15 minutes to 30 minutes in length.

Perception of Urgency Survey

To determine if there is a gap between what physicians and nurses perceive as an urgent issue, a perception of urgency survey was developed (Appendix D). The survey presented real messages with all identifiable information removed extracted from the IP Tool to physicians and nurses and allowed them to independently rank the urgency of the issues. To select the messages for review, a one-month sample of messages were extracted and stripped of any identifying

information and information related to urgency of the message. Messages that were not going to be useful were removed from this set and after exclusion, the data set included 1665 messages. Two practicing physicians helped define the following exclusion criteria:

1. Messages with multiple issues
2. Messages without issue identified ie. only content is "please call back"
3. Messages with no message in the message body
4. Not clear from the message what the issue is
5. Message content has individual identifying information

3 sets of 29 messages were then randomly selected using the random function in Microsoft Excel from the larger data set and reviewed by senior physicians and nurses. Consensus among the senior physicians and nurses was reached on a single set to use that contained messages that represented a range of messages in terms of urgency and category of issue (such as patient communication or medication related). This final set of messages was then incorporated into the survey along with other demographic questions. Two versions of the survey were developed using the SurveyMonkey online tool because the demographic questions for the physicians were different than those for the nurses. The physicians filled out the survey using the online tool and nurses filled out the survey on paper, after which the data was manually inputted into the online tool. The survey was distributed to nurses on paper because based on past experience, the majority of frontline nurses did not use their corporate email so the online tool couldn't be distributed to them electronically.

Essentially the physicians and nurses read the description of each message and then ranked the message based on 3 parameters: 1) if the message is Urgent or Non-urgent; 2) if the message should be responded to in less than 10 minutes, 10-29 minutes, 30-59 minutes, 60-120 minutes, or greater than 120 minutes; 3) if the message requires a callback, face-to-face discussion, electronic response, or no response (info only). Two open-ended questions asking the participants to define an urgent issue and a non-urgent issue were also included at the end of the survey.

Data analysis

Semi-Structured Interview

The interview data was assessed using thematic analysis, which allows categories and ultimately themes within the data to be observed (Priest, Roberts, & Woods, 2002) (Hsieh & Shannon, 2005). The transcripts and interview recordings were reviewed and independently coded by the principal investigator. Prior to coding, the principal investigator reviewed the transcripts several times in order to define the coding structures and relationships between codes and sub-codes where relevant. This allowed the investigator to modify the coding structure and better determine how best to effectively code the data before the entire data set was coded. Once the coding structure was developed, the transcripts were imported into qualitative analysis software, specifically QSR NVivo version 9. Using the coding structure that identified the overall trends in the data, each transcript was individually coded. Once coding was completed, a series of queries were carried out in order to sort, categorize and examine the coded text. From these analyses, key themes that emerged could be pulled from the text and used in the interpretation of the data.

Perceptions of Urgency Survey

The survey data was first analyzed using the odds ratio. The odds ratio is a statistics commonly used in clinical research and decision-making to determine the odds of an effect occurring versus the odds of it not occurring. A common use is to provide clinicians direct information on which treatment approach, such as using a particular drug or not, has the best odds of benefiting the patient. In this study, the odds ratio was used to determine if a nurse is more likely than a physician to rank a clinical message as urgent (versus non-urgent). Secondary data related to urgency included the timeframe the message should be responded to, if the message should be responded to in 59 minutes or less versus 60 minutes or greater, and whether the message warrants a synchronous versus asynchronous response. When the odds ratio was not significant due to a small sample size, conclusions can't be drawn from this data. Therefore, a second analysis using proportions was conducted to compare responses. The responses from the physicians and nurses were combined and the proportions between the categories 1) urgent vs. non-urgent 2) <= 59 mins vs. >= 60 mins 3) synchronous vs. asynchronous was analyzed. The proportions between the physician and nursing groups for each category were also analyzed.

The survey data was downloaded from the online tool's database into an excel sheet format. Any identifying information was removed and the survey results were tallied into 2 x 2 tables to show the frequency distribution. The data corresponding to the timeframe a message should be responded to within and the type of response the message requires had to be collapsed so it could be entered into a 2 x 2 table. For the timeframe a message should be responded to within, responses of less than 10 minutes, 10-29 minutes, and 30-59 minutes were collapsed into the category of 59 minutes or less. For the responses of 60-120 minutes and for greater than 120

minutes, these were collapsed into the category of 60 minutes or greater. For the response type required, callback and face-to-face discussion were collapsed into the category of synchronous. The response types of electronic response and no response (info only) were collapsed into the category of asynchronous.

Tables 1-3 below were constructed for each of the 29 clinical messages. The odds ratio was calculated using the formula (A x D)/(B x C). In order to directly interpret the data, the odds ratio needs to be greater than 1.00 (McHugh, 2009). Therefore, the tables were constructed with the group expected to have the higher odds in the first column, which in this case was the nurses. For some questions though, the physicians did have the higher odds so the table was modified so the physicians were in the first column. Some of the cells also had tallies of 0 and given the formula, a value of 0 would generate an odds ratio result of 0. Therefore, if a cell contained a value of 0, a 1 was included so the calculation would produce a result. For the proportional analysis, A+B was compared to C+D and A/C (or C/A) was compared to B/D (or D/B).

Table 1: Urgency - example

	Nurses	Physicians	Total
Urgent	A	B	A+B
Non-urgent	C	D	C+D
Total	A+C	B+D	

Table 2: Timeframe for response - example

	Nurses	Physicians	Total
<= 59 mins	A	B	A+B
>= 60 mins	C	D	C+D
Total	A+C	B+D	

Table 3: Response type - example

	Nurses	Physicians	Total
Synchronous	A	B	A+B
Asynchronous	C	D	C+D
Total	A+C	B+D	

A third analysis was also conducted in order to compare the responses from this survey with what the nurse who originally sent the message indicated. For the parameters of urgency and response type, the responses that received the majority of responses from the survey participants was used for the comparison. For example, if 11 nurses ranked the message as urgent and 5 nurses ranked the message as non-urgent, urgent would be considered the answer that received the majority of responses. Timeframe for response was not used because this could not be obtained for all of the original messages, as it was not always indicated, particularly for the urgent messages.

Table 4: Comparison example

	RN	MD	Org
Urgent			X
Non-urgent	X	X	

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

Legend:

RN = nurse

MD = physician

Org = original nurse who sent the message

Chapter 5: Results

This was a mixed-methods study using both qualitative and quantitative techniques to characterize the disruptive and inefficient nature of clinical communication on the medical wards. The first part of this results section will focus on the qualitative component and describe the findings from the semi-structured interviews. This will explore key themes that affect communication on the medical wards. The second part of this results section will focus on the quantitative component and describe the findings from the perceptions of urgency survey. This will explore a specific issue that has been identified through past work in evaluating clinical communication and an issue that was also uncovered again in the semi-structured interviews.

Qualitative: Semi-Structured Interviews

This thesis built on work that has been conducted in clinical communication over the past 6 years. Many of the benefits of this approach, the use of electronic communication facilitated through mobile devices, has been evaluated and described through related activities at UHN (Wu et al., 2011) (Wu et al., 2010) (Wong, Quan, Shadowitz, & Etchells, 2009). From a physician perspective, they felt the approach reduced interruptions to patient care, provided them context that helped them prioritize tasks effectively, and improved communication with their team members and other clinicians, which sped up coordination and completion of tasks, making them more efficient. From a nursing perspective, the team based communication significantly reduced their time trying to identify who to page. The electronic communication reduced the amount of time it took to reach and receive a response from a physician as they were able to send messages and get back to what they were doing rather than waiting by a phone. They also valued from a safety standpoint the ability to call a physician directly for urgent issues.

In addition to these benefits, the interviews uncovered one additional main benefit. Clinicians like the fact that there is a record of the communication. It allows them to go back to the communication if needed, it creates accountability, and allows others to see what is happening with the care of the patient.

> *You have a record, so you can go through and make sure you didn't miss anything. You can triage, 'cause you may have to be doing multiple things at once and this way you have a better sense. So overall, I think it's good. [MD04 - Physician]*

> *I like that there's accountability for the doctors or whoever's responding-- yeah, the doctor who respond to my page, I like that I can go back and check the precise time of our communication and I can include that in my clinical notes. [RN02 - Nurse]*

Since many of the benefits with this approach have been previously described, the results here will primarily focus on describing the issues in an effort to better understand them and resolve them. A total of 17 clinicians participated in the semi-structured interviews and included 5 medical residents, 8 nurses, 2 pharmacists, and 2 social workers. The thematic analysis of the interview transcripts highlighted 5 main themes that will be discussed. These 5 themes include accountability, increase in communication, perception of urgency, knowledge of inappropriate use, and gaps in the tool or workflow. During the transcript and coding process, additional sub-themes were identified and are described here within the 5 main themes. However, details of these additional sub-themes can be found in Appendix B. To provide some context, table 5 provides summary statistics on the number of references that support each theme and the number of interview participants who contributed references to the theme. These numbers however should not be used to interpret the importance of each theme.

Table 5: Number of References and Contributors

Theme	# of References	# of Contributors
Accountability	24	12
Increase in Communication	27	11
Perception of Urgency	59	17
Knowledge of Inappropriate Use	17	7
Gaps in Tool or the Workflow	93	16

Accountability

The IP Tool messages are stored electronically and so are essentially retrievable. This ability to access the messages has generated a much greater awareness to accountability. One common comment, primarily from the nurses, was that they like knowing that the physician received the message. Part of nursing practice is that a nurse has a medico-legal obligation to inform the physician of relevant patient issues. Previously with pagers, nurses would get this confirmation when the physician called back. If the physician didn't call back, the nurse would have to page again because it is known there are times when the page would not be delivered and was essentially lost. Now with the IP Tool, they are able to see that the message went through and the physicians received the message.

> *Because it's just, like, this thing about accountability in terms of letting them know, that they are aware. [RN03 - Nurse]*

A lot of the more junior nurses are also sometimes unsure of themselves or uncomfortable with a situation. This is when they will look to the physician for reassurance. They will send the message to a physician to let them know and so if the physician is OK with the situation, so is the nurse. It gives the nurses peace of mind and makes them feel like they are fulfilling their responsibility by passing on the message.

> *So some questions where you-- you just-- 'cause you want to be accountable and sometimes, when it comes down to clarification and just patient status, it kind of gives you peace of mind and feels like you're filling your responsibility and accountability, that you're passing on the messages. [RN03 - Nurse]*

Physicians also use the fact that everything is recorded electronically to their advantage. It is now possible for them to create a record so they are themselves covered if there is a court case. Even if the conversation was by phone, they will send an electronic message summarizing the conversation, similar to how a project manager may email out the minutes of a meeting.

> *I would think that maybe a spin-off of this would be to understand if there's-- how is this working in litigation, where you now have an actual record of what was said. 'Cause I use it now as a reference. So even if I have a phone conversation with a nurse, based on a message that we've had, I will record what we said and send it. [MD03 - Physician]*

Physicians can be quite busy and not always respond to requests sent to them. When they used pagers, a common reason they would quote as to why they didn't respond was that they didn't receive the page. Sometimes they truly didn't receive the page but other times they were ignoring the page because they were busy. Now with the IP Tool, clinicians can prove that the message was sent and received and at what time.

> *…because then it's actually stamped and you see it and it's there. So you know that it's been received. And they can't say, well, I never knew about it or-- [AH02 - Social Worker]*

In terms of responsibility, clinicians feel that the IP Tool creates more of a responsibility or obligation for the physicians to respond to messages in a timely manner. Not only is there more visibility to everyone that the message was sent and at what time, the escalation features of the system forces the physician to respond in some fashion to close the loop.

> *I like that there's accountability for the doctors or whoever's responding… I can go back and check the precise time of our communication and I can include that in my clinical notes. [RN02 - Nurse]*

Interestingly though there were physicians that identified the opposite and felt the IP Tool created less of a responsibility or obligation for them to respond. Part of the reason some physicians felt this way was that they now knew the clinical context of the issue. By knowing

what the message is about, it gives them the ability to "prioritize" or ignore the message if they know it's not life threatening. When it's a pager, there is always the chance it's life threatening so they always had to call back.

> *…there's less of a responsibility or an obligation to actually-- if they send me a message or if I send them a message back, then it's almost, like, you can get away with a lot more because you don't have to reply. [MD01 - Physician]*

Physicians also felt that nurses were using the system to absolve themselves of their responsibility. Rather than thinking through the situation and taking responsibility, they just sent it through using the technology and could now say "I sent it to the physician".

> *There's any sort of problem going on, instead of thinking about it or, you know, say oh, this I.P. tool is there, let's just put it through. Some just feel the need to send everything on there and maybe they feel that by sending it on here they dissolve themselves as responsibility... [MD05 - Physician]*

There are comments from nurses that support the fact they may be using the system to cover themselves from a medico-legal perspective. Some nurses felt if they sent the message to the physician and made them aware, the nurse has done his or her part and it is now the physician's responsibility.

> *And I think everything you do is recorded, like, you can go back and check, so there's that legal piece, which I guess covers you, in terms of time you called, those things which are critical, what you are calling for. [RN09 - Nurse]*

As a tactic to get the physicians to respond in a timely manner, some of the nurses have become clever at painting a clinical picture so the issue seems dire, creating a situation where the physician legally has to go assess the patient. The asynchronous nature of communication may prevent immediate clarification of severity.

> *I'll give you a classic, like, high blood pressure and patient has a headache. So initially, you know, I have to think, does this patient have a hypertensive emergency?... So by putting sort of history together in this way, that sort of suggestive way, then-- yeah… But if it was a phone conversation, I might be able to say, okay, what-- how severe is it? But*

instead, there isn't always that opportunity, so I have to go assess the patient. [MD03 - Physician]

Increase in Communication

The intention of the IP Tool was to reduce interruptions by triaging issues so that less urgent issues could be addressed efficiently in batches, rather than on an ad-hoc basis. Unfortunately, the opposite actually happened and the amount of communication sent to the physicians actually increased. The fact communication has increased was identified not only by the physicians, but from the other clinicians as well.

I feel like I'm constantly bombarded with things… Just psychologically I feel like it's harassing me a lot more than the pager used to. [MD02 - Physician]

I definitely think that they're getting more issues communicated to them more frequently in general than before… [AH01 - Pharmacist]

Yes. Definitely, I'm paging them more frequently in general than I would have previously. [RN02 - Nurse]

One of the reasons for the increase in communication is that many of the barriers to paging have been eliminated. Since paging was so inefficient, clinicians would often save up issues before paging so that when the physician called back, they could address multiple issues while on the phone. Now with the IP Tool, sending a message is very easy and convenient so there's no disincentive to initiating communication.

