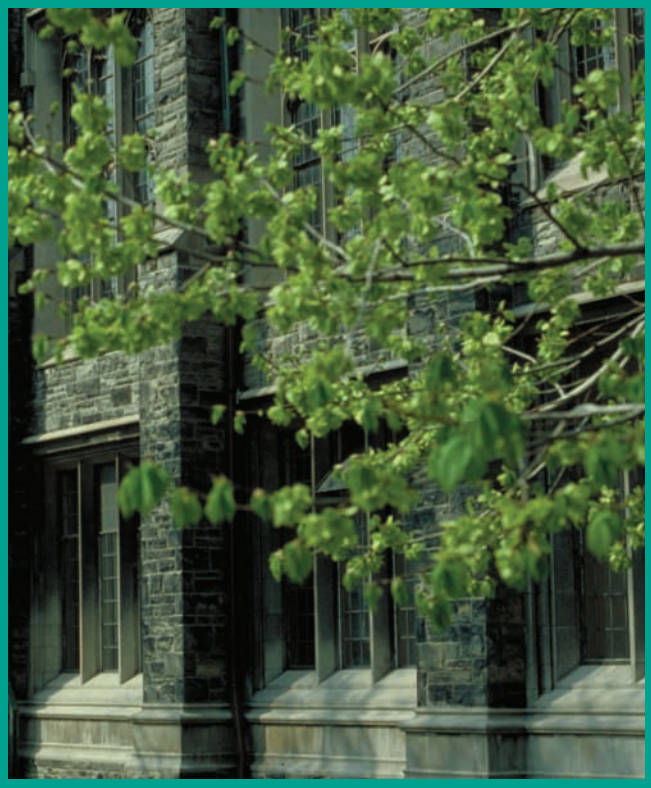
Interruptions in Nursing Practice at SickKids



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Key Messages

Overall

- A total of 5,325 interruptions were observed in the nursing work environment on the four study units at SickKids
- The work environment itself accounted for a third of the interruptions in this study
- Other nursing staff accounted for a quarter of the interruptions observed
- Over half of the interruptions observed on the study units were intrusions
- More than a quarter of the interruptions were distractions
- Only ten percent of the interruptions observed were discrepancies
- Close to a third of intrusions were in the area of communication with the nurse related to patient care
- Close to one-third of the interruptions take place when nurses are engaged in patient care assessment or procedures
- Almost one-quarter of the time nurses were involved in documentation activities when interrupted
- The majority of interruptions to nursing practice at SickKids that were observed in this study could have negative consequences
- Almost two-thirds of the interruptions resulted in a delay to the original work that the nurse was engaged in when interrupted
- Just over one-quarter of the interruptions resulted in a loss of concentration or focus from their original work

Unit Differences

- Critical care unit nurses had higher numbers of interruptions originating from within the environment
- Critical care unit nurses had significantly higher numbers of intrusions, specifically involving monitors and pumps
- Critical care unit nurses experienced significantly fewer distractions from overhead pagers but significantly more distractions from alarm bells and pagers
- Discrepancies occurred significantly more on the complex medical and surgical unit primarily related to missing or misplaced supplies, broken equipment, and the nurse forgetting something
- Interruptions during patient care assessments or procedures were significantly less evident on the medical unit
- Nurses on the medical unit were interrupted significantly more while preparing or administering medications

Executive Summary

The 'Interruptions in Nursing Practice at SickKids' study was a research project that was designed to gain an understanding of the concept of interruptions in pediatric nurses' work, and the systems issues related to interruptions in nursing work. The study was conducted over 13 months from November 2005 to November 2006, and employed a mixed methodology comprised of work observation and focus groups. Thirty-two nurses were observed in this study. The units sampled included medicine, surgical care, complex medical and surgical care, and intensive care, all of which represent the broader pediatric population in hospitals in Canada.

Nursing Interruptions at SickKids

A total of 5,325 interruptions were observed in the nursing work environment during the study. Factors within the work environment accounted for a third of the interruptions in this study overall, while other nursing staff accounted for a quarter of the interruptions observed. Over half of the interruptions observed on the study units were intrusions, while more than a quarter were distractions, and fewer were discrepancies and breaks. Close to a third of intrusions were in the area of communication related to patient care, while monitors or pumps were also noted to cause intrusions. Almost a third of the interruptions to nursing work at SickKids take place when nurses are engaged in patient care assessment or procedures, while close to a quarter of the time nurses were involved in documentation activities when interrupted.

Unit-Specific Nursing Interruptions

The critical care unit had higher numbers of interruptions originating from within the environment while the medical unit had the least. Intrusions were less evident on the medical unit and highest in critical care and on the surgical care unit, specifically in the form of monitors and pumps. Distractions occurred least in critical care and most on the complex medical and surgical unit, where overhead pagers were noted as a distraction. Critical care experienced the most distractions from alarm bells and pagers. Discrepancies were more evident on the complex medical and surgical unit, often as a result of missing or misplaced supplies or broken equipment. In addition, nurses on the complex medical and surgical unit experienced discrepancies as a result of forgetting something required for care.

