Interruptions during senior nurse handover in the intensive care unit: a quality improvement study

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Conflicts of interest

There are no conflicts of interest to declare.

ABSTRACT

Background

Interruptions during handover may compromise continuity of care and patient safety.

Local Problem

Interruptions occur frequently during handovers.

Methods

A quality improvement study was undertaken to improve nursing team leader handover processes in one intensive care unit. The frequency, source, and reason interruptions occurred were recorded before and after a handover intervention.

Interventions

The intervention involved relocating handover from the desk to bedside and using a printed version of an evidence-based electronic minimum dataset. These strategies were supported by education, champions, reminders, audit and feedback.

Results

Forty handovers were audiotaped before, and 49 were observed 3 months following the intervention. Sixty-four interruptions occurred before and 52 after the intervention, but this difference was not statistically significant. Team leaders were frequently interrupted by nurses discussing personal or work-specific matters before and after the intervention.

Conclusions

Further work is required to reduce interruptions that do not benefit patient care.

Key words

Bedside Handoff, Handover, Intensive Care Unit, Interruptions, Quality Improvement

INTRODUCTION

Clinical handover (handoff) occurs frequently in health care facilities each day to ensure continuity of care despite multiple shift and staffing changes. Since the World Health Organization (WHO) listed clinical handover as one of the top five priority areas for patient safety improvement (World Health Organization, 2007), much work has been carried out to improve communication during handover and reduce interruptions and subsequent adverse patient events. This large body of research has led to several advancements in clinical handover. Some of these advancements include the use of verbal, face-to-face handovers in place of written or audiotaped handovers (Smeulers, Lucas, & Vermeulen, 2014; Vergales, Addison, Vendittelli, Nicholson, Carver, Stemland et al., 2015), relocation of handovers from office spaces or meeting rooms to the patient bedside (Bradley & Mott, 2014; Mardis et al., 2016), the use of evidenced