I think before things were saved up and then paged and given all at once. And now it's, like, there's a temptation just to send things all the time, like, small issues. [AH01 - Pharmacist]

I think that in the past... they would perhaps think, okay… I am now going to be locked to a phone until they call back and it could be up to ten minutes until they call back. So I think there isn't that disincentive anymore. [MD03 - Physician]

The IP Tool introduced the element of sending a lot of non-actionable or FYI type of messages. Much of this is information that previously would not have been sent to the physicians because

physicians would provide immediate feedback questioning why they were paged about this item. The system is more impersonal because of its asynchronous nature so the nurses are more open to sending potentially needless information.

> *Like, oh, FYI, these lab values came back… More just non-actionable items. Whereas before, I think-- if I got paged because a patient went for a scope, I think I would probably say why are you paging me? [MD03 - Physician]*

> *So sometimes we're just sending stuff and since a message is more indirect versus paging, you just start sending off. So I think all the nurses could say they're guilty of that, that sometimes they can be sending needless information. [RN03 - Nurse]*

One of the reasons the nurses are sending a lot of FYI messages relates back to the theme of accountability. The nurses may sometimes be unsure about an issue and so rather than taking a chance, they will just send the physician the issue, even though it may not be necessary.

> *So I can imagine for a lot of people who are in more novice roles, just to be safe and without hurting a person, that they will send information that may not be necessary. So I think that will sometimes translate into needless information on the physician's side. [RN03 - Nurse]*

An interesting fact is that the nurses acknowledge that receiving all of this additional, sometimes unnecessary, information can be frustrating to the physicians. Yet, they continue to send this information.

> *So I find that-- I can imagine for them it may be a little frustrating 'cause they're getting all these tidbits of information. [RN03 - Nurse]*

Perception of Urgency

One of the main features of the IP Tool is the ability to triage messages based on urgency. Urgent messages are sent immediately to the physicians to interrupt them of the issue and non-urgent messages are posted to the system to be addressed in batch when the physicians have time. This feature though has also been a source of a problem that is consistently brought up, the gap between what physicians and nurses perceive as an urgent issue.

The definition of an urgent issue is one of the initial problems as different people have different definitions of what urgent is. In many cases, an urgent issue is one that relates to life or death where the patient's condition is of concern. In other cases, an urgent issue is one where the patient's life is not at risk but the issue is time sensitive. So while one clinician feels the issue is urgent because it is time sensitive, the physician feels it is not urgent because delay to act will not impact the health of the patient.

> *Because I think in a hospital when you think of urgent you think of people like life and death. And it's not always the case that what your issue is life or death. But it's urgent as in, I need you to look at this now. [AH01 - Pharmacist]*

> *There's multiple people from the interdisciplinary team that have come to this meeting for this specific time. And then the doctors are not there. So to me that's urgent. But to them, it's not. It's not lifesaving but it's families that have come out of their busy schedule or they've taken time off work so they need to be somewhere at a particular time, too. [AH02 - Social Worker]*

Continuing on the idea of time, many things begin as non-urgent. Although non-urgent, they are still things that need to be addressed at some point. So there are many items that begin as non-urgent both from a clinical and time perspective. However, as time passes and the items don't get addressed, they become urgent because they have to get done.

> *If, you know, we've been waiting four days for the doctor to fill it out and they haven't, that becomes an urgent matter. So it may not start off as urgent but then the longer it goes on-- it becomes urgent. [AH02 - Social Worker]*

The scope of practice of the different disciplines plays a role in how urgent is defined. For one clinician, who is responsible for a single aspect of the patient's care, many things can be urgent or time sensitive because they need to work efficiently and complete their tasks. However, the physician is looking at the patient's bigger picture of issues and needs to prioritize these across all requests.

> *… like, a bed offer. For me that's a priority… that's a priority on my caseload, it's something that I have to drop everything I'm doing and run and go and deal with it right away, for them it's a little bit different, I think. [AH04 - Social Worker]*

> *So I think there's often practice differences as to what is important. So within their schema it's appropriate, but for us, it's kind of-- it's not really appropriate. [MD03 - Physician]*

Some have the experience that perception of urgency varies more between individuals within a discipline, rather than individuals across disciplines.

> *And I feel-- my experience is that it really varies between-- physician to physician or resident to resident. It's less so a difference between the professions. It's more so a difference between individuals. [RN02 - Nurse]*

While many of the problems relate to issues being sent inappropriately as urgent, there are times when an issue is sent through as non-urgent when it should be urgent. For example, the nurse didn't want to interrupt the physician so sent it as non-urgent.

> *…a family member or something that-- seems rather urgent and sometimes I get messages that are expired…It's kind of time sensitive. So if it's time sensitive, I'd actually rather get a page of it, even if it disrupts my day. [MD02 - Physician]*

The context of the situation plays a role in whether the issue is urgent or not. In most cases, physicians and nurses feel that when the patient wants to speak to the physician, this is a non-urgent issue. However, if the patient is upset and demanding to speak to the physician, then it becomes urgent.

> *It's situations where I have patients and/or their families that are physically standing in front of me and they're upset about something. Perhaps angry. And I'm hearing a lot of yelling right in front of me and that becomes urgent for me because I need some back up to deal with the situation that I often don't have the answer that only an M.D. can provide. [RN02 - Nurse]*

There is also a trend where urgent issues are sent more frequently right around shift change. The reason for this is that nurses are trying to get things done before their shift ends so that they don't hand over tasks to the next shift.

> *Like, at seven o'clock, for example, and the coumadin order is not there yet and I'm going home by seven thirty, I don't want to miss that coumadin. So it's, like, both for patient safety and my convenience. [RN09 - Nurse]*

> *So I'm waiting for a response regarding a medication that-- okay, I don't need to give it in 15 minutes, but I also don't want to pass it on to the next shift. So in that sense, I would like a response* now. *[RN02 - Nurse]*

Knowledge of Inappropriate Use

The ultimate goal is to provide the best possible care to the patient and all clinicians will strive towards this. Providing patient care involves clinical tasks that have a direct impact on the health of the patient, but it also involves tasks that may not. Even though the tasks do not have a direct impact on the health of the patient, they need to be completed nonetheless. Therefore, clinicians have exploited features of the IP Tool as a tactic to expedite responses from the physicians. One of the most common tactics is that clinicians use their knowledge of how the urgent and non-urgent features work in order to interrupt the physicians.

> *That's another thing. I kind of cheat and don't use the system properly. So every message I send I always send it as urgent because I want it go to the Blackberry. [AH01 - Pharmacist]*

> *I like that if you know how to use the urgent and non-urgent features effectively it generally works quite well in getting a response in a timely fashion. [RN02 - Nurse]*

Some nurses use a tactic where in the message they will paint a picture to make the issue sound urgent so that the physician will respond more quickly but in reality, the issue isn't really that much of a concern.

> *Some details will be sort of cherry picked to make the issue sound very dire and then when you go and actually see the patient it's a bit more subtle… So they know that we won't raise our heads unless we think it's important [MD03 - Physician]*

Since physicians receive context regarding what the issue is, they are now able to prioritize their tasks better. However, by knowing how urgent an issue is, this can also allow them to be less responsive without compromising the safety of the patient.

> *There's less of a responsibility or an obligation… like, you can get away with a lot more because you don't have to reply… that happens because, you know, we're prioritizing something that we're doing as being more important to us. [MD01 - Physician]*

General Gaps in the Tool or Workflow

One of the questions asked specifically in the interviews was what are some of the gaps in the tool or workflow that still need to be addressed. The results here will inform future work to continue enhancing the solutions implemented for improving communication on the medical wards. One feature that was felt would be beneficial is the option to send messages directly to the team's smartphone for FYI purposes that do not require a response. This is to communicate matters that are not clinically urgent but are time sensitive so the clinician wants the physician to know about it right away.

> *Probably having an option for an FYI that goes straight to the Blackberry, like, as opposed to having to say it's urgent. So a way of saying, you don't need to call me, you don't need to respond, but I want you to know about this right now. [AH01 - Pharmacist]*

A workflow issue that needs to be resolved relates to the management of medication orders. Nurses and pharmacists send physicians messages regarding medications but current hospital policy does not allow medication orders to be provided by email or text. These orders must be either entered through the hospital EPR system or provided by verbal order over the phone. However, many physicians simply respond to the electronic message providing an order, creating more work for the nurses and pharmacists as they can't accept these orders.

> *So I guess one of the biggest gaps is that-- 'cause a lot of your workflow, obviously is taking orders. And the primary barrier is that right now hospital policy is email, text, you cannot use as a replacement for a written order. [AH03 - Pharmacist]*

To reduce the number of disruptions or messages sent directly to the physicians' smartphone, the system posts non-urgent messages in the system that the physicians need to go check on a regular

basis. Unfortunately, this is a new workflow and physicians just find themselves too busy during the day to log into the system on a regular basis to check the non-urgent messages.

> *So I would be sending them something and then, like, hours would go by and nothing would happen if I put it non-urgent. And then I would call them and-- did you get my message? And they'd say, no, I never got it. 'Cause they hadn't checked the tool, right. So that's kind of an issue. [AH01 - Pharmacist]*

> *So I think it's a good system, but it's perhaps not working optimally right now because the physicians aren't checking the sign-out messages, the non-urgent. And then probably the side effect of that is the nurses are always sending things urgent. [MD04 - Physician]*

As described previously, there are times when physicians and nurses are not aligned when it comes to the urgency of an issue. In the current process, it is the initiator of the message or in most cases the nurse, who sets the priority. A gap in the IP Tool system is the lack of a standardized priority consensus. There is a need for clinicians to negotiate and implement message priority in addition to the ability for the physician to modify the priority.

> *I think the missing link is negotiating with the allied health as to the priority. So it may come to us as urgent 15 minutes, and we may look at it and say no, this is more of a-- this can either wait till the morning or it can wait a few hours. [MD03 - Physician]*

The 24/7 nature of patient care causes issues with communication because clinicians do not work 24/7. Often times, issues will occur that take time to address and so may cross over from one shift to another, or from one day to the next. If proper hand over has not occurred, duplication of effort can happen.

> *... what do you do about issues that do cross over shifts, right?... we'll get a re-pager of it, or if it's a new person on, but old issue, then it's-- that history isn't carrying over. [MD03 - Physician]*

Some of the IP Tool messages go directly to the physicians' smartphone and they have the ability to respond to these messages. However, the functionality on the smartphone is limited and is not meant to represent the capabilities one would expect from a handheld application.

> *I do find the BlackBerry, the interface is quite limited from that perspective… There's no way of marking, as far as I know, marking conversations that need to be closed or sort of a priority list. It's simply a file list of messages… So in that sense, it's kind of limited on the device and the information we receive. [MD03 - Physician]*

Each of the medical teams had a team smartphone that was carried by one physician on the team throughout the day. During the evenings and weekends, team coverage would change so a single physician could be covering patients on multiple teams. Therefore, there are times when a physician could be carrying multiple team smartphones, which can be a burden.

> *I would say another issue, just try to consolidate to one BlackBerry. So if I'm covering two teams, that it all go to one BlackBerry as opposed to having multiple BlackBerry's. [MD03 - Physician]*

Smartphone popularity has increased significantly over the past couple years and pretty much all the residents have their own personal smartphone. So when they are carrying one of the hospital provided smartphones, they are carrying multiple devices. The gap that exists is the ability to leverage the residents' personal smartphones to reduce costs for the hospital, but also allow residents to use the device of their choice.

> *I would love to just have my personal phone that could somehow have an encrypted server set up that I could use. Heck, we could probably write off part of our phone bill if we actually used it. [MD04 - Physician]*

There are various security features implemented to protect the privacy and security of patient information. Some of these features though can create additional steps to access for the clinicians, which can be a hindrance to their workflow and effectiveness at communicating.

> *Yeah, well, you know my whole issue with all of the difficulty we've had in the medical system implementing electronic records is I don't buy the confidentiality issues… I feel like the banking industry has been dealing with these same confidentiality issues for years, with potentially more sensitive information than whether my grandma has congestive heart failure… and I feel like they've been able to deal with it…[MD04 - Physician]*

Many of the communication tools that exist today, including email, instant messaging and social media, have the ability to notify users if their message has been read or not. This feature has a number of uses and benefits but is currently missing from the IP Tool.

> *I find it's a little hard sometimes, we don't know, again, like, if the doctors have read the message first of all. So it would be helpful to have kind of like a read-- or a read receipt on the system. [RN01 - Nurse]*

Currently, only the medical teams are provided with smartphone devices to facilitate communication. This allows the residents to receive and respond to messages while remaining mobile. However, when they respond to the messages, the other clinicians must still find an available computer to log into the system and check the message. They don't have the ability to check messages while on the go.

> *It would be extremely convenient, I think, if we-- if nurses carried the same-- a similar communication tool that we could communicate directly back and forth… Rather than, you know, checking-- constantly rechecking if I got a response. [RN02 - Nurse]*

> *I wish I knew when I have a message like, you know, some alert instead of always having to log into a computer…I feel like I'm always waiting at a computer, waiting for a response. And a lot of my time is wasted because of all the waiting… [RN04 - Nurse]*

The impersonal nature of the IP Tool and the ease with responding to messages can at times create problems. When physicians respond to messages, they close the loop from the system perspective but they may not actually have resolved the underlying clinical problem. Sometimes the responses do not provide much detail so can be frustrating to the other clinicians, especially if their issue is not resolved.

> *I think when physicians don't address the questions, sometimes they say things like "will do," or just "okay," but there's no follow up. Will do, like, and I'll check, the EPR for any orders and there's nothing there…So it's frustrating that way. [RN04 - Nurse]*

Quantitative: Perceptions of Urgency Survey

The perceptions of urgency survey comprised of 29 clinical messages extracted from the IP Tool at UHN that 14 physicians (MD) and 16 nurses (RN) ranked in terms of urgency. For each individual message, the odds ratio and confidence interval was calculated and an interpretation of the message is provided. This is followed with a comparison of the responses against what the nurse who originally sent the message indicated for urgency and type of response requested. The response that received the majority of responses for the physician and nurse columns was used for this comparison. Where the response was exactly equal for each choice, an X is indicated for both choices. In order to directly interpret the odds ratio, the value needs to be greater than 1. Therefore, the group who is expected to have the higher odds, the nurses in this case, needs to be represented in this first column of the 2x2 table in order to generate an odds ratio greater than 1. In some cases, the MDs had the higher odds so the columns were reversed for the odds ratio and confidence interval calculations. This section presents the highlighted messages and the detailed interpretation of each individual message is provided in Appendix C. The last part of this section describes the results obtained from the last two questions of the survey, which asked respondents to indicate how they would define an urgent issue and a non-urgent issue.