Interruptions during patient care assessments or procedures were significantly less evident on the medical unit, while the complex medical and surgical unit experienced the most interruptions during care. In addition, nurses on the medical unit were interrupted significantly more while preparing or administering medications. Close to two-thirds of the interruptions resulted in a delay to the original work that the nurse was engaged in when interrupted, while just over one-quarter resulted in a loss of concentration or focus from their original work.

Summary

This research provides an understanding of interruptions in pediatric nurses' work environments that can contribute to patient safety occurrences.

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Chapter One: Introduction

Background

The Institute of Medicine report on errors in health care emphasizes that most errors are systems-related requiring a greater focus on improving the systems of care delivery (Kohn, Corrigan & Donaldson, 2000). Leape (1997) suggests that errors often happen because of defects in the systems in which we work, or because of conditions beyond the control of the individual. Systems-related issues are described as failures in the design of processes, management of the conditions of work, and in the individual training for that work (Leape). For example, a systems-related issue could be if the supply cart for a patient care unit had not been updated to reflect the supply needs of an expanded patient care population serviced by the unit. A failure in the design of processes could be when the design of the intravenous infusion pump is altered by the vendor without input from nurses or clinicians, and the new design changes impede practice, or no longer reflect the requirements of the clinical setting. Limited research has been conducted in the field of nursing that examines systems issues that relate to patient safety. In contrast, most of the work that has been conducted has focused on the lack of nursing knowledge or skill related to errors. While knowledge and skill may be important considerations, it is imperative that we explore these in relation to work design and systems within the health care environment. This research examined the concept of interruptions in pediatric nurses' work, and the systems issues related to interruptions in nursing work.

1.2 Conceptual Framework

The framework for this study emerged from the management literature in the field of work redesign. Work redesign involves the analysis and redesign of work within an organization (Hackman & Oldham, 1980). The process of work redesign includes stakeholders in the planning and implementation of workplace changes. Work redesign has the potential of transforming work processes and communication patterns in an effort to produce a needed change within a system. Originally the Hackman and Oldham conceptual framework was developed to test core job characteristics with their motivating and satisfying potential. They identified that staff perceptions of their work were important and the stronger an employees "growth need" the more the core characteristics were important in the work. Given that nurses have high levels of "growth need", that is, the need for professional and personal growth and development, the importance of understanding how interruptions in nursing work impact on the core job characteristics, especially in the area of completing "whole" pieces of work becomes evident. Understanding interruptions in the context of nursing work may assist employers to redesign the work and the systems nurses work in to strengthen the core job characteristics (i.e. reduce certain types of interruptions). In addition, understanding interruptions in the daily work of nurses will shed light onto the potential systems factors that may lead to unsafe situations. The work redesign framework will assist in better understanding nursing work in a complex environment, will engage nurses in the redesign process, and may ultimately guide changes that can improve weak systems, ultimately enhancing patient safety.

1.3 Context and Purpose

The importance of developing an understanding of systems factors in the work environment that may contribute to patient safety is underscored by the lack of literature that examines patient safety in relation to the nursing practice environment. Some research has identified a link between nurse staffing, nursing skill mix and patient safety outcomes (Aiken et al., 2001; Blegen, Goode, & Reed, 1998; McGillis Hall et al., 2001; Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2001). However, this research has not addressed how systems in the nursing work environment can specifically contribute to patient safety. For instance, there has been no research aimed at understanding interruptions in the nursing work environment that may contribute to patient safety incidents in pediatrics. In pediatric tertiary environments, these occurrences are more pronounced with patients having higher levels of acuity and complex treatment needs.

Interruptions have been defined as "externally generated, randomly occurring, discrete events that break continuity of cognitive focus on a primary task" (Corragio, 1990). The intrusive nature of interruptions has been noted to have a detrimental effect on task performance and work satisfaction (Speier, Valacich, & Vessey, 1999). The purpose of this research was to investigate the context of interruptions in nursing work through work sampling and focus groups with nurses in pediatric, acute care units in a teaching hospital in Toronto.

1.4 Objective

The objective of this study was to describe systems-related environmental factors that contribute to work interruptions for pediatric nurses in a sample of pediatric acute-care, medical-surgical and critical care units in Toronto.

Chapter Two: Methods

2.1 Design

The study was conducted in two phases extending over 13 months, from November 2005 to November 2006. An exploratory research design was used to complete the first study phase, which involved work sampling observation of nurses on the four selected study units. Work sampling is a data collection process that involves observing people in their natural work environment. The objective of this phase was to observe nursing interruptions as they would be experienced on a typical nursing shift in the pediatric setting. To achieve this goal, the data collectors randomly observed the nursing personnel on the selected units as they carried out their routine nursing work activities. Specifically, the work sampling techniques captured information related to 1) the types of interruptions that occur; 2) the source of that interruption; 3) identification of the work being performed by the nurse when interrupted; and 4) the outcome of the interruption.

Phase two of the study involved focus groups with nurses to validate the findings from the work observation. Nursing personnel who participated in phase one of the study were invited to participate in the focus groups.