In order to characterize the respondents who participated in the survey, specific demographic information was asked and outlined in Table 6 below. In terms of experience, there was a good range across both disciplines. The majority of the physicians were in their first year of residency, typical of the General Internal Medicine (GIM) service as it is staffed predominantly with year 1 residents. There were also more experienced physicians, including 4 staff physicians. On the nursing side, there were both junior and senior nurses, the most junior having

1.5 years experience and the most senior having 35 years of experience. The physicians were asked to indicate the length of time they have worked on the GIM service in order to get a sense of their exposure to the communication process in place. Many of the advanced communication processes described in this study are unique to the GIM service and based on the responses, most had a fair amount of exposure to the processes. From the nursing side, the majority of the staff were full time so had regular exposure to the communication processes as well. The last question that was asked of both physicians and nurses related to their level of technology adoption. The majority of the nurses indicated they were usually one of the first to adopt technology, compared to only a couple on the physician side who also indicated this. The majority of physicians responded more on the side of being not as quick to adopt technology.

Table 6: Demographics of physicians and nurses

Demographics - Physicians	
Experience Level	
Year 1 resident	7
Year 2 resident	2
Year 3 resident	1
Staff Physician	4
GIM service length	
1- 2 months	3
3-4 months	5
> 4 months	2
Staff Physician	4
Technology Adoption	
First to adopt a technology	2
Second fastest to adopt a technology	4
Takes some time before adopting a technology	5
Adopts a technology only after the majority of people have done so	3
The last to adopt a technology	0

Demographics - Nurses	
Years Practicing Nursing	
1-3 Years	3
3-5 Years	5
5-10 Years	3
> 10 Years	5
Work Frequency	
Full time	15
Part time	1
Casual	0
Technology Adoption	
First to adopt a technology	8
Second fastest to adopt a technology	4
Takes some time before adopting a technology	4
Adopts a technology only after the majority of people have done so	0
The last to adopt a technology	0

Message Analysis

The following section will begin with providing some overall statistics on the responses received from the perceptions of urgency survey. Messages with key findings will then be presented and described.

Table 7: Significant Odds Ratio

OR significant	
Urgent	3
Timeframe for Response	7
Response Type	1

Table 7 provides a tally of the odds ratios (OR) where the confidence interval (CI) is significant or the range does not overlap 1.0. The distribution is shown across the urgent, timeframe for response, and response type tables. In total, only 11 out of the 87 2x2 tables had odds ratios that were significant. In addition, the sample size is too small to draw any reliable conclusions from the odds ratio.

Table 8: Majority Response for Urgency

Survey Respondents - Majority Response	
RN urgent, MD non-urgent	4
MD urgent, RN non-urgent	0
All agree	25

Table 8 uses data obtained from taking the response to the urgency question that accounted for the majority of the responses for each discipline. For example, if 3 MDs ranked the message as urgent and 11 MDs ranked the message as non-urgent, the majority response would be non-urgent. It tallies the responses and describes the distribution of messages where the nurses primarily ranked it as urgent and the physicians primarily ranked it as non-urgent (RN urgent, MD non-urgent), where the physicians primarily ranked it as urgent and the nurses primarily

ranked it as non-urgent (MD urgent, RN non-urgent), and where there was agreement on the urgency between the two groups (All agree). The data shows that for only 4 messages there was disagreement and this was when the nurses primarily felt the message was urgent and the physicians primarily felt the issue was non-urgent. In the other 25 messages, the two groups agreed on the urgency of the issue.

Table 9: Majority Response for Timeframe for Response

Majority Response for Timeframe for Response	
RN <= 59 mins, MD >= 60 mins	7
MD <= 59 mins, RN >= 60 mins	3
All agree	19

Table 9 uses the same approach as table 7 to obtain data on the majority response. It tallies the responses and describes the distribution of messages where the nurses primarily indicated a response was necessary within an hour and the physicians primarily indicated that a response in greater than an hour was adequate (RN <= 59 mins, MD >= 60 mins), where the physicians primarily indicated a response was necessary within an hour and the nurses primarily indicated that a response in greater than an hour was adequate (MD <= 59 mins, RN >= 60 mins), and where both groups were in agreement as to what the timeframe for response should be (All agree). From the data we see that for 10 of the messages, nurses and physicians disagreed on the appropriate timeframe for response. In 7 instances, the nurses felt a response was required in less than an hour and the MDs did not, and in 3 instances the physicians felt a response was required in less than an hour and the RNs did not. For the other 19 messages, both groups were in agreement as to the appropriate response timeframe.

Table 10: Majority Response for Type of Response

Majority Response - Type of Response	
RN synchronous, MD asynchronous	2
MD synchronous, RN asynchronous	0
All agree	27

Table 10 also uses the same approach as table 7 to obtain data on the majority response. This table tallies the responses and describes the distribution of messages where nurses felt it required a synchronous response but the physicians felt it only required an asynchronous response (RN synchronous, MD asynchronous), where physicians felt it required a synchronous response but the nurses felt it only required an asynchronous response (MD synchronous, RN asynchronous), and where both groups agreed on the type of response necessary (All agree). The data shows that for the most part, the nurses and physicians agreed on the type of response that was necessary (27 out of 29 messages). Only in 2 instances was there disagreement where the nurses felt the message required a synchronous response and the physicians felt an asynchronous response was adequate.

Table 11: Survey Respondents and Original RN Comparison for Urgency

Survey Respondents & Org RN Comparison for Urgency	
Org RN urgent, others non-urgent	7
Org RN non-urgent, other urgent	2
General disagreement	5
All agree	15

Table 11 also uses the data obtained from taking the response to the urgency question that accounted for the majority of the responses for each discipline and pairs it with the urgency the nurse who originally sent the message assigned to the message. This table shows the distribution of messages where the original nurse who sent the message marked it as urgent and the survey respondents all marked it as non-urgent (Org RN urgent, others non-urgent), where the original nurse marked the message as non-urgent and the survey respondents marked it as urgent (Org RN non-urgent, other urgent), where there was just general disagreement across the groups (General disagreement), and where all 3 groups agreed on the urgency (All agree). The data shows that for 7 of the messages, the original nurse sent it as an urgent request but both the

physician and nursing groups who completed the survey felt it was a non-urgent issue. For 2 of the messages, the original nurse sent it as a non-urgent request but both the physician and nursing groups who completed the survey felt it was an urgent issue. In total, there were 9 out of the 29 messages where the original nurse's indication of urgency was completely different from the indication of urgency from both the physician and nursing group's who completed the survey. In 15 out of the 29 messages, all groups were in agreement regarding urgency and in the remaining 5 messages there was just general disagreement.

Table 12: Survey Respondents and Original RN Comparison for Response Type

Survey Respondents & Org RN Comparison for Type of Response	
Org RN synchronous, Others asynchronous	3
Org RN asynchronous, Others synchronous	1
General disagreement	5
All agree	20

Table 12 uses the data obtained from taking the response to the response type question that accounted for the majority of the responses for each discipline and pairs it with the response type the nurse who originally sent the message assigned to the message. The table shows the distribution of messages where the original nurse who sent the message requested a synchronous response and the survey respondents all indicated an asynchronous response was adequate (Org RN synchronous, Others asynchronous), where the original nurse indicated an asynchronous response was adequate but the survey respondents indicated a synchronous response was necessary (Org RN asynchronous, Others synchronous), where there was just general disagreement across the groups (General disagreement), and where all 3 groups agreed on the type of response necessary (All agree). Similar to the results of table 9, all groups agreed on the response type necessary for most of the messages (20 out of 29). In 3 of the messages, the original nurse indicated that a synchronous response was necessary while the survey respondents felt an asynchronous response was adequate. There was one instance where the original nurse

indicated that an asynchronous response was adequate but the survey respondents felt it required a synchronous response and 5 messages where there was just general disagreement.

Highlighted Messages

This section will highlight selected messages from Appendix C to show the range of data obtained and where the detailed analysis uncovered some interesting findings.

Message 1
Issue: Family inquiry
Time Sent: 10:16pm
Details: Hi pt\'s daughter would like you to give her an update. Her # is xxx-xxx-xxxx. Thanks.

Table 13: Message 1 Odds Ratio – Highlighted Message

Urgency

	RN	MD	Total
Urgent	2	1	2
Non-urgent	14	14	28
Total	14	16	30

OR = 2.000
CI = 0.1622 to 24.6643

Timeframe for Response

	RN	MD	Total
< = 59 Mins	9	1	10
> = 60 Mins	7	13	20
Total	16	14	30

OR = 16.714
CI = 1.7422 to 160.3573

Response Type

	RN	MD	Total
Synchronous	3	1	4
Asynchronous	13	14	27
Total	16	15	31

OR = 3.231
CI = 0.2973 to 35.1115

Table 14: Message 1 Comparison – Highlighted Message

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

This message represents one of the most common requests from the nurse to the medical team, a family member wishing to speak to a physician. The confidence interval for the timeframe for response indicates the odds ratio is significant but we can't make any reliable conclusions since the sample size is too small. We see from table 13 that both nurses and physicians ranked the message as urgent 14 times (28/2) more than non-urgent, that it requires a response within an hour 2 times more (20/10), and that it requires a synchronous response about 7 times more (27/4) than asynchronous. From table 14 we see that when comparing to the request from the original nurse, everyone was in agreement with the urgency level and appropriate response type.

Message 3
Issue: Blood Glucose
Time Sent: 6:41pm
Details: just want to let you know about her BS. BS @ 0800= 13; 1200= 17.2, 1700=16.8!

Table 15: Message 3 Odds Ratio – Highlighted Message

Urgency

	MD	RN	Total
Urgent	1	1	2
Non-urgent	13	15	28
Total	14	16	30

OR = 1.154
CI = 0.0654 to 20.3422

Timeframe for Response

	MD	RN	Total
< = 59 Mins	8	4	12
> = 60 Mins	6	12	18
Total	14	16	30

OR = 4.000
CI = 0.8494 to 18.8368

Response Type

	MD	RN	Total
Synchronous	1	1	2
Asynchronous	14	15	29
Total	15	16	31

OR = 1.071
CI = 0.061 to 18.82

Table 16: Message 3 Comparison – Highlighted Message

Urgency

	RN	MD	Org
Urgent			X
Non-urgent	X	X	

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

Blood glucose or blood sugar level is monitored for every patient throughout the day. This is a classic FYI or for your information type of message. Table 15 shows the odds ratio is not significant but based on proportions, we see that both nurses and physicians feel this is a non-urgent issue that only requires an asynchronous response. When comparing to the original request from the nurse, table 16 shows that both the physician and nursing groups who completed the survey ranked the issue as non-urgent, while the original nurse sent it as an urgent request. All indicated that an asynchronous response was appropriate. One observation is that the message was sent at 6:41pm, close to the end of a 12-hour nursing shift.

Message 5

Issue: Pls clarify Nitro patch other
Time Sent: 1:00am
Details: According to order on EPR 0.4mg/hr Nitro patch due at 0205hrs and previous Nitro patch given on Oct 25th (at 0534hrs) scheduled to be removed at 0534hrs on Oct 26th so pt. will have 2 patches on at 0205hrs Pls R/A order

Table 17: Message 5 Odds Ratio – Highlighted Message

Urgency

	RN	MD	Total
Urgent	7	5	12
Non-urgent	9	9	18
Total	16	14	30

OR = 1.400
CI = 0.3208 to 6.1095

Timeframe for Response

	MD	RN	Total
< = 59 Mins	12	11	23
> = 60 Mins	2	5	7
Total	14	16	30

OR = 2.727
CI = 0.4364 to 17.0463

Response Type

	RN	MD	Total
Synchronous	4	2	6
Asynchronous	12	12	24
Total	16	14	30

OR = 2.000
CI = 0.3062 to 13.062

Table 18: Message 5 Comparison – Highlighted Message

Urgency

	RN	MD	Org
Urgent			X
Non-urgent	X	X	

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

This message relates to clarification of a medication order. The message was sent at 1:00am and the order needed to be resolved by 2:05am due to the scheduling of medication administration. Table 17 shows the odds ratios are not significant based on the confidence intervals but based on proportions, we see there is a lot of variation in responses for urgency and a response within an hour was chosen only about 3 times more than a response in greater than an hour. It's interesting to note that based on the message, the issue needed to be resolved within an hour, but not everyone indicated that the issue needed to be resolved within the hour. When comparing to the original request from the nurse in table 18, we see that both the physician and nursing groups who completed the survey proportionally ranked the issue as non-urgent, while the original nurse sent it as an urgent request. All agreed an asynchronous response was the most appropriate.

Message 13

Issue: code status
Time Sent: 12:19pm
Details: We need the patient\'s code status confirmed. The oncall wrote an order that patient is DNR but \"team 4 to confirm this order in am\". Unfortuntanly this means that the patient is full code until a proper order is written.Can you do this please? Thanks.

Table 19: Message 13 Odds Ratio – Highlighted Message

Urgency

	RN	MD	Total
Urgent	10	3	13
Non-urgent	6	11	17
Total	16	14	30

OR = 6.111
CI = 1.1983 to 31.1644

Timeframe for Response

	RN	MD	Total
< = 59 Mins	14	4	18
> = 60 Mins	2	10	12
Total	16	14	30

OR = 17.500
CI = 2.6665 to 114.8499

Response Type

	RN	MD	Total
Synchronous	7	2	9
Asynchronous	9	12	21
Total	16	14	30

OR = 4.667
CI = 0.7764 to 28.0485

Table 20: Message 13 Comparison – Highlighted Message

Urgency

	RN	MD	Org
Urgent	X		X
Non-urgent		X	

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

Code status (what to do if the patient stops breathing or their heart stops) is a sensitive and important issue, especially if the patient is nearing end of life. Table 19 shows the odds ratio for urgency and timeframe for response are significant based on the confidence intervals but again, not reliable due to the small sample size. However, based on the proportions, it shows that nurses and physicians were in disagreement regarding urgency and timeframe for response. Nurses predominantly felt this was an urgent issue requiring a response within an hour, where as the physicians predominantly felt this was a non-urgent issue and a response in greater than an hour was adequate. Table 20 shows a similar story for this message where the nurses who completed the survey and the nurse who originally sent the message indicated this was an urgent issue, compared to the physicians who completed the survey who felt this was a non-urgent issue.

Message 16
Issue: sodium 118
Time Sent: 5:49pm
Details: latest sodium from 1500 is 118.

Table 21: Message 16 Odds Ratio – Highlighted Message

Urgency

	RN	MD	Total
Urgent	11	8	19
Non-urgent	5	6	11
Total	16	14	30

OR = 1.650
CI = 0.3696 to 7.3653

Timeframe for Response

	MD	RN	Total
< = 59 Mins	11	11	22
> = 60 Mins	3	5	8
Total	14	16	30

OR = 1.667
CI = 0.3177 to 8.7439

Response Type

	RN	MD	Total
Synchronous	3	2	5
Asynchronous	13	12	25
Total	16	14	30

OR = 1.385
CI = 0.1963 to 9.7681

Table 22: Message 16 Comparison – Highlighted Message

Urgency

	RN	MD	Org
Urgent	X	X	
Non-urgent			X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

Table 21 shows that the odds ratios are not significant based on the confidence intervals but based on proportions, we see there wasn't a lot of agreement in responses regarding the urgency. For the timeframe for response, nurses and physicians indicated a response was required within an hour almost 3 times (22/8) more than a response was required in greater than an hour. For the response type, nurses and physicians indicated an asynchronous response 5 times (25/5) more than synchronous. Table 22 shows that while the physicians and nurses who completed the survey felt this was an urgent issue, the nurse who originally sent this message sent it as a non-urgent issue. One observation is that a sodium level of 118 is clinically quite low.

Message 21
Issue: blood sugar
Time Sent: 12:44am
Details: accucheck is now 12.3

Table 23: Message 21 Odds Ratio – Highlighted Message

Urgency

	MD	RN	Total
Urgent	1	1	2
Non-urgent	13	16	29
Total	14	17	31

OR = 1.231
CI = 0.07 to 21.6393

Timeframe for Response

	MD	RN	Total
< = 59 Mins	4	4	8
> = 60 Mins	10	12	22
Total	14	16	30

OR = 1.200
CI = 0.2374 to 6.065

Response Type

	MD	RN	Total
Synchronous	1	1	2
Asynchronous	14	15	29
Total	15	16	31

OR = 1.071
CI = 0.061 to 18.82

Table 24: Message 21 Comparison – Highlighted Message

Urgency

	RN	MD	Org
Urgent			X
Non-urgent	X	X	

Response Type

	RN	MD	Org
Synchronous			X
Asynchronous	X	X	

This message is an FYI message letting the team know what the patient's blood sugar level is. Table 23 shows that the odds ratios are not significant based on the confidence intervals and based on proportions, both nurses and physicians felt this issue was non-urgent, could be responded to in greater than an hour, and that an asynchronous response was adequate. When we look at Table 24 though, we see that the nurse who originally sent this message sent it as an urgent issue requiring a synchronous response. It is interesting because there must be some context not available from the message sent that influenced the original nurse to send it as urgent and requiring a synchronous response.

Definitions of Urgent and Non-urgent

The last questions on the perceptions of urgency survey asked the physicians and nurses to define an urgent and a non-urgent issue. The responses ranged from defining based on

timeframe a response is needed within, impact on the patient's health, and by providing a specific list of tasks or situations.

For an urgent issue, many of the physicians defined it based on timeframe. The most common response was an issue that had to be addressed within an hour or else the patient's health or safety would be compromised. Some defined the timeframe as requiring immediate attention, typically within 10 minutes or at most 30 minutes. Some of the tasks or situations that were defined as urgent included things that interfered with the flow of care, such as obtaining consent for a procedure or tasks related to discharging a patient. Others included patients complaining of pain, shortness of breath (SOB), decrease in level of consciousness (LOC), abnormal results/blood work, patient needing assessment, patient fell or medication related issues. From a nursing perspective, many also defined an urgent issue based on timeframe a response or action was required without compromising the health of the patient. The timeframes included from 10-30 minutes, 15-30 minutes, within 1 hour, and within 10-60 minutes. There were a lot of general comments indicating the need for immediate action or response, something needs to be done now etc. with no other specifics. Specific tasks or situations identified include the patient wanting to speak with the physician, chest pain, acute bleeding, decrease in LOC, issues with patient behaviour, assessment required, things that delay patient care such as consent for a procedure, abnormal results, medication orders and a number of others.

When it came to a non-urgent issue, physicians typically defined it as something that could be addressed in more than 1 hour without affecting the patient's health. Some defined the timeframe as greater than 30 minutes, could be addressed later in the day, and even the next

morning if the issue came through overnight. Some specific tasks or situations were identified and generally related to items that are for information purposes or to make the physician aware, doesn't warrant immediate interruption of the physician, and things that are unlikely to harm the patient or are not relevant to patient care ie. more administrative. From a nursing perspective, using timeframe was also a common way to define a non-urgent issue. Some of the responses included something that can wait several hours, can be addressed in more than 60 minutes, addressed in greater than 30 minutes but less than 2 hours, and can be addressed in 4-6 hours. Other responses included things that are information only, don't need immediate action, a response is needed but not immediately, things that aren't affecting care or the patient's well being, family requests, and a few other task related situations.

In general, there was variation across disciplines and within disciplines as to how an urgent and a non-urgent issue is defined. A variety of timeframes for a required response, impact on the patient's health or safety, and numerous tasks and situations were used in the definitions. None of the respondents provided suggestions on how urgency should actually be defined. This provides a clear indication that use of the general terms of "urgent" and "non-urgent" to define workflow and processes should be avoided.

Chapter 6: Discussion and Conclusion

Discussion

The purpose of this study was to determine how the introduction of the IP Tool impacted clinical communication on the medical wards, uncover some of the new issues caused by the technology and to further explore the gap between what physicians and nurses perceive as an urgent issue. This was accomplished through the use of semi-structured interviews and a perception of urgency survey. The semi-structured interviews uncovered 5 main themes highlighting key issues that need to be resolved, which include accountability, increase in communication, perceptions of urgency, knowledge of inappropriate use, and other gaps in the tool or workflow. The perceptions of urgency survey uncovered that there is usually little disagreement between physicians and nurses on the clinical urgency of an issue. The disagreement in urgency is primarily regarding what timeframe the issue needs to be addressed in, particularly for issues that impact clinician workflow and not patient safety. The results of the study also highlighted some overarching themes related to the work to improve clinical communication:

1. This work highlights how complex clinical communication is and that some of the main problems can't be resolved with technology. In fact, the technology can accentuate the interprofessional issues that are at the root of many of the problems so it is important to focus on the "human" element of communication.
2. While numeric pagers have been identified previously as a primary source of the communication problems, the work to improve clinical communication is not only about pager replacement. It requires a fundamental shift in how clinicians communicate so

organizations must recognize that a pager replacement strategy alone will not be effective.

3. The technology implemented resolved many of the previous communication problems but because the fundamental nature of how clinicians communicated was changed, new problems were created that need to be addressed. Therefore, efforts to improve clinical communication must be ongoing and be part of a culture of continuous quality improvement.

Key Findings from Semi-Structured Interviews

The 5 main themes that emerged from the data included accountability, increase in communication, perceptions of urgency, knowledge of inappropriate use, along with other general gaps in the tool or workflow.

Accountability

Facilitating communication through electronic messages now meant the messages were stored and therefore retrievable. This fact is now blurring the lines between what is considered communication and what is considered clinical documentation. Before these electronic tools were introduced, much of this communication was informal and facilitated by phone, in person discussions, or through scraps of paper that were thrown out. Some of the discussions were very frank, such as informing a colleague that a patient's family members were quite aggressive. Much of the value of the communication tools was that these types of frank comments could be communicated effectively but were not included as part of the patient record. The culture is now shifting where this electronic information is now being used as a record of the communication that occurred, whether it is officially part of the patient record or not. These electronic

communication tools are now being leveraged to create accountability as a mechanism to improve patient care. Whether this is a step in the right direction or not is to be determined.

Increase in Communication

The intention of the IP Tool was to make it easier for clinicians to communicate with one another in order to improve the effectiveness and efficiency of coordinating patient care. To some extent, the initiative was too successful in accomplishing this and created an unintentional consequence where the amount of communication, and therefore the number of interruptions, increased. The clinicians who were primarily contributing to this increase in communication were the younger, more junior nurses. The fact that these nurses are part of the generation that grew up with technology, the fact that the tools implemented removed many of the barriers seen previously with paging and therefore made communicating very easy, combined with the fact that these nurses were less experienced and were often unsure of themselves, all amounted to more messages being sent to the physicians. The element of accountability also contributed to the increase in communication because many of the more junior nurses, when they were unsure of themselves, would eliminate any risk by sending the medical team a message so that they were aware, to some extent transferring the responsibility to the physician. While more communication isn't necessarily bad, there is a balance that must be found. If the quality of the messages remains high and is improving communication and patient care, the increase in communication is warranted. If the messages provide little value and are seen as a way of absolving oneself of clinical responsibilities, this will not improve patient care nor will it help the clinician mature as a professional in their respective discipline.

Perception of Urgency

In healthcare, the concept of triaging is prioritizing the care patients receive based on urgency or the severity of their condition. Therefore, in order to reduce interruptions, the IP Tool utilized the concept of triaging in an attempt to allow non-urgent issues to be addressed in a less interruptive fashion. Unfortunately, this approach was at times problematic and one of the common complaints from the physicians was that nurses were sending what they felt were non-urgent issues as urgent requests. The root of this problem seems to be that there is a gap between what physicians and nurses perceive to be an urgent issue. The complexity of this problem prompted the development of the perceptions of urgency survey to explore this issue further, another major component of this study.

Knowledge of Inappropriate Use

The IP Tool provided features designed specifically to reduce disruptions but some clinicians leveraged these features and employed other tactics using the electronic nature of the messages in order to improve individual productivity. Clinicians would send physicians messages marked as urgent not because they felt the issue was clinically urgent, but because they knew these messages went directly to the team smartphone and interrupted the physician. They essentially wanted the physicians to address the problem right away, often because they were about to end their shift. On the physician side, since they received the messages electronically and could assess the urgency of the issue, there were times when they purposely ignored messages because they knew a lack of response would not impact the safety of the patient. This prompted some

nurses to use a tactic where they would formulate a message with certain key phrases that made the issue sound more urgent than it actually was in order to elicit a quicker response from the physicians. This is an aspect of interprofessional collaboration that relates to the theme of perceived urgency that will take a shift in culture to resolve.

Gaps in the Tool or Workflow

One feature that the nurses, pharmacists, and social workers identified as important is the ability to send FYI messages that immediately interrupts the physicians but does not require a response. While the value is there for some clinicians, this needs to be balanced because this will increase the number of interruptions the physicians receive. Many of the interruptions were a result of physicians not going into the system to check non-urgent messages so this signals the need for a mobile application. Hospital policy currently does not allow the provision of any type of orders through electronic means, although verbal orders are allowed. Therefore, this created workflow issues for the pharmacists as their issues were predominantly for clarifying medication orders. Although less safe, it was more efficient for the pharmacist to talk with the physician on the phone and take verbal orders. Other gaps and issues identified make it clear that continued work to improve these communication tools is necessary.

Key Findings from Perceptions of Urgency Survey

Interestingly, although there was a lot of feedback from physicians that nurses were sending non-urgent issues through as urgent, the results from the survey showed that the nurses and physicians were predominantly in agreement when it came to ranking a message as urgent or not. However, a second analysis was done to compare the responses from the physicians and nurses who completed the survey with the response from the original nurse who sent the message. This

painted a different picture where all clinicians were in agreement only about half the time (15/29 messages). The original nurse's response completely differed from the survey responses (both physicians and nurses) for 9 of the 29 messages, and in 5 cases there was just general disagreement. When survey respondents were asked to define an urgent issue and a non-urgent issue, the responses were quite varied both within the respective disciplines and across disciplines. Urgency was defined using timeframe, whether or not the patient's health or safety would be compromised, whether or not the issue interfered with the flow of care, and through the listing of specific tasks or situations. If we triangulate the information from the survey with the information from the semi-structured interviews, we find that physicians and nurses predominantly agree on the clinical urgency of an issue, the disagreements are with the time sensitivity of an issue. In many cases, messages were sent through as urgent because the clinician wanted the physician to address the issue right away since it was nearing the end of their shift. There are many instances when the issue isn't clinically urgent but other factors, such as when a patient's family is waiting to speak to the physician, that an issue is urgent because it is time sensitive. There are also non-urgent issues that if unaddressed for a long time, become urgent because ultimately they still need to be addressed. Many times, the context surrounding the situation at the time has a major impact on the perceived urgency, which was a limitation of the survey as it did not provide the real time context.

It's Not a Pager Replacement Strategy

Technology has obviously had an impact on all aspects of our lives and the potential benefits for improving patient care are quite clear. However, it is very important to recognize that technology is an enabler and not a solution in itself. Clinical communication is very complex and while introducing technology has many benefits, it is the processes enabled through

introducing the technology that actually improves communication. So while part of the work to improve communication was replacing pagers with smartphones, it was the new communication processes enabled by the smartphones and other technologies that provided the value. There are also interprofessional and interpersonal aspects to communication that need to be addressed that technology alone can't address and in fact, magnify the issues. Therefore, organizations must realize that improving communication does not involve developing a pager replacement strategy alone, it requires effort to fundamentally change how clinicians communicate with one another. Much of this work will require focus on improving interprofessional collaboration or the "human" element of communication.

Resolving Issues with Communication Requires Continuous Quality Improvement

Work in the area of clinical communication began with understanding the problem and identifying what was at the root of the issues. This led to initiatives to implement technology that enabled new communication processes that transformed how clinicians communicated with one another on the medical wards. These initiatives were evaluated through quality improvement activities and more advanced technology solutions and processes were developed, implemented, and again evaluated. This work in the Greater Toronto Area (GTA), which forms the foundation of this study, began over 6 years ago. There is no doubt clinical communication on the medical wards is very complex and as we make changes to the processes, the culture changes and new problems are inevitably going to arise. Therefore, organizations embarking on the journey to improve clinical communication must do so within a culture of continuous quality improvement because issues with communication will continually evolve, and therefore so must the solutions to address them.

Limitations of Study

The primary limitation of this study was that the perception of urgency survey was not able to provide the context surrounding the issue. Aspects such as knowledge of the patient's overall status, trend of results, demeanour of the patient all have an impact on the urgency of an issue. The ideal approach would be to perform this analysis in real time where immediate feedback from the nurse and physician at the time the message was sent would provide the context necessary, but the resources to do this were not available for the scope of this thesis. The sample size for the survey wasn't large enough for the odds ratios to be statistically significant, which impacted the analysis. However, for the purposes of exploring the issue in more detail and using the data to triangulate results with the semi-structured interviews, it served its purpose. This study also did not look at clinical outcomes, which will be an important aspect to consider in future evaluations.

Conclusion and Next Steps

Addressing issues with clinical communication on the medical wards is complex and technology interventions alone will not resolve the issues. While previous issues stemmed from the reliance on pager technology, this work is not about pager replacement, it is a fundamental shift in how clinicians communicate. We will therefore start focussing our attention on working with our frontline clinicians to improve interprofessional collaboration and address the "human" element of communication in healthcare. There are cultural and policy related issues that need to be addressed along with new issues that have surfaced with the shift to electronic communication. We will work with hospital administrators to change policy so that orders can be facilitated through electronic means and integrate seamlessly with our computerized order entry systems to improve workflow. Consensus on classifying the urgency of issues will be obtained with an

interprofessional group of clinicians and this logic will be built into the tools to guide our clinicans. There will also be the ability to negotiate the urgency of messages. In order to accommodate the mobile clinician, a full featured mobile application will be built. It is also important that work to improve clinical communication occur within a structure of continuous quality improvement since it is likely new issues will need to be addressed as we apply these next steps.