2.2 Setting and Sample

Four units in a tertiary care pediatric academic affiliated teaching hospital participated in this study. The units sampled included medicine, surgical care, complex medical and surgical, and critical care, all of which represent the broader pediatric population in hospitals in Canada. Four units provided an adequate sample for the work sampling data collection (i.e., 32 nurses/8 per unit). To enhance the representativeness of the study, a medical, a surgical care, a complex medical-surgical, and a critical care unit were selected for the sample. One of the underpinnings of applied health services research of this nature is to engage in partnerships with clinical decision-makers. The Child Health Services (CHS) Directors on each of these units indicated a strong interest in participating in this study, and facilitated data collection on the units. In addition, the Quality of Nursing Work Life Committee at SickKids, the Nursing Practice Council and the Centre for Nursing deemed this study to be a priority. This research is also aligned with the concepts outlined in the SickKids Blueprint for Patient Safety (Stevens, Matlow & Laxer, 2007).

2.3 Procedure for Data Collection

Work sampling data was collected on each of the medical, surgical care, complex medical and surgical, and critical care units selected from the study site. Based on an earlier pilot study (McGillis Hall, 2003) it was found that data collection on weekday day shifts provided an accurate representation of the types, number and scope of interruptions in nursing work environments. Therefore, data collection involved 4 days of work sampling observation each week conducted on weekday 12-hour shifts, for a 2-month period. One nurse per day was observed by the data collector. The principal investigator had previous experience conducting work sampling studies of nurses (McGillis Hall & O'Brien-Pallas, 2000). For the purposes of this work, sampling during evenings, nights and weekends was not necessary.

The data collector met with the nursing staff on each study unit to explain the study and the work sampling procedure. Nurses were given the opportunity to discuss and respond to any questions related to the study during these sessions. For each participating unit, during the two-week data collection period, the CHS Director provided a list of scheduled staff to the project manager. The project manager worked with the data collector to determine nurse selection for that day. All full-time or part-time unit nurses working that day were provided with the opportunity to participate in the work observation. If more than one nurse volunteered and consented to participate for that day, the research manager randomly selected a nurse to be observed that day. A letter of information about the study was given to all nurses, along with a consent form for them to complete. Nurses were informed of their option to opt-out of the study if they chose not to participate. Receipt of the completed consent form signified a nurse's willingness to participate in the study. Different nurses were observed on each of the study days, such that the total sample of nurses observed was 8 per unit. The nurse was observed by the data collector for the duration of their worked shift, excluding breaks. The data collector observed the nurse for the day, and was aware that ensuring the privacy of patients was critical. The data collector could converse with the nurse to clarify perceptions of an interruption prior to coding if unclear (i.e., conversations were nurse-oriented, not focused on the patient). The data collector was to be considered an observer only, and was not expected to intervene or participate in any patient care situation. A parent information sheet was provided to parents of patients assigned to the nurse being observed each day, to ensure they were aware and informed that the study was underway. The data collector recorded on the data collection sheet the types of interruptions that occurred (i.e., a phone call; respond to patient call bell; meet with a physician; etc.); the source of that interruption; the nursing work activity being performed when interrupted; and the outcome of the interruption (i.e., late delivery of medications). Inter-rater reliability of the work observation was conducted throughout the study process, specifically on the first day of data collection and once weekly afterwards, with the aim of achieving 80% reliability between the observers. Over a two-hour period the research manager and data collector would both silently complete simultaneous observations of the study nurse. A total of 192 observations comprised the inter-rater reliability checks. An inter-rater reliability score of 92% was achieved and maintained throughout the data collection period.

Nursing staff working on the participating units were asked to indicate their interest in participating in a focus group meeting to be held at a later point in the study to review and validate the preliminary findings related to interruptions in their environment. A total of 9 nurses from the participating units attended a one-hour focus group meeting. The focus group participants were asked to describe their perceptions of the interruptions that occur on a typical work shift in their setting. Focus groups were taped, field notes were taken and a thematic data analysis was conducted by the research team – two of which have considerable experience with this methodology, including in the specific area of studying nursing interruptions. First, each member of the team reviewed a transcript and came up with a set of themes that were generated from the data. Next the team members conferred to discuss the themes, deal with any inconsistencies that emerged, and come up with a consistent set of codes to be used for the data analysis of the focus group data. The focus groups were led by the principal investigator from the Lawrence S. Bloomberg Faculty of Nursing at the University of Toronto who has extensive experience conducting focus groups.

2.4 Data Analysis

The work sampling data was categorized and coded into themes and developed into a framework for categorizing nursing interruptions in pediatric practice. Focus group data was transcribed and analyzed for themes and triangulated with the work sampling data. Simultaneous triangulation was used in this study as it allowed for the use of qualitative and quantitative methods at the same time. In this case, there was limited interaction between the types of data during the data collection, but the findings were integrated to complement one another at the end of the study (Morse, 1991).

2.5 Protection of Human Subjects

No patients were involved in this study and the data collectors were instructed to ensure that patients' privacy was protected. The nursing staff were approached by the research manager or data collector, who explained the purpose of the study, the activities expected of participants, and the participants' rights for and methods for ensuring self-determination, privacy and confidentiality. Nurses were informed of their option to opt-out of the study at this time. Nurses were told that their decision to participate would have no effect on their work, that they could withdraw from participation at any time, and that they could decline to answer any question. Nurses were informed that although no benefits would be directly experienced by them, there would be no harm as a result of participating in the study. Nurses who agreed to be included were required to sign a consent form. A copy of the signed consent form was given to the nurse. All data were confidential. No units, patients, or nurses were identified in any report of the study results. Subject anonymity was maintained. Only the principal investigator and the research coordinator had access to the data, which was kept in a locked file at the university. Consent forms and data collection documents will be kept for six years in a locked filing cabinet located at the Lawrence S. Bloomberg Faculty of Nursing, University of Toronto.

Chapter Three: Results

3.1 Results

Overall, a total of 5,325 interruptions were observed in the nursing work environment during the work observation study period at SickKids [see Figure 1]. Of these, 1,430 (26.9%) took place on the surgical care unit, 1,373 (25.8%) on the complex medical and surgical unit, 1,316 (24.7%) in critical care, and 1,206 (22.6%) on the medical unit. Thus, a consistent percentage of data was collected on each of the study units, suggesting that the data are representative of the types of interruptions that occur across these units.

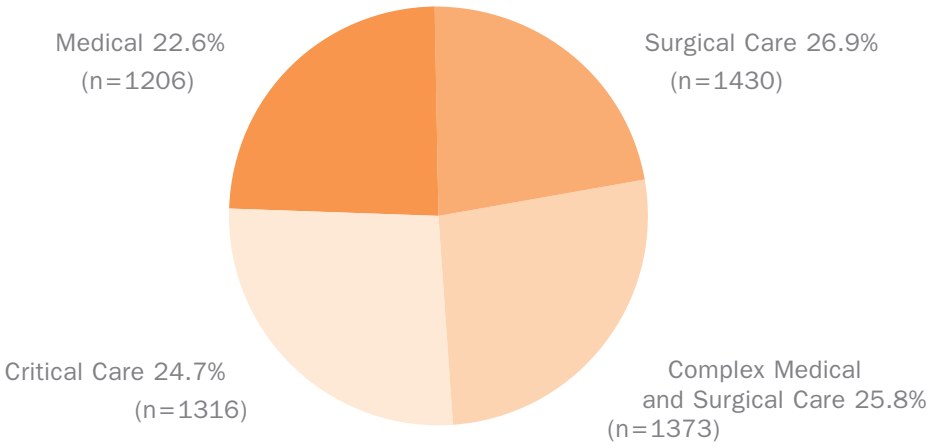

Figure 1: Breakdown of Interruptions Across Nursing Units

3.2 Sources of Interruptions

The sources of interruptions to nursing work at SickKids included the environment, other staff nurses, patients, family members, the individual nurse her/himself, physicians, other health care providers, support staff, and others [see Table 1]. Factors within the work environment itself accounted for a third of the interruptions in this study overall (n=1,741, 32.7%). Following this, other nursing staff accounted for a quarter of the interruptions observed (n=1,338, 25.1%). Patients (n=462, 8.7%) and family members (n=445, 8.4%) accounted for interruptions to a lesser extent. Nurses themselves (n=327, 6.1%), physicians (n=292, 5.5%), other health care providers (n=291, 5.5%), support staff (n=232, 4.4%), and others (n=197, 3.7%) contributed to interruptions to a much lesser degree.

Table 1: Sources of Interruptions					
Source	Surgical Care Frequency (%)	Complex Medical and Surgical Frequency (%)	Medical Frequency (%)	Critical Care Frequency (%)	Overall Frequency (%)
Environment	428 (29.9)	420 (30.6)	405 (33.6)	488 (37.1)	1741 (32.7)
Nurse	382 (26.7)	309 (22.5)	330 (27.4)	317 (24.1)	1338 (25.1)
Patient	180 (12.6)	136 (9.9)	86 (7.1)	60 (4.6)	462 (8.7)
Family Member	146 (10.2)	96 (7.0)	114 (9.5)	89 (6.8)	445 (8.4)
Self	79 (5.5)	127 (9.2)	75 (6.2)	46 (3.5)	327 (6.1)
Physician	44 (3.1)	90 (6.6)	53 (4.4)	105 (8.0)	292 (5.5)
Other HCP	63 (4.4)	69 (5.0)	31 (2.6)	128 (9.7)	291 (5.5)
Support Staff	57 (4.0)	66 (4.8)	67 (5.6)	42 (3.2)	232 (4.4)
Others	51 (3.1)	60 (4.4)	45 (3.6)	41 (3.1)	197 (3.7)
Totals	**1430 (100)**	**1373 (100)**	**1206 (100)**	**1316 (100)**	**5325 (100)**

Small differences in the sources were noted amongst the study units, although none of these differences were statistically significant. For example, the critical care unit had higher numbers of interruptions originating from within the environment ($n=488$) while the medical unit had the least ($n=405$). As well, patients were more often the source of interruptions on the surgical care unit ($n=180$) and the complex medical and surgical unit ($n=136$), than on the medical and critical care units. Higher levels of interruptions from family members occurred on the surgical care unit and the medical unit, than on the other units in the study. Interruptions from physicians and other health care providers were highest in critical care. Finally, more interruptions were self-initiated by nurses on the complex medical and surgical unit than the overall sample (6.1%).