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Appendix A

Interview Questions

Nursing, Pharmacy and Allied Health Interview Questions

1. Is communication that requires a conversation being facilitated by text through the IP Tool? Examples.
2. Is the loop on communication being closed ie. are you getting the feedback you require?
3. Do you feel residents are misinterpreting your messages or not understanding what your request is? Ie. are the responses to your requests through the IP Tool meeting your information needs?
4. Are you sending communication regarding items you wouldn't previously have paged about? Examples.
5. Do you feel there is a gap between what nurses, pharmacists, and allied health feel (ask specific to the discipline) are important and what physicians feel are important? Examples.
6. Do you feel the process for implementing the IP Tool was effective? Ie. Has there been too much focus on the technology itself as opposed to the process? Were you properly engaged?
7. What gaps with the process for communication still exist?
8. What are your suggestions for improving communication, both from a technology and a process perspective?

Physician interview questions

1. Is communication that requires a conversation being facilitated through the IP Tool? Examples.
2. Is the loop on communication being closed ie. is feedback being provided to all requests that you receive?
3. Do you feel you fully understand all of the requests that you receive through the IP Tool?
4. Are you receiving communication regarding items you wouldn't previously have been paged about? Examples.
5. Do you feel there is a gap between what physicians feel is important and what the nurses, pharmacists, and allied health feel is important? Examples.
6. Do you feel the process for communication has been adequately addressed? Ie. Has there been too much focus on the technology itself as opposed to the process?
7. What gaps with the process for communication still exist?
8. What are your suggestions for improving communication, both from a technology and a process perspective?

Appendix B:

Additional Themes from Qualitative Analysis

The results of the semi-structured interviews described in chapter 5 focussed on 5 main themes. During the transcript review and coding process, there were actually more sub-themes that emerged from the data. In the results section, these sub-themes were incorporated as part of the 5 main themes but the sub-themes are outlined here to provide additional perspective.

Urgent because it's end of shift

One of the main reasons messages were being sent through as urgent even though the issue wasn't clinically urgent was that it was close to the end of the clinician's shift. They wanted to get the issue addressed before they left so the task wasn't handed over to their colleague on the next shift.

> *I've had a patient who-- her NGT got blocked and she needed to receive medication for- to control her heart rate. And this is at the end of my shift. So I paged them as urgent and I kept paging them. [RN11 – Nurse]*
>
> *But in terms of a shift change, for example, I need a response now… 'cause that is a lot of times where it is that-- although it's not clinically urgent it's time sensitive. So it is urgent. [RN02 – Nurse]*
>
> *I do also notice that around changeover time, issues that have been sort of chronically-- or have-- pre-existing, become urgent issues. [MD01 – Physician]*

Urgent to get immediate response

Another reason for sending messages through as urgent even though the issue wasn't clinically urgent was for personal productivity. The clinician didn't want to wait and potentially forget

about the issue so they would send it as urgent in hopes the physicians would address the issue right away.

> *Everybody puts urgent because we want the response immediately. Otherwise, if you put non-urgent, the doctors will just drag and drag and will forget to respond to the issue. So everybody puts in urgent. [RN09 – Nurse]*

> *but sometimes the turnaround time to-- even though it's not urgent, the turnaround time could be pretty extensive. So we tend to just do urgent anyways 'cause we need answers right now. [RN03 – Nurse]*

Tool is convenient or impersonal

One of the reasons for the increase in communication is the fact that the new electronic tool is very accessible. The barriers to paging have been removed and since the tool is more impersonal, clinicians don't hesitate and don't feel bad about sending through insignificant information.

> *We have a lot of young nurses. Even young doctors who want to know these little things, insignificant things, right... And you provide them with this very accessible form of communication and here you are. [RN09 - Nurse]*

> *But I guess through the web paging system, it's-- you don't feel as bad paging them for little things or just to give them lab values or something. [RN11 - Nurse]*

Sending information they previously wouldn't have

Given the previous barriers to paging, many issues would not have been communicated and the nurses would just address it themselves. Now, with the accessibility of the electronic tool, they are sending information and issues they previously wouldn't have.

> *So some stuff that you may have not wanted to call for before 'cause it's kind of silly, you can just send it information-only. So they're aware, but you don't have to, like, call them and call back and take that time, that dialogue time. [RN03 - Nurse]*

Changing of Tylenol, you know, I think before with the old paging system we'd probably just change it ourselves if it's the same dosage… whereas now it's just so quick and easy to send them a quick note and just so the EPR's already updated. [RN04 - Nurse]

I think that in the past… they end up hanging around by a phone. So it's a bit more cumbersome for them… they don't get the same feedback and they don't have the same barriers to entry that there was. So a lot of the messages will be-- I would say a good 50 percent of the messages can be-- would be more, I think, above and beyond. So I think there isn't that disincentive anymore. [MD03 - Physician]

I think the biggest ones are just procedural things on the ward. So, you know, patient left for scope, there's nothing-- no act-- like, all the non-action ones… Whereas before, I think-- if I got paged because a patient went for a scope, I would be-- I think I would probably say why are you paging me? [MD03 - Physician]

Change in practice

The new electronic tool has enabled clinicians to work in different ways and improve their personal productivity.

The only thing that's better about it is if I do send them the FYI's with respond within I.P. tool they can say-- they can write something back if they want to. Versus before they would have had to call me and sometimes if they're busy they wouldn't call me. [AH01 - Pharmacist]

Family meetings, so that happens quite often is when I'm waiting for them to come to a family meeting. It's pre-arranged, everyone knows the time. And then sure enough, they're not here. So I'd have to page and page and page, so at least with web paging I can just send one page out and they get it immediately and I know that they've received it. [AH02 – Social Worker]

The electronic tool speeds up the process of getting certain issues addressed, again, improving their personal productivity.

And sending it through EPR, it actually speeds up the process because then it's actually stamped and you see it and it's there. So you know that it's been received. And they can't say, well, I never knew about it or-- so with respect to a page they could always say they didn't get it. So this way I know that they've gotten it. [AH02 – Social Worker]

The electronic tool provides context so the physicians are able to assess the urgency of the message and prioritize their work.

> *I think the key thing is that the information coming to us is text and it describes the issue. So we can, at our end, then Dee can make a call as to what the priority is. [MD03 - Physician]*

> *What I've noticed as compared to the old paging system we had is that doctors seem to be calling me back less frequently than I request. [RN02 - Nurse]*

Some clinicians now use the electronic tool to create a record of the conversations they had with the nurse.

> *'Cause I use it now as a reference. So even if I have a phone conversation with a nurse, based on a message that we've had, I will record what we said and send it. [MD03 – Physician]*

> *I use the tool simply just to go back and see the communication. 'Cause it's, you know, there's situations where I felt it took quite a long time to get an appropriate response. And so in my doc-- paper documentation I'm saying at this time I requested this. But it was at this time that I even got a response. [RN02 - Nurse]*

The electronic tool is patient centred so all communication related to the patient is centralized.

The visibility of the communication reduces the amount of duplicated efforts.

> *Actually, before we would be calling them every so often. A nurse would have a patient and she'd ask you to call… and you're not even aware that somebody else called the doctor about the same patient. So they were getting double messages or two different things happening at the same time… But now I find that when you email them you have everything there and you just, you know, email them once or so. [RN06 - Nurse]*

One common inappropriate usage of the tool was to provide orders. Hospital policy doesn't allow orders to be taken over email or text and so this was a misunderstanding that came up often.

> *I wanted them to cancel one dosage and reenter a different dosage… they would respond to my message, yes, give this new-- "x" new dosage and I'd say, sure, but I-- I would page back yes but I need you to enter it… I'm, like, I can't give it unless you enter it in EPR. [RN02 - Nurse]*

Diminished Quality of Messages

One drawback of the electronic tool was that the richness or quality of the communication was often diminished. Texting was easier so often times a quick message or response would be

provided but the detail would be left out. This often led to more back and forth that actually took more time.

> *Yeah, there is a possibility because our tendency is when you send messages, we kind of send the message in a text form as opposed to a paragraph or a story, right. So we might abbreviate it so much that it could be misinterpreted. [RN09 - Nurse]*

> *A lot of the times, too, there have been events where I just needed a simple question answered… sometimes they say things like "will do," or just "okay," but there's no follow up… And then I feel like I have to keep sending a page, like, please do what you said you were going to do. And then just-- will do. So it's frustrating that way [RN04 - Physician]*

> *So although I'm getting responses quicker, it's not always as detailed as I'd like. It's still-- sometimes the fashion that people text message each other and I just get a yes or no answer and I need more information. [RN02 - Physician]*

Appendix C:

Perceptions of Urgency Survey Analysis

Message 1
Issue: Family inquiry
Time Sent: 10:16pm
Details: Hi pt\'s daughter would like you to give her an update. Her # is xxx-xxx-xxxx. Thanks.

Table 25: Message 1 Odds Ratio

Urgency

	RN	MD	Total
Urgent	2	1	2
Non-urgent	14	14	28
Total	14	16	30

OR = 2.000
CI = 0.1622 to 24.6643

Timeframe for Response

	RN	MD	Total
< = 59 Mins	9	1	10
> = 60 Mins	7	13	20
Total	16	14	30

OR = 16.714
CI = 1.7422 to 160.3573

Response Type

	RN	MD	Total
Synchronous	3	1	4
Asynchronous	13	14	27
Total	16	15	31

OR = 3.231
CI = 0.2973 to 35.1115

This message represents one of the most common requests from the nurse to the medical team, a family member wishing to speak to a physician. The confidence interval for the timeframe for response indicates the odds ratio is significant but we can't make any reliable conclusions since the sample size is too small. We see that both nurses and physicians ranked the message as urgent 14 times (28/2) more than non-urgent, that it requires a response within an hour 2 times more (20/10), and that it requires a synchronous response about 7 times more (27/4) than asynchronous.

Table 26: Message 1 Comparison

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

When comparing to the request from the original nurse, everyone was in agreement with the urgency level and appropriate response type.

Message 2
Issue: Pt complains chest tightness
Time Sent: 9:20am
Details: Good morning, pt complains of having chest tightness and tummy pain. bP-129/59, hR-83, Spo2-90-94 on r/a. rr-25. Chest tightness resolve by taking deep breath and puffer temporarily. Please come to assess pt. Thank you!

Table 27: Message 2 Odds Ratio

Urgency

	RN	MD	Total
Urgent	15	12	27
Non-urgent	1	2	3
Total	16	14	30

OR = 2.500
CI = 0.2016 to 30.999

Timeframe for Response

	RN	MD	Total
< = 59 Mins	16	14	30
> = 60 Mins	1	1	2
Total	17	15	32

OR = 1.143
CI = 0.0652 to 20.02

Response Type

	RN	MD	Total
Synchronous	12	10	22
Asynchronous	4	4	8
Total	16	14	30

OR = 1.200
CI = 0.2374 to 6.065

This message represents a patient complaining of chest pain and this typically warrants a more urgent response. Again, the confidence intervals are not significant so we can't draw conclusions on the difference between nurses and physicians. However, we do see that proportionally, both groups ranked the message as urgent 9 times (27/3) more than non-urgent, all indicated that a response within an hour was necessary, and most felt an asynchronous response was required.

Table 28: Message 2 Comparison

Urgency

	RN	MD	Org
Urgent	X	X	X
Non-urgent			

Response Type

	RN	MD	Org
Synchronous	X	X	X
Asynchronous			

When comparing to the original request from the nurse, everyone was in agreement with the urgency level and appropriate response type.

Message 3
Issue: Blood Glucose
Time Sent: 6:41pm
Details: just want to let you know about her BS. BS @ 0800= 13; 1200= 17.2, 1700=16.8!

Table 29: Message 3 Odds Ratio

Urgency

	MD	RN	Total
Urgent	1	1	2
Non-urgent	13	15	28
Total	14	16	30

OR = 1.154
CI = 0.0654 to 20.3422

Timeframe for Response

	MD	RN	Total
< = 59 Mins	8	4	12
> = 60 Mins	6	12	18
Total	14	16	30

OR = 4.000
CI = 0.8494 to 18.8368

Response Type

	MD	RN	Total
Synchronous	1	1	2
Asynchronous	14	15	29
Total	15	16	31

OR = 1.071
CI = 0.061 to 18.82

Blood glucose or blood sugar level is monitored for every patient throughout the day. This is a classic FYI or for your information type of message. The odds ratio is not significant but based on proportions, we see that both nurses and physicians feel this is a non-urgent issue that only requires an asynchronous response.

Table 30: Message 3 Comparison

Urgency

	RN	MD	Org
Urgent			X
Non-urgent	X	X	

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

When comparing to the original request from the nurse, both the physician and nursing groups who completed the survey ranked the issue as non-urgent, while the original nurse sent it as an urgent request. All indicated that an asynchronous response was appropriate. One observation is that the message was sent at 6:41pm, close to the end of a 12-hour nursing shift.

Message 4
Issue: Please order Oral Balance Gel
Time Sent: 2:47pm
Details: I was unable to assess swallowing today. RR was too high. His mouth is ++dry. Please order Oral Balance Get from pharmacy. It is an artificial saliva that is often ordered by Palliative. Don\'t order MoiStir. It is bad stuff.

Table 31: Message 4 Odds Ratio

Urgency

	RN	MD	Total
Urgent	2	1	3
Non-urgent	14	13	27
Total	16	14	30

OR = 1.857
CI = 0.15 to 22.9984

Timeframe for Response

	RN	MD	Total
< = 59 Mins	5	4	9
> = 60 Mins	11	10	21
Total	16	14	30

OR = 1.136
CI = 0.2366 to 5.4574

Response Type

	MD	RN	Total
Synchronous	1	1	2
Asynchronous	14	16	30
Total	15	17	32

OR = 1.143
CI = 0.0652 to 20.02

This message relates to a medication order and the confidence intervals for the odds ratios are not significant. Based on proportions, we see that both nurses and physicians ranked the message as non-urgent 9 times more than urgent, required a response in greater than 1 hour 3 times more than less than an hour, and all indicated that an asynchronous response was adequate.

Table 32: Message 4 Comparison

Urgency

	RN	MD	Org
Urgent			X
Non-urgent	X	X	

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

When comparing to the original request from the nurse, both the physician and nursing groups who completed the survey ranked the issue as non-urgent, while the original nurse sent it as an urgent request. All agreed an asynchronous response was the most appropriate.