These findings were substantiated by focus group participants who provided detailed examples of some of the sources of interruptions related to the environment, other nurses, patients, family members, the nurse themselves, physicians and other health care providers. Focus group attendees indicated that being interrupted by other nurses was common, primarily as fellow nurses requested assistance or answers to questions. Some nurses felt that this was a typical occurrence on a unit and therefore not seen as an interruption.

"You don't want to be completely away from everything, but sometimes all the noise and chaos and extra people at the desk – the doctor is sitting right next to you when you're doing your work or something – they can just, interrupt you or the patient can. The family can still see you and still walk up, or all the noise that goes on, like call bells going over heads, you're hearing things all the time."

"When a patient needs you, they call out."

"Having to go back and get supplies." "I actually do that a lot. I'm half way down the hall to my room and go 'oh I forgot that', and have to backtrack."

"Consulting services don't have access to the computer so they're constantly coming to us, asking us to sign in to the program so they can have access."

"Even some other nurses can't go in and sign on in." "We're dependent on the other nurses."

3.3 Types of Interruptions

The types of interruptions observed in the nursing work environment at SickKids were categorized as intrusions, distractions, discrepancies, and breaks [see Table 2].

Table 2: Definitions of Types of Interruption (Jett & George, 2003)

Interruption Type	Definition
Intrusion	"An intrusion is an unexpected encounter initiated by another person that interrupts the flow and continuity of an individual's work and brings that work to a temporary halt". (p. 495)
Distraction	"Distractions are psychological reactions triggered by external stimuli or secondary activities that interrupt focused concentration on a primary task; generally instigated by competing activities or environmental stimuli that are irrelevant to the task at hand". (p. 500)
Break	"Breaks are planned or spontaneous recesses from work on a task that interrupt the task's flow and continuity". (p. 497-498)
Discrepancy	"Discrepancies are perceived inconsistencies between one's knowledge and expectations and one's immediate observations that are perceived to be relevant to both the task at hand and personal well-being". (p. 502)

Table 3 demonstrates that over half of the interruptions observed on the study units overall were intrusions (n=3,160, 59.3%), while more than a quarter of them were distractions (n=1,513, 28.4%), and fewer (n=544, 10.2%) were discrepancies, and breaks (n=108, 2.0%).

Table 3: Types of Interruption

Type	Surgical Care Frequency (%)	Complex Medical and Surgical Frequency (%)	Medical Frequency (%)	Critical Care Frequency (%)	Overall Frequency (%)
Intrusion	876 (61.3)	729 (53.1)	673 (55.8)	882 (67.0)	3160 (59.3)
Distraction	395 (27.6)	402 (29.3)	373 (30.9)	343 (26.1)	1513 (28.4)
Discrepancy	138 (9.7)	192 (14.0)	140 (11.6)	74 (5.6)	544 (10.2)
Break	21 (1.5)	50 (3.6)	20 (1.7)	17 (1.3)	108 (2.0)
Totals	**1430 (100)**	**1373 (100)**	**1206 (100)**	**1316 (100)**	**5325 (100)**

The findings appear relatively consistent across the participating units although some statistically significant differences were noted ($F=13.223$; $df=5320, 4$; $p=.000$). Specifically, critical care interruptions were significantly different from all of the other individual units. For example, intrusions were less evident on the medical unit ($n=673$), and highest in critical care ($n=882$) and on the surgical care unit ($n=876$). Distractions occurred least in critical care ($n=343$) and most on the complex medical and surgical unit ($n=402$) and surgical care unit ($n=395$). Discrepancies occurred the most on the complex medical and surgical unit ($n=192$), followed by the medical unit ($n=140$) and the surgical care unit ($n=138$), but were much less visible in critical care ($n=74$). Finally, breaks were most apparent on the complex medical and surgical unit ($n=50$), while the numbers were lower for the surgical care ($n=21$), medical ($n=20$) and critical care units ($n=17$).

Comments from focus group participants provided additional context regarding how nurses perceive the types of interruptions in nursing work at SickKids.

"We're just used to it. It's just our practice."

"Interruptions when you have to help out another staff person are – like a built-in thing – you don't think of it as an interruption."

"Usually when you're interrupted, it's at a time when you're just really trying to get your work going – sometimes they're just always calling you."

3.4 Causes of Interruptions

Close to a third of intrusions were in the area of communication with the nurse related to patient care (n=1,871, 35.1%), followed by monitors or pumps (n=357, 6.7%), the need for assistance (n=312, 5.9%), socializing (n=211, 4.0%), phone calls for the nurse or patient (n=146, 2.7%), pagers (n=133, 2.5%), another health care provider (n=63, 1.2%), and call bells (n=51, 1.0%) [see Table 4].