Message 5

Issue: Pls clarify Nitro patch other
Time Sent: 1:00am
Details: According to order on EPR 0.4mg/hr Nitro patch due at 0205hrs and previous Nitro patch given on Oct 25th (at 0534hrs) scheduled to be removed at 0534hrs on Oct 26th so pt. will have 2 patches on at 0205hrs Pls R/A order

Table 33: Message 5 Odds Ratio

Urgency

	RN	MD	Total
Urgent	7	5	12
Non-urgent	9	9	18
Total	16	14	30

OR = 1.400
CI = 0.3208 to 6.1095

Timeframe for Response

	MD	RN	Total
< = 59 Mins	12	11	23
> = 60 Mins	2	5	7
Total	14	16	30

OR = 2.727
CI = 0.4364 to 17.0463

Response Type

	RN	MD	Total
Synchronous	4	2	6
Asynchronous	12	12	24
Total	16	14	30

OR = 2.000
CI = 0.3062 to 13.062

This message relates to clarification of a medication order. The message was sent at 1:00am and the order needed to be resolved by 2:05am due to the scheduling of medication administration. The confidence intervals indicate the odds ratios are not significant and based on proportions, we see there is a lot of variation in responses for urgency and a response within an hour was chosen only about 3 time more than response in greater than an hour. It's interesting to note that based on the message, the issue needed to be resolved within an hour, but not everyone indicated that the issue needed to be resolved within the hour.

Table 34: Message 5 Comparison

Urgency

	RN	MD	Org
Urgent			X
Non-urgent	X	X	

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

When comparing to the original request from the nurse, both the physician and nursing groups who completed the survey proportionally ranked the issue as non-urgent, while the original nurse sent it as an urgent request. All agreed an asynchronous response was the most appropriate.

Message 6

Issue: Please remember to come write order for sitter until reassessed
Time Sent: 5:31pm
Details: Pt once again exhibiting odd behaviour. Agitated at times when trying to be redirected by staff. Continues to hover around washroom, with paper in hand trying to wipe washroom wall. Gait continues to be unsteady. We have requested a sitter, but please write order when you can.

Table 35: Message 6 Odds Ratio

Urgency

	MD	RN	Total
Urgent	1	1	2
Non-urgent	13	16	29
Total	14	17	31

OR = 1.231
CI = 0.07 to 21.6393

Timeframe for Response

	RN	MD	Total
< = 59 Mins	6	4	10
> = 60 Mins	10	10	20
Total	16	14	30

OR = 1.500
CI = 0.3218 to 6.9909

Response Type

	MD	RN	Total
Synchronous	3	3	6
Asynchronous	11	13	24
Total	14	16	30

OR = 1.182
CI = 0.1972 to 7.0817

The confidence intervals indicate that the odds ratios are not significant but proportionally, both physicians and nurses ranked the message as urgent, does not require a response within an hour, and that an asynchronous response was adequate.

Table 36: Message 6 Comparison

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

Everyone agreed that this was a non-urgent issue where an asynchronous response was appropriate.

Message 7
Issue: ccac form
Time Sent: 2:53pm
Details: CCAC application has been initiated for PSW, nursing for monitoring blood sugars and administering insulin, and palliative care services. Please complete physician section for administration of insulin. Thank you

Table 37: Message 7 Odds Ratio

Urgency

	RN	MD	Total
Urgent	3	1	4
Non-urgent	13	14	27
Total	16	15	31

OR = 3.231
CI = 0.2973 to 35.1115

Timeframe for Response

	RN	MD	Total
< = 59 Mins	4	1	5
> = 60 Mins	12	14	26
Total	16	15	31

OR = 4.667
CI = 0.4572 to 47.6316

Response Type

	MD	RN	Total
Synchronous	1	1	2
Asynchronous	14	15	29
Total	15	16	31

OR = 1.071
CI = 0.061 to 18.82

The confidence intervals indicate that the odds ratios are not significant but proportionally, both physicians and nurses ranked the message as urgent, does not require a response within an hour, and that an asynchronous response was adequate.

Table 38: Message 7 Comparison

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

Everyone agreed that this was a non-urgent issue where an asynchronous response was appropriate.

Message 8
Issue: Discharge
Time Sent: 9:11pm
Details: Pt requesting to be discharged now.

Table 39: Message 8 Odds Ratio

Urgency

	RN	MD	Total
Urgent	11	9	20
Non-urgent	5	5	10
Total	16	14	30

OR = 1.222
CI = 0.2671 to 5.5924

Timeframe for Response

	RN	MD	Total
< = 59 Mins	13	11	24
> = 60 Mins	3	3	6
Total	16	14	30

OR = 1.182
CI = 0.1972 to 7.0817

Response Type

	MD	RN	Total
Synchronous	9	10	19
Asynchronous	5	6	11
Total	14	16	30

OR = 1.080
CI = 0.2434 to 4.7912

This message relates to a patient wanting to immediately leave the hospital. The odds ratio is not significant and proportionally, we see a bit of variance in the responses. It's likely because there aren't a lot of details in this message, particularly the reason why the patient is requesting to be immediately discharged. Therefore, the majority of respondents indicated there should be a response within 1 hour, likely to get more details.

Table 40: Message 8 Comparison

Urgency

	RN	MD	Org
Urgent	X	X	
Non-urgent			X

Response Type

	RN	MD	Org
Synchronous	X	X	X
Asynchronous			

For this message, the nurse who originally sent this message sent it as a non-urgent issue requiring a synchronous response. The majority of the physicians and nurses who completed the survey felt this was an urgent issue requiring a synchronous response.

Message 9
Issue: DVT prophylaxis?
Time Sent: 12:44am
Details: Hi. Would you be able to tell me why pt is not on any DVT prophylaxis? (i.e Heparin SC) His extremeties remained quite edematous as per condition, and chairfast/require max assist from 2 person to just transfer from bed to chair/commode.

Table 41: Message 9 Odds Ratio

Urgency

	RN	MD	Total
Urgent	3	1	4
Non-urgent	13	13	26
Total	16	14	30

OR = 3.000
CI = 0.2748 to 32.7477

Timeframe for Response

	RN	MD	Total
< = 59 Mins	7	1	8
> = 60 Mins	9	13	22
Total	16	14	30

OR = 10.111
CI = 1.0539 to 97.0061

Response Type

	RN	MD	Total
Synchronous	6	1	7
Asynchronous	10	13	23
Total	16	14	30

OR = 7.800
CI = 0.8043 to 75.643

This message relates to clarifying why a medication was not ordered. Proportionally, we see that both nurses and physicians ranked the message as non-urgent 6 times (26/4) more than urgent and indicated an asynchronous response 3 times (23/7) more than synchronous. The confidence interval indicates that the odds ratio for the timeframe for response is significant but one of the cells only has a single value so it's not reliable enough to draw any conclusions.

Table 42: Message 9 Comparison

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

Everyone agreed that this was a non-urgent issue where an asynchronous response was appropriate.

Message 10

Issue: hyperglycemia
Time Sent: 11:03pm
Details: Hpt\'s bs=23.1, as per sliding scale 12 u hum r admnistered then it says paged MD. Kindly inform me if you want me to administer more. Thanks

Table 43: Message 10 Odds Ratio

Urgency

	RN	MD	Total
Urgent	13	5	18
Non-urgent	3	9	12
Total	16	14	30

OR = 7.800
CI = 1.4761 to 41.2156

Timeframe for Response

	RN	MD	Total
< = 59 Mins	15	12	27
> = 60 Mins	1	2	3
Total	16	14	30

OR = 2.500
CI = 0.2016 to 30.999

Response Type

	RN	MD	Total
Synchronous	8	4	12
Asynchronous	8	10	18
Total	16	14	30

OR = 2.500
CI = 0.5478 to 11.4101

The confidence interval for the odds ratio calculation for the urgency is significant but one cell has a count of less than 5 so the sample is too small to be reliable. Proportionally though, we see there is a lot of variance in responses and so this indicates there is disagreement regarding the urgency. We see similar results proportionally for the response type but see that both nurses and physicians indicated the message required a response in less than 1 hour 9 times more than requiring a response in more than 1 hour.

Table 44: Message 10 Comparison

Urgency

	RN	MD	Org
Urgent	X		
Non-urgent		X	X

Response Type

	RN	MD	Org
Synchronous	X		
Asynchronous	X	X	X

For this message, the majority of nurses who completed the survey felt this was an urgent issue. The physicians who completed the survey and the nurse who originally sent the message felt this was a non-urgent issue.

Message 11

Issue: Magnesium in the EPR
Time Sent: 6:05pm
Details: Yesterday, there were two magnesium sulphate orders in the MAR, one was unauthorized. She recieved the dose that was authorized. Today, I noticed that the unauthorized magnesium order from yesterday is now authorized. Like I said, she did recieve a dose of mag sulphate yesterday, do you want her to recieve another dose today? Her mag came back today at 0.79, it was 0.69 yesterday before recieving the mag sulphate.

Table 45: Message 11 Odds Ratio

Urgency

	RN	MD	Total
Urgent	5	2	7
Non-urgent	11	12	23
Total	16	14	30

OR = 2.727
CI = 0.4364 to 17.0463

Timeframe for Response

	RN	MD	Total
< = 59 Mins	12	5	17
> = 60 Mins	4	9	13
Total	16	14	30

OR = 5.400
CI = 1.1196 to 26.0452

Response Type

	RN	MD	Total
Synchronous	4	1	5
Asynchronous	12	13	25
Total	16	14	30

OR = 4.333
CI = 0.4226 to 44.4299

This message again relates to a medication clarification. The confidence interval for the timeframe for response indicates the odds ratio is significant but the small sample size still

makes the calculation unreliable. However, looking at the proportions shows us that there is a fair amount of disagreement across the groups for the timeframe for response. For the urgency and response type, there is a bit of variation in responses but in general, nurses and physicians felt this was a non-urgent issue that could be addressed with asynchronous communication.

Table 46: Message 11 Comparison

Urgency

	RN	MD	Org
Urgent			X
Non-urgent	X	X	

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

This is another message where the nurse who originally sent the message sent it as urgent and the physicians and nurses who completed the survey felt it was a non-urgent issue. All indicated an asynchronous response was appropriate.

Message 12
Issue: bp
Time Sent: 9:04pm
Details: patient bp is 90/54, i will hold his metoprolol for tonight? let me know if you want to do anythign else.

Table 47: Message 12 Odds Ratio

Urgency

	MD	RN	Total
Urgent	9	8	17
Non-urgent	5	8	13
Total	14	16	30

OR = 1.800
CI = 0.4146 to 7.8144

Timeframe for Response

	RN	MD	Total
< = 59 Mins	14	11	25
> = 60 Mins	2	3	5
Total	16	14	30

OR = 1.909
CI = 0.2701 to 13.4959

Response Type

	MD	RN	Total
Synchronous	7	4	11
Asynchronous	7	12	19
Total	14	16	30

OR = 3.000
CI = 0.6418 to 14.0235

None of the odds ratios were significant but this message received varied responses for urgency and response type. So based on the proportions of the responses, there was not a lot of agreement among the respondents. For the timeframe for response though, both nurses and physicians indicated that a response was required within an hour 5 times (25/5) more than a response in greater than an hour.

Table 48: Message 12 Comparison

Urgency

	RN	MD	Org
Urgent	X	X	X
Non-urgent	X		

Response Type

	RN	MD	Org
Synchronous		X	
Asynchronous	X	X	X

This message had a lot of variation in responses and it reflects in this comparison. The majority of the physicians who completed the survey thought this was an urgent issue where as the nurses who completed the survey were split between urgent and non-urgent. The nurse who originally sent the message sent it as urgent.

Message 13

Issue: code status
Time Sent: 12:19pm
Details: We need the patient\'s code status confirmed. The oncall wrote an order that patient is DNR but \"team 4 to confirm this order in am\". Unfortuntanly this means that the patient is full code until a proper order is written.Can you do this please? Thanks.

Table 49: Message 13 Odds Ratio

Urgency

	RN	MD	Total
Urgent	10	3	13
Non-urgent	6	11	17
Total	16	14	30

OR = 6.111
CI = 1.1983 to 31.1644

Timeframe for Response

	RN	MD	Total
< = 59 Mins	14	4	18
> = 60 Mins	2	10	12
Total	16	14	30

OR = 17.500
CI = 2.6665 to 114.8499

Response Type

	RN	MD	Total
Synchronous	7	2	9
Asynchronous	9	12	21
Total	16	14	30

OR = 4.667
CI = 0.7764 to 28.0485

Code status (whether to resuscitate a patient or not) is a sensitive and important issue, especially if the patient is nearing end of life. The confidence intervals for both urgency and timeframe for response indicate the odds ratio is significant but again, not reliable due to the small sample size. However, based on the proportions, it shows that nurses and physicians were in disagreement regarding urgency and timeframe for response.

Table 50: Message 13 Comparison

Urgency

	RN	MD	Org
Urgent	X		X
Non-urgent		X	

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

For this message, the nurses who completed the survey and the nurse who originally sent the message indicated this was an urgent issue, compared to the physicians who completed the survey who felt this was a non-urgent issue.

Message 14

Issue: sitter
Time Sent: 12:09am
Details: pt settled, has been quiet and cooperative. Do we still need sitter? please call unit with verbal order if we can cancel sitter order. Thx

Table 51: Message 14 Odds Ratio

Urgency

	RN	MD	Total
Urgent	1	1	2
Non-urgent	13	16	29
Total	14	17	31

OR = 1.231
CI = 0.07 to 21.6393

Timeframe for Response

	RN	MD	Total
< = 59 Mins	6	2	8
> = 60 Mins	10	12	22
Total	16	14	30

OR = 3.600
CI = 0.5909 to 21.9324

Response Type

	MD	RN	Total
Synchronous	7	6	13
Asynchronous	7	10	17
Total	14	16	30

OR = 1.667
CI = 0.3883 to 7.1532

The odds ratios were not significant but there was a lot of variability in responses for timeframe for response and response type, but pretty much all respondents felt this was a non-urgent issue with both nurses and physicians ranking it as non-urgent 14 times more than urgent.

Table 52: Message 14 Comparison

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous		X	X
Asynchronous	X	X	

All agreed this was a non-urgent issue but there was little congruence on what the appropriate response type should be.