Table 4: Cause of the Interruption

Explanation	Surgical Care Frequency (%)	Complex Medical and Surgical Frequency (%)	Medical Frequency (%)	Critical Care Frequency (%)	Overall Frequency (%)
Intrusion	876 (61.3)*	729 (53.1)*	673 (55.8)*	882 (67.0)*	3160 (59.3)
Communication to Nurse	518 (36.2)	404 (29.4)	433 (35.9)	516 (39.2)	1871 (35.1)
Monitor/Pump	89 (6.2)*	39 (2.8)*	35 (2.9)*	194 (14.7)*	357 (6.7)
Assistance Needed	101 (7.1)	71 (5.2)	75 (6.2)	65 (4.9)	312 (5.9)
Socializing	73 (5.1)	66 (4.8)	32 (2.7)	40 (3.0)	211 (4.0)
Phone Call for Nurse/ Patient	36 (2.5)	51 (3.7)	31 (2.6)	28 (2.1)	146 (2.7)
Pager	27 (1.9)	54 (4.0)	36 (3.0)	16 (1.2)	133 (2.5)
Other HCP	18 (1.3)	21 (1.5)	6 (0.5)	18 (1.4)	63 (1.2)
Call Bell	9 (0.6)	19 (1.4)	23 (1.9)	0 (0)	51 (1.0)
Distraction	395 (27.6)*	402 (29.3)*	373 (30.9)*	343 (26.1)*	1513 (28.4)
Overhead Page	129 (9.0)*	141 (10.3)*	195 (16.2)*	89 (6.8)*	554 (10.4)
Alarms/Bells/Pager	135 (9.4)*	139 (10.1)*	74 (6.1)*	149 (11.3)*	497 (9.3)
People Making Noise	124 (8.7)	98 (7.1)	98 (8.1)	92 (7.0)	412 (7.7)
Multi-Tasking	4 (0.3)	12 (0.9)	2 (0.2)	3 (0.2)	21 (0.4)
Other Noise	4 (0.3)	9 (0.7)	1 (0.1)	3 (0.2)	17 (0.3)
Telephone Ring	1 (0.1)	3 (0.2)	3 (0.2)	6 (0.5)	13 (0.2)
Discrepancy	138 (9.7)*	192 (14.0)*	140 (11.6)*	74 (5.6)*	544 (10.2)
Missing/Misplaced/ Broken/Waiting	91 (6.4)*	103 (7.5)*	85 (7.0)*	61(4.6)*	340 (6.4)
Forgot Something	13 (0.9)*	42 (3.1)*	18 (1.5)*	4 (0.3)*	77 (1.4)
Patient Has Additional Unexpected Need	21 (1.5)	26 (1.9)	15 (1.2)	4 (0.3)	66 (1.2)
Patient Not Ready/ Have to Wait	9 (0.6)	9 (0.7)	15 (1.2)	1 (0.1)	34 (0.6)
Need Clarification	5 (0.3)	9 (0.7)	7 (0.6)	4 (0.3)	25 (0.5)
Error on Chart	0 (0.0)	3 (0.2)	0 (0.0)	0 (0.0)	3 (0.1)
Break	21 (1.5)	50 (3.6)	20 (1.7)	17 (1.3)	108 (2.0)
Unplanned Break	7 (0.5)	18 (1.3)	12 (1.0)	5 (0.4)	42 (0.8)
Planned Break	7 (0.5)	11 (0.8)	5 (0.4)	10 (0.8)	33 (0.6)
Communication by Nurse	4 (0.3)	18 (1.3)	1 (0.1)	2 (0.2)	25 (0.5)
Planned Lunch	5 (0.3)	6 (0.4)	4 (0.3)	5 (0.4)	20 (0.4)
Missing	0 (0.0)	1 (0.1)	0 (0.0)	1 (0.1)	2 (0.1)
Totals	**1430 (100)**	**1373 (100)**	**1206 (100)**	**1316 (100)**	**5325 (100)**

* = p<.05

Statistically significant differences were found between the study units ($F=15.018$; $df=5318, 4$; $p=.000$), again most often in relation to critical care. For example, intrusions from monitors and pumps were significantly higher in critical care ($n=194$), than on the surgical care unit ($n=89$), the complex medical-surgical unit ($n=39$), or medicine ($n=35$). As well, distractions from overhead pagers were significantly lower in critical care ($n=89$), in comparison to surgical ($n=129$), complex medical-surgical unit ($n=141$) and highest on the medical unit ($n=195$). In contrast, distractions from alarm bells and pagers were significantly higher in critical care ($n=149$), than on the complex medical-surgical unit ($n=139$), surgical care ($n=135$), and medicine ($n=74$). Finally, discrepancies related to missing or misplaced supplies or broken equipment were significantly higher on the complex medical-surgical unit ($n=103$), surgical care unit ($n=91$), and medical unit ($n=85$), than in critical care ($n=61$). In addition, discrepancies caused by the nurse forgetting something were significantly higher on the complex medical-surgical unit ($n=42$), medicine ($n=18$), and surgical care unit ($n=13$), than in critical care ($n=4$).

The majority of interruptions were intrusions that relate to communicating to the nurse. Information obtained during the focus groups highlight some of the types of communication activities that interrupt nurses in their work.

"Every service, like Infectious Diseases comes in and you're in the middle of doing something and they want to ask you questions, or Gastroenterology comes in or that sort of thing."

"They come in and instead of looking through the chart and saying, 'oh yeah, he had a fever last night'…they're asking you, 'what antibiotics is he on?' You want to say, well, look in the med sheet."

"Monitors are always interrupting us when we're getting report. Monitors going off. You go into the other room for the monitors and the call bell system goes off."

Overhead pages, which are a form of distraction in this study, were also identified as one of the most common types of interruptions. Participants stated that they were constantly being 'called out' of rooms to either go to the desk, answer the telephone, answer questions, assist another nurse or be sent to another room for either their patient or another nurse.

"You're in the middle of something in here, but you're being called to the other room."

"Usually it's something that we're waiting for, in order to make the plan of care for the next step. If you're waiting for procedures to be done and they're calling us to tell us about procedures, you need to take the call."

3.5 Nurse Work Being Performed When Interrupted

Close to one-third of the interruptions to nursing work at SickKids take place when nurses are engaged in patient care assessment or procedures ($n=1,704$; 32.0%) [see Table 5]. As well, almost one-quarter of the time ($n=1,289$, 24.2%) nurses were involved in documentation activities when interrupted. Less than 10% of the interruptions occurred while nurses were either in transit between one location and another; preparing or administering medications; consulting about a patient with other members of the health care team or patients; on their break; working with the intravenous equipment or other supplies; involved in communication activities including the telephone; or doing laboratory work, housekeeping or clerical duties.

Table 5: Nurse Work Being Performed When Interrupted

Nursing Work Being Interrupted	Surgical Care Frequency (%)	Complex Medical and Surgical Frequency (%)	Medical Frequency (%)	Critical Care Frequency (%)	Overall Frequency (%)
Patient Care Assessment/ Procedure	469 (32.8)	524 (38.2)	257 (21.3)	454 (34.5)	1704 (32.0)
Documentation	394 (27.6)	331 (24.1)	293 (24.3)	271 (20.6)	1289 (24.2)
Transit	168 (11.7)	135 (9.8)	119 (9.9)	73 (5.5)	495 (9.3)
Medications	107 (7.5)	115 (8.4)	150 (12.4)	122 (9.3)	494 (9.3)
Consulting	103 (7.2)	91 (6.6)	112 (9.3)	125 (9.5)	431 (8.1)
Break/Not Doing Anything	53 (3.7)	41 (3.0)	122 (10.1)	52 (4.0)	268 (5.0)
IV	17 (1.2)	41 (3.0)	60 (5.0)	46 (3.5)	164 (3.1)
Communicating	37 (2.6)	20 (1.5)	41 (3.4)	54 (4.1)	152 (2.9)
Equipment/Supplies	40 (2.8)	33 (2.4)	10 (0.8)	43 (3.3)	126 (2.4)
Lab Work	0 (0)	12 (0.9)	20 (0.7)	35 (2.7)	67 (1.3)
Housekeeping/Clerical	27 (1.9)	9 (0.7)	7 (0.6)	9 (0.7)	52 (1.0)
Universal Precautions	11 (0.8)	11 (0.8)	5 (0.4)	11 (0.8)	38 (0.7)
Phone	4 (0.3)	3 (0.2)	8 (0.7)	19 (1.4)	34 (0.6)
Missing	0 (0)	7 (0.5)	2 (0.2)	2 (0.2)	11 (0.2)
Totals	**1430 (100)**	**1373 (100)**	**1206 (100)**	**1316 (100)**	**5325 (100)**

Some statistically significant differences in the work nurses are performing when interruptions occur were evident among the study units ($F=20.183$; $df=5309, 4$; $p=.000$), primarily in relation to the medical unit. For example, interruptions during patient care assessments or procedures were significantly less evident on the medical unit ($n=257$) than they were on the other units, with the complex medical and surgical unit ($n=524$) experiencing the most interruptions during care. In addition, nurses on the medical unit were interrupted significantly more while preparing or administering medications ($n=150$), followed by nurses in critical care ($n=122$), and complex medical-surgical unit nurses ($n=115$), and the surgical care unit ($n=107$).

As well, although not significant, interruptions while nurses were documenting occurred more frequently on the surgical care unit ($n=394$) than on the complex medical-surgical unit ($n=331$), medicine ($n=293$) and critical care ($n=271$). Nurses on the surgical unit ($n=168$), and the complex medical-surgical unit ($n=135$) experienced more interruptions while in transit than nurses on the medical unit ($n=119$) and in critical care ($n=73$), although these differences were not significant.

Focus group participants provided insight into the impact that interruptions had on patient care delivery.

"When you've got the really complex kids and you're speaking to families and then you get a phone call from the pharmacy in the middle of the parent crying and so, you're interrupting … and you can never get back to helping that person through their grieving process."

"You have to go to the other patient in the room whose alarm is ringing, so it's just that communication with the family, the time that you're spending trying to support them, that's always interrupted."

"I think that is the kind of thing, because you can never recapture that moment and I think all it does is tell them that we're too busy, we don't have the time to listen and so, then we're reticent then, as time goes on, to really talk."

3.6 Outcome of the Interruptions

The majority of interruptions to nursing practice at SickKids that were observed in this study could have negative consequences (n=4,736, 88.9%), while few could lead to a positive outcome (n=587, 11.0%), as outlined in Table 6.