Message 15

Issue: Consent

Time Sent: 10:16am
Details: received call from CTScan already, they want written consent for the procedure,pls. obtain one, they will call again to confirm, no consent seen in his chart. Thanks

Table 53: Message 15 Odds Ratio

Urgency

	RN	MD	Total
Urgent	12	10	22
Non-urgent	4	4	8
Total	16	14	30

OR = 1.200
CI = 0.2374 to 6.065

Timeframe for Response

	RN	MD	Total
< = 59 Mins	14	12	26
> = 60 Mins	2	2	4
Total	16	14	30

OR = 1.167
CI = 0.142 to 9.5868

Response Type

	RN	MD	Total
Synchronous	9	3	12
Asynchronous	7	11	18
Total	16	14	30

OR = 4.714
CI = 0.9384 to 23.6823

This is a message that has some time sensitivity to it as the CT scan procedure is being held up due to lack of a written consent. The odds ratios were not significant but based on proportions, nurses and physicians ranked the issue as urgent almost 3 times (22/8) more than non-urgent and felt it required a response within an hour almost 7 times (26/4) more than requiring a response in greater than an hour.

Table 54: Message 15 Comparison

Urgency

	RN	MD	Org
Urgent	X	X	X
Non-urgent			

Response Type

	RN	MD	Org
Synchronous	X		X
Asynchronous		X	

For this message, everyone agreed it was an urgent issue but there was a difference in what the physicians who completed the survey felt the appropriate response should be.

Message 16
Issue: sodium 118
Time Sent: 5:49pm
Details: latest sodium from 1500 is 118.

Table 55: Message 16 Odds Ratio

Urgency

	RN	MD	Total
Urgent	11	8	19
Non-urgent	5	6	11
Total	16	14	30

OR = 1.650
CI = 0.3696 to 7.3653

Timeframe for Response

	MD	RN	Total
< = 59 Mins	11	11	22
> = 60 Mins	3	5	8
Total	14	16	30

OR = 1.667
CI = 0.3177 to 8.7439

Response Type

	RN	MD	Total
Synchronous	3	2	5
Asynchronous	13	12	25
Total	16	14	30

OR = 1.385
CI = 0.1963 to 9.7681

The odds ratios are not significant and based on proportions, there wasn't a lot of agreement in responses regarding the urgency. For the timeframe for response, nurses and physicians indicated a response was required within an hour almost 3 times (22/8) more than a response was required in greater than an hour. For the response type, nurses and physicians indicated an asynchronous response 5 times (25/5) more than synchronous.

Table 56: Message 16 Comparison

Urgency

	RN	MD	Org
Urgent	X	X	
Non-urgent			X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

While the physicians and nurses who completed the survey felt this was an urgent issue, the nurse who originally sent this message sent it as a non-urgent issue. One observation is that a sodium level of 118 is clinically quite low.

Message 17

Issue: pt wants to speak with MD
Time Sent: 3:23pm
Details: Pt asking md to review results/ explain results of recent test. 2decho

Table 57: Message 17 Odds Ratio

Urgency

	RN	MD	Total
Urgent	3	1	4
Non-urgent	13	14	27
Total	16	15	31

OR = 3.231
CI = 0.2973 to 35.1115

Timeframe for Response

	RN	MD	Total
< = 59 Mins	6	2	8
> = 60 Mins	10	12	22
Total	16	14	30

OR = 3.600
CI = 0.5909 to 21.9324

Response Type

	RN	MD	Total
Synchronous	9	1	10
Asynchronous	7	13	20
Total	16	14	30

OR = 16.714
CI = 1.7422 to 160.3573

This is another case of the patient or family member wanting to speak with the physician. The confidence interval for the response type odds ratio is significant but the small sample doesn't allow us to conclude anything from it. However, based on proportions, we see that physicians predominantly believe the issue an be addressed with an asynchronous response, where as the

nurses were fairly split in their responses. For the urgency and timeframe for response, both physicians and nurses proportionally ranked the issue as non-urgent and requiring a response in greater than an hour.

Table 58: Message 17 Comparison

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous	X		
Asynchronous		X	X

For this message, everyone agreed it was a non-urgent issue, although the nurses who completed the survey felt it required a synchronous response.

Message 18

Issue: pain
Time Sent: 2:07pm
Details: could you assess pt for RLQ abdo pain pt says started since last night, thank you .

Table 59: Message 18 Odds Ratio

Urgency

	RN	MD	Total
Urgent	10	3	13
Non-urgent	6	11	17
Total	16	14	30

OR = 6.111
CI = 1.1983 to 31.1644

Timeframe for Response

	RN	MD	Total
< = 59 Mins	12	6	18
> = 60 Mins	4	8	12
Total	16	14	30

OR = 4.000
CI = 0.8494 to 18.8368

Response Type

	RN	MD	Total
Synchronous	7	3	10
Asynchronous	9	11	20
Total	16	14	30

OR = 2.852
CI = 0.5677 to 14.3266

The odds ratio for the urgency was significant but reliability is again limited due to the small sample. Looking at the proportions, more nurses ranked the message as urgent than physicians, and more physicians ranked the message as non-urgent than nurses. We also see that more nurses indicated that a response within an hour was necessary than physicians.

Table 60: Message 18 Comparison

Urgency

	RN	MD	Org
Urgent	X		X
Non-urgent		X	

Response Type

	RN	MD	Org
Synchronous			X
Asynchronous	X	X	

The nurses who completed the survey and the nurse who originally sent the message indicated this was an urgent issue, where as the physicians who completed the survey felt this was a non-urgent issue. This message was originally sent through requesting a synchronous response, while the physicians and nurses who completed the survey felt an asynchronous response was appropriate.

Message 19
Issue: Pt. status
Time Sent: 8:36am
Details: Pt. recieved Ativan last night and is very confused this am, as per the daughter\'s assessment. She is not speaking English to me today, and is not always responding to her daughter\'s conversation. The family does not want Ativan again and they would like to restart the anti-anxiety med that she was previously on. (? Olanzapine). The son will tell me the name of the med when he comes in. Thanks

Table 61: Message 19 Odds Ratio

Urgency

	MD	RN	Total
Urgent	2	2	4
Non-urgent	12	14	26
Total	14	16	30

OR = 1.167
CI = 0.142 to 9.5868

Timeframe for Response

	MD	RN	Total
< = 59 Mins	5	5	10
> = 60 Mins	9	11	20
Total	14	16	30

OR = 1.222
CI = 0.2671 to 5.5924

Response Type

	MD	RN	Total
Synchronous	3	3	6
Asynchronous	11	13	24
Total	14	16	30

OR = 1.182
CI = 0.1972 to 7.0817

The odds ratios are not significant and based on proportions, nurses and physicians generally agreed that the message is non-urgent, does not require a response within an hours, and that an asynchronous response is adequate.

Table 62: Message 19 Comparison

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

All agreed this was a non-urgent issue requiring an asynchronous response.

Message 20
Issue: Chest pain
Time Sent: 8:53am

Details: Pt reports has been having midsternal chest pain, stabbing quality, rated 5/10. States has been having CP since yesterday. VSS. BP=100/75, HR=67, O2=98% on ra. No acute distress noted. ECG ordered. Please respond if you require further action. Thanks.

Table 63: Message 20 Odds Ratio

Urgency

	RN	MD	Total
Urgent	14	12	26
Non-urgent	2	2	4
Total	16	14	30

OR = 1.167
CI = 0.142 to 9.5868

Timeframe for Response

	RN	MD	Total
< = 59 Mins	16	14	30
> = 60 Mins	1	1	2
Total	17	15	32

OR = 1.143
CI = 0.0652 to 20.02

Response Type

	RN	MD	Total
Synchronous	11	9	20
Asynchronous	5	5	10
Total	16	14	30

OR = 1.222
CI = 0.2671 to 5.5924

Another example of the patient complaining of chest pain and proportionally, almost all respondents ranked this as an urgent issue and requires a response within 1 hour. The response type varied a bit more but both nurses and physicians indicated a synchronous response was required 2 times more than asynchronous.

Table 64: Message 20 Comparison

Urgency

	RN	MD	Org
Urgent	X	X	X
Non-urgent			

Response Type

	RN	MD	Org
Synchronous	X	X	
Asynchronous			X

Everyone agreed this was an urgent issue and everyone except the nurse who originally sent the message felt a synchronous response was required.

Message 21
Issue: blood sugar
Time Sent: 12:44am
Details: accucheck is now 12.3

Table 65: Message 21 Odds Ratio

Urgency

	MD	RN	Total
Urgent	1	1	2
Non-urgent	13	16	29
Total	14	17	31

OR = 1.231
CI = 0.07 to 21.6393

Timeframe for Response

	MD	RN	Total
< = 59 Mins	4	4	8
> = 60 Mins	10	12	22
Total	14	16	30

OR = 1.200
CI = 0.2374 to 6.065

Response Type

	MD	RN	Total
Synchronous	1	1	2
Asynchronous	14	15	29
Total	15	16	31

OR = 1.071
CI = 0.061 to 18.82

This message is an FYI message letting the team know what the patient's blood sugar level is. The odds ratios are not significant and based on proportions, both nurses and physicians felt this issue was non-urgent, could be responded to in greater than an hour, and that an asynchronous response was adequate.

Table 66: Message 21 Comparison

Urgency

	RN	MD	Org
Urgent			X
Non-urgent	X	X	

Response Type

	RN	MD	Org
Synchronous			X
Asynchronous	X	X	

The nurse who originally sent this message sent it as an urgent issue requiring a synchronous response. The physicians and nurses who completed the survey felt this was a non-urgent issue where an asynchronous response was appropriate.

Message 22

Issue: pt T=38.0
Time Sent: 12:42am
Details: Hi, Temp=38.0 orally now. Would you like any interventions done?

Table 67: Message 22 Odds Ratio

Urgency

	RN	MD	Total
Urgent	7	5	12
Non-urgent	9	9	18
Total	16	14	30

OR = 1.400
CI = 0.3208 to 6.1095

Timeframe for Response

	RN	MD	Total
< = 59 Mins	14	9	23
> = 60 Mins	2	5	7
Total	16	14	30

OR = 3.889
CI = 0.6168 to 24.5183

Response Type

	MD	RN	Total
Synchronous	2	2	4
Asynchronous	12	14	26
Total	14	16	30

OR = 1.167
CI = 0.142 to 9.5868

This is another FYI message with non-significant odds ratios. The responses for the urgency though are varied across the groups indicating some disagreement. For the timeframe for response, nurses and physicians indicated a response was required within an hour about 3 times more than required in more than an hour. For the response type, nurses and physicians indicated an asynchronous response was adequate almost 7 times more than a synchronous response.

Table 68: Message 22 Comparison

Urgency

	RN	MD	Org
Urgent			X
Non-urgent	X	X	

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

The nurse who originally sent this message sent it as an urgent request while the physicians and nurses who completed the survey felt this was a non-urgent issue. All indicated that an asynchronous response was appropriate.

Message 23

Issue: Tobramycin level=0.9
Time Sent: 12:06am
Details: Please enter Tobramycin dose on EPR. Thanks

Table 69: Message 23 Odds Ratio

Urgency

	MD	RN	Total
Urgent	6	4	10
Non-urgent	10	10	20
Total	16	14	30

OR = 1.500
CI = 0.3218 to 6.9909

Timeframe for Response

	RN	MD	Total
< = 59 Mins	12	5	17
> = 60 Mins	4	9	13
Total	16	14	30

OR = 5.400
CI = 1.1196 to 26.0452

Response Type

	RN	MD	Total
Synchronous	2	1	3
Asynchronous	14	14	28
Total	16	15	31

OR = 2.000
CI = 0.1622 to 24.6643

This is a medication order request where the timeframe for response had a significant confidence interval for the odds ratio but still too small of a sample to draw reliable conclusions. Based on proportions, nurses predominantly indicated a response within an hour was necessary, where as physicians predominantly indicated a response greater than an hour was adequate. Responses to the urgency had some variation but proportionally, both physicians and nurses ranked the issue as non-urgent 2 times more than urgent.

Table 70: Message 23 Comparison

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous			X
Asynchronous	X	X	

Everyone indicated that this was a non-urgent issue. The nurse who originally sent the message requested a synchronous response, while those who completed the survey felt an asynchronous response was appropriate.

Message 24
Issue: HIV medications
Time Sent: 9:18am
Details: Pt was not ordered HIV medications. please advise , pt stated that these are what he iis taking at home Truvada 400mg BID, rETONAVIR 180MG, kIVEXA 1mg . please confirm and order these medications for pt.

Table 71: Message 24 Odds Ratio

Urgency

	RN	MD	Total
Urgent	3	2	5
Non-urgent	13	12	25
Total	16	14	30

OR = 1.385
CI = 0.1963 to 9.7681

Timeframe for Response

	RN	MD	Total
< = 59 Mins	9	2	11
> = 60 Mins	7	12	19
Total	16	14	30

OR = 7.714
CI = 1.2835 to 46.3656

Response Type

	MD	RN	Total
Synchronous	1	1	2
Asynchronous	14	15	29
Total	15	16	31

OR = 1.071
CI = 0.061 to 18.82

This is another medication order request where the timeframe for response had a significant confidence interval for the odds ratio and the responses were varied but still had too small of a sample to draw reliable conclusions. Based on proportions, both nurses and physicians ranked the issue as non-urgent 5 times (25/5) more than urgent. For the response type, both nurses and physicians indicated the issue required an asynchronous response 14 times more than a synchronous response.

Table 72: Message 24 Comparison

Urgency

	RN	MD	Org
Urgent			X
Non-urgent	X	X	

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

The nurse who originally sent this message sent it as an urgent request while the physicians and nurses who completed the survey felt this as a non-urgent issue. All indicated that an asynchronous response was appropriate.

Message 25
Issue: Poor appetite
Time Sent: 12:28pm
Details: Hi there, just FYI pt is having low PO intake, only spoonfuls taken at meals. Temp at 0800 was 37.5. 1 tab of tylenol given, rechecked temp at 1215, still at 37.5. Pt is also going to receive hemodialysis soon. Daughter is at bedside. Foley bag draining, about 100cc since 0700 this morning.

Table 73: Message 25 Odds Ratio

Urgency

	MD	RN	Total
Urgent	1	1	2
Non-urgent	13	15	28
Total	14	16	30

OR = 1.154
CI = 0.0654 to 20.3422

Timeframe for Response

	RN	MD	Total
< = 59 Mins	6	4	10
> = 60 Mins	10	10	20
Total	16	14	30

OR = 1.500
CI = 0.3218 to 6.9909

Response Type

	MD	RN	Total
Synchronous	2	1	3
Asynchronous	12	15	27
Total	14	16	30

OR = 2.500
CI = 0.2016 to 30.999

This is another FYI message outlining the patient's general status. None of the odds ratios were significant but based on proportions, both nurses and physicians predominantly indicated the issue was non-urgent, could be addressed in greater than an hour, and that an asynchronous response was adequate.

Table 74: Message 25 Comparison

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

For this message, everyone indicated it was a non-urgent issue where an asynchronous response was appropriate.