Table 6: Outcome of the Interruptions

Type	Surgical Care Frequency (%)	Complex Medical and Surgical Frequency (%)	Medical Frequency (%)	Critical Care Frequency (%)	Overall Frequency (%)
Negative	1234 (86.3)	1220 (88.9)	1085 (90.0)	1197 (91.0)	4736 (88.9)
Delay	840 (58.7)	825 (60.1)	712 (59.0)	839 (63.8)	3216 (60.4)
Loss of Concentration/Focus	388 (27.1)	373 (27.2)	355 (29.4)	343 (26.1)	1459 (27.4)
Incomplete Work	4 (0.3)	18 (1.3)	12 (1.0)	12 (0.9)	46 (0.9)
Need to Multi-task	2 (0.1)	2 (0.1)	3 (0.2)	2 (0.2)	9 (0.2)
Increased Risk of Error	0 (0)	4 (0.3)	1 (0.1)	2 (0.2)	7 (0.1)
Positive	196 (13.7)	151 (11.0)	121 (10.0)	119 (9.0)	587 (11.0)
Helps Nurse	98 (6.9)	54 (3.9)	64 (5.3)	67 (5.1)	283 (5.3)
Increased Safety	87 (6.1)	76 (5.5)	50 (4.1)	48 (3.6)	261 (4.9)
Increase Patient Comfort/Condition	7 (0.5)	10 (0.7)	5 (0.4)	1 (0.1)	23 (0.4)
Increase Accuracy	4 (0.3)	9 (0.7)	2 (0.2)	2 (0.2)	17 (0.3)
Missing	0 (0)	2 (0.1)	2 (0.2)	0 (0)	4 (0.1)
Totals	**1430 (100)**	**1373 (100)**	**1206 (100)**	**1316 (100)**	**5325 (100)**

Almost two-thirds (n=3,216, 60.4%) of the interruptions resulted in a delay to the original work that the nurse was engaged in when interrupted, while just over one-quarter (n=1,459, 27.4%) of the interruptions resulted in a loss of concentration or focus from their original work. Some interruptions resulted in incomplete work (n=46, 0.9%), nurses being required to multi-task (n=9, 0.2%), and an increased risk of error (n=7, 0.1%). At the same time, there were interruptions that may help the nurse (n=283, 5.3%), contribute to increased safety (n=261, 4.9%), improvements in patient comfort or the patient's condition (n=23, 0.4%), and increased accuracy (n=17, 0.3%). No statistically significant differences in outcomes were noted amongst the study units.

Nurses participating in the focus groups were able to provide additional comments that help to explain how delays occur and how concentration on their work can be impeded.

"Forgetfulness is a problem - like sometimes you're in the middle of doing something and you go and run and do something else and you're trying to think, okay, what was I just doing, you know, trying to recall what it was."

"Usually if I'm giving a med and resetting my pumps, I just kind of set my pump up, you know? Maybe I just don't take that time to reset it, make sure everything is running fine, and that's something I will try and make a note to myself to get back to do, but then, oftentimes if it's a busy day, something else is going to come to you before you get back to that. So, just the double checking on what you just completed and having that extra time to do it, is what is lost."

"They'll come in the middle of you doing a dressing change or doing something at the bedside and, so you're taken away, so then meds are late and aren't done on time…to get answers that they could easily look up."

4 Chapter Four: Discussion

4.1 Discussion

4.2 Conclusions

4.1 Discussion

Findings from this research highlight the complexity of nursing work environments in pediatric tertiary settings, and how this can have a direct influence on interruptions in nursing work and related patient safety outcomes. Overall, the work environment and other nurses are the predominant sources of interruptions at SickKids. When the study findings are examined together, it is evident that these environmental and interruptions from nursing peers take the form of intrusions and distractions, at a time when the nurse is involved in patient care assessments, procedures or documentation. From a patient safety perspective, the result is most often negative, resulting in delays and loss of concentration or focus.

SickKids is an internationally renowned hospital with core values related to providing the best in family-centered care while striving for excellence in a safe and healthy environment (SickKids, 2007). Despite these core beliefs, the complex nature of the work environment may be in opposition. If nurses are experiencing intrusions at the point of care, the bedside, this may be causing challenges to the principles of family-centered care. In addition, distractions while nurses are involved in patient care can have implications for patient safety.

Work environment interruptions involving intrusions from monitors and pumps were highest in the Critical Care Unit, both as a result of the degree of technology involved in patient care combined with the level of acuity of patients being cared for. While this provides some explanation for the study findings it also brings to light some areas for consideration in the redesign of work processes. While nursing interruptions are of concern on any patient care unit, the critical nature of these patients only adds to their vulnerability to patient safety occurrences.

At the same time, intrusions were significantly lower on the medical unit, where complexity in the pediatric work environment takes on a different form, with nurses required to provide extensive support and care to terminally ill children. However, medical nurses were interrupted significantly more than nurses on other units, when they were preparing or administering medications.

Finally, nurses on the combined medical-surgical unit and surgical care unit had significantly higher numbers of discrepancies related to missing or misplaced supplies or broken equipment. At the same time, it was on these units that nurses were noted to encounter more self-interruptions. In the context of work redesign, it is plausible that the challenges with supplies and equipment are hampering these nurses' ability to organize their daily care.

4.2 Conclusions

This study provides the first evidence of the context of interruptions to nursing work in pediatric tertiary care settings. These data can serve to inform hospital administrators and nurse leaders about the key environmental factors that have an impact on patient safety outcomes. Findings from this research can be used to develop specific redesign strategies for the study units, aimed at decreasing work-related interruptions in nursing care.

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