Message 26
Issue: Abdo XR
Time Sent: 7:10am
Details: Xray was paged multiple times with no response. Nursing supervisor made aware and day technician to do Xray. Abdo seems softer, pt appears stable. Thanks.

Table 75: Message 26 Odds Ratio

Urgency

	MD	RN	Total
Urgent	2	1	3
Non-urgent	12	15	27
Total	14	16	30

OR = 2.500
CI = 0.2016 to 30.999

Timeframe for Response

	MD	RN	Total
< = 59 Mins	7	6	13
> = 60 Mins	7	10	17
Total	14	16	30

OR = 1.667
CI = 0.3883 to 7.1532

Response Type

	MD	RN	Total
Synchronous	1	1	2
Asynchronous	13	16	29
Total	14	17	31

OR = 1.231
CI = 0.07 to 21.6393

This is a FYI message where none of the odds ratios were significant. Based on proportions, both nurses and physicians predominantly indicated this issue was non-urgent and required an asynchronous response. The responses for the timeframe for response was quite varied.

Table 76: Message 26 Comparison

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

For this message, everyone indicated it was a non-urgent issue where an asynchronous response was appropriate.

Message 27
Issue: trop
Time Sent: 7:19am
Details: hi pt\'s trop level in am was 0.09.

Table 77: Message 27 Odds Ratio

Urgency

	RN	MD	Total
Urgent	10	5	15
Non-urgent	6	9	15
Total	16	14	30

OR = 3.000
CI = 0.6762 to 13.309

Timeframe for Response

	RN	MD	Total
< = 59 Mins	10	6	16
> = 60 Mins	6	8	14
Total	16	14	30

OR = 2.222
CI = 0.5137 to 9.6123

Response Type

	RN	MD	Total
Synchronous	3	2	5
Asynchronous	13	12	25
Total	16	14	30

OR = 1.385
CI = 0.1963 to 9.7681

This message received varied responses and the odds ratios were not significant. Based on proportions, nurses predominantly ranked this message as urgent and requiring a response within an hour, where as the physicians predominantly ranked it as non-urgent and that a response in greater than an hour was appropriate. For the response type, both nurses and physicians indicated an asynchronous response was adequate 5 times (25/5) more than a synchronous response.

Table 78: Message 27 Comparison

Urgency

	RN	MD	Org
Urgent	X		
Non-urgent		X	X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

The nurses who completed the survey felt this was an urgent issue while the physicians who completed the survey and the nurse who originally sent the message felt this was a non-urgent issue. All agreed that an asynchronous response was appropriate.

Message 28
Issue: pt refused 2200 meds
Time Sent: 11:40pm
Details: Pt refused all her 2200 P.O meds.

Table 79: Message 28 Odds Ratio

Urgency

	MD	RN	Total
Urgent	5	2	7
Non-urgent	9	14	23
Total	14	16	30

OR = 3.889
CI = 0.6168 to 24.5183

Timeframe for Response

	MD	RN	Total
< = 59 Mins	8	3	11
> = 60 Mins	6	13	19
Total	14	16	30

OR = 5.778
CI = 1.1184 to 29.8483

Response Type

	MD	RN	Total
Synchronous	2	2	4
Asynchronous	12	14	26
Total	14	16	30

OR = 1.167
CI = 0.142 to 9.5868

For this message, the timeframe for response had a significant odds ratio but again we can't draw any conclusions due to the small sample size. Based on proportions, physicians predominantly indicated the message required a response within an hour, where as nurses predominantly indicated the message could be addressed in greater than an hour. Through somewhat varied, both nurses and physicians predominantly indicated this message was non-urgent and required an asynchronous response.

Table 80: Message 28 Comparison

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

For this message, everyone indicated it was a non-urgent issue where an asynchronous response was appropriate.

Message 29
Issue: IV fluids
Time Sent: 9:33pm
Details: Hi pt is drinking well. Does he still need IVF?

Table 81: Message 29 Odds Ratio

Urgency

	MD	RN	Total
Urgent	1	1	2
Non-urgent	14	16	30
Total	15	17	32

OR = 1.143
CI = 0.0652 to 20.02

Timeframe for Response

	RN	MD	Total
< = 59 Mins	5	3	8
> = 60 Mins	11	11	22
Total	16	14	30

OR = 1.667
CI = 0.3177 to 8.7439

Response Type

	MD	RN	Total
Synchronous	1	1	2
Asynchronous	13	16	29
Total	14	17	31

OR = 1.231
CI = 0.07 to 21.6393

For this message, none of the odds ratios were significant. Based on proportions, both nurses and physicians predominantly ranked this message as non-urgent, indicated that a response in greater than an hour was appropriate, and that an asynchronous response was adequate.

Table 82: Message 29 Comparison

Urgency

	RN	MD	Org
Urgent			
Non-urgent	X	X	X

Response Type

	RN	MD	Org
Synchronous			
Asynchronous	X	X	X

For this message, everyone indicated it was a non-urgent issue where an asynchronous response was appropriate.

Appendix D

Perception of Urgency Survey

Nurse Demographics Questions

The objective of this survey is to determine what physicians and nurses perceive as urgent issues.

Participation in this study is completely voluntary. You may decide not to be in this study, or to be in the study now and then change your mind later. Participating in the study, declining to participate in the study, or leaving the study at any time, will have no potential negative impact on your current or future working relationship with any of the study investigators. By completing this survey you are providing consent to participate.

1. **What is your name (first and last name) and contact info? This is so we can ensure you receive your honorarium.**

2. **How many years have you been practicing nursing?**

3. **How often do you work on GIM? (Circle one)**

   Full-time Part-time Casual

4. **Please indicate your level of technology adoption based on these definitions: (Circle one)**

   a) First to adopt a technology
   b) Second fastest to adopt a technology
   c) Takes some time before adopting a technology
   d) Adopts a technology only after the majority of people have done so
   e) The last to adopt a technology

Physician Demographics Questions

The objective of this survey is to determine what physicians and nurses perceive as urgent issues.

Participation in this study is completely voluntary. You may decide not to be in this study, or to be in the study now and then change your mind later. Participating in the study, declining to participate in the study, or leaving the study at any time, will have no potential negative impact on your current or future working relationship with any of the study investigators. By completing this survey you are providing consent to participate.

5. **What is your name (first and last name) and contact info? This is so we can ensure you receive your honorarium.**

6. **What is your level of training?**

   a) R1
   b) R2
   c) R3
   d) R4
   e) Staff Physician

7. **How many months of service on GIM have you done?**

   Drop Down: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, N/A Staff Physician

8. **Are you a Medicine resident of are you from another service?**

   Drop Down: Medicine, Other Service, N/A Staff Physician

9. **Please indicate your level of technology adoption based on these definitions: (Circle one)**

   f) First to adopt a technology
   g) Second fastest to adopt a technology
   h) Takes some time before adopting a technology
   i) Adopts a technology only after the majority of people have done so
   j) The last to adopt a technology

Message to Review

Instructions:

Read the details of each message and complete the following for each one: (circle an answer)
1) Whether you would consider the issue discussed Urgent or Non-Urgent.
2) What timeframe you feel a response to the issue should be provided within
3) Whether you feel the issue requires a call back, a face-to-face discussion, an electronic response, or no response at all (just informational).

The messages are real messages sent using an electronic system at UHN. They are presented here in their original form (grammar etc.) except when identifiable information was used. Please respond the best you can based on the information provided as it is understood there will be some context you won't have.

1) Message 1

Issue: Family inquiry
Time Sent: 10:16pm
Details: Hi pt\'s daughter would like you to give her an update. Her # is xxx-xxx-xxxx. Thanks.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

2) Message 2

Issue: Pt complains chest tightness
Time Sent: 9:20am
Details: Good morning, pt complains of having chest tightness and tummy pain. bP-129/59, hR-83, Spo2-90-94 on r/a. rr-25. Chest tightness resolve by taking deep breath and puffer temporarily. Please come to assess pt. Thank you!

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

3) Message 3

Issue: Blood Glucose
Time Sent: 6:41pm
Details: just want to let you know about her BS. BS @ 0800= 13; 1200= 17.2, 1700=16.8!

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

4) Message 4

Issue: Please order Oral Balance Gel
Time Sent: 2:47pm
Details: I was unable to assess swallowing today. RR was too high. His mouth is ++dry. Please order Oral Balance Get from pharmacy. It is an artificial saliva that is often ordered by Palliative. Don\'t order MoiStir. It is bad stuff.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

5) Message 5

Issue: Pls clarify Nitro patch other
Time Sent: 1:00am
Details: According to order on EPR 0.4mg/hr Nitro patch due at 0205hrs and previous Nitro patch given on Oct 25th (at 0534hrs) scheduled to be removed at 0534hrs on Oct 26th so pt. will have 2 patches on at 0205hrs Pls R/A order

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

6) Message 6

Issue: Please remember to come write order for sitter until reassessed
Time Sent: 5:31pm
Details: Pt once again exhibiting odd behaviour. Agitated at times when trying to be redirected by staff. Continues to hover around washroom, with paper in hand trying to wipe washroom wall. Gait continues to be unsteady. We have requested a sitter, but please write order when you can.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

7) Message 7

Issue: ccac form
Time Sent: 2:53pm

Details: CCAC application has been initiated for PSW, nursing for monitoring blood sugars and administering insulin, and palliative care services. Please complete physician section for administration of insulin. Thank you

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

8) Message 8

Issue: Discharge
Time Sent: 9:11pm
Details: Pt requesting to be discharged now.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

9) Message 9

Issue: DVT prophylaxis?
Time Sent: 12:44am
Details: Hi. Would you be able to tell me why pt is not on any DVT prophylaxis? (i.e Heparin SC) His extremeties remained quite edematous as per condition, and chairfast/require max assist from 2 person to just transfer from bed to chair/commode.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion

	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

10) Message 10

Issue: hyperglycemia
Time Sent: 11:03pm
Details: Hpt\'s bs=23.1, as per sliding scale 12 u hum r admnistered then it says paged MD. Kindly inform me if you want me to administer more. Thanks

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

11) Message 11

Issue: Magnesium in the EPR
Time Sent: 6:05pm
Details: Yesterday, there were two magnesium sulphate orders in the MAR, one was unauthorized. She recieved the dose that was authorized. Today, I noticed that the unauthorized magnesium order from yesterday is now authorized. Like I said, she did recieve a dose of mag sulphate yesterday, do you want her to recieve another dose today? Her mag came back today at 0.79, it was 0.69 yesterday before recieving the mag sulphate.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

12) Message 12

Issue: bp

Time Sent: 9:04pm
Details: patient bp is 90/54, i will hold his metoprolol for tonight? let me know if you want to do anythign else.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

13) Message 13

Issue: code status
Time Sent: 12:19pm
Details: We need the patient\'s code status confirmed. The oncall wrote an order that patient is DNR but \"team 4 to confirm this order in am\". Unfortuntanly this means that the patient is full code until a proper order is written.Can you do this please? Thanks.

Y Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

14) Message 14

Issue: sitter
Time Sent: 12:09am
Details: pt settled, has been quiet and cooperative. Do we still need sitter? please call unit with verbal order if we can cancel sitter order. Thx

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback

Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

15) Message 15

Issue: Consent
Time Sent: 10:16am
Details: received call from CTScan already, they want written consent for the procedure,pls. obtain one, they will call again to confirm, no consent seen in his chart. Thanks

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

16) Message 16

Issue: sodium 118
Time Sent: 5:49pm
Details: latest sodium from 1500 is 118.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

17) Message 17

Issue: pt wants to speak with MD

Time Sent: 3:23pm
Details: Pt asking md to review results/ explain results of recent test. 2decho

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

18) Message 18

Issue: pain
Time Sent: 2:07pm
Details: could you assess pt for RLQ abdo pain pt says started since last night, thank you .

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

19) Message 19

Issue: Pt. status
Time Sent: 8:36am
Details: Pt. recieved Ativan last night and is very confused this am, as per the daughter\'s assessment. She is not speaking English to me today, and is not always responding to her daughter\'s conversation. The family does not want Ativan again and they would like to restart the anti-anxiety med that she was previously on. (? Olanzapine). The son will tell me the name of the med when he comes in. Thanks

Your perception of:

Urgency	Time Response Needed within	Response Required

Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

20) Message 20

Issue: Chest pain
Time Sent: 8:53am
Details: Pt reports has been having midsternal chest pain, stabbing quality, rated 5/10. States has been having CP since yesterday. VSS. BP=100/75, HR=67, O2=98% on ra. No acute distress noted. ECG ordered. Please respond if you require further action. Thanks.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

21) Message 21

Issue: blood sugar
Time Sent: 12:44am
Details: accucheck is now 12.3

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

22) Message 22

Issue: pt T=38.0
Time Sent: 12:42am
Details: Hi, Temp=38.0 orally now. Would you like any interventions done?

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

23) Message 23

Issue: Tobramycin level=0.9
Time Sent: 12:06am
Details: Please enter Tobramycin dose on EPR. Thanks

Y Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

24) Message 24

Issue: HIV medications
Time Sent: 9:18am
Details: Pt was not ordered HIV medications. please advise , pt stated that these are what he iis taking at home Truvada 400mg BID, rETONAVIR 180MG, kIVEXA 1mg . please confirm and order these medications for pt.

Your perception of:

Urgency	Time Response Needed within	Response Required

Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

25) Message 25

Issue: Poor appetite
Time Sent: 12:28pm
Details: Hi there, just FYI pt is having low PO intake, only spoonfuls taken at meals. Temp at 0800 was 37.5. 1 tab of tylenol given, rechecked temp at 1215, still at 37.5. Pt is also going to receive hemodialysis soon. Daughter is at bedside. Foley bag draining, about 100cc since 0700 this morning.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

26) Message 26

Issue: Abdo XR
Time Sent: 7:10am
Details: Xray was paged multiple times with no response. Nursing supervisor made aware and day technician to do Xray. Abdo seems softer, pt appears stable. Thanks.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)

Greater than 120 minutes

27) Message 27

Issue: trop
Time Sent: 7:19am
Details: hi pt\'s trop level in am was 0.09.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

28) Message 28

Issue: pt refused 2200 meds
Time Sent: 11:40pm
Details: Pt refused all her 2200 P.O meds.

Your perception of:

Urgency	Time Response Needed within	Response Required
Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

29) Message 29

Issue: IV fluids
Time Sent: 9:33pm
Details: Hi pt is drinking well. Does he still need IVF?

Your perception of:

Urgency	Time Response Needed within	Response Required

Urgent	Less than 10 minutes	Callback
Non-urgent	10-29 minutes	Face-to-face discussion
	30-59 minutes	Electronic response
	60-120 minutes	No response (info only)
	Greater than 120 minutes	

30) How would you define an Urgent issue?

31) How would you define a Non-Urgent issue?

Complete. Thank you for filling out this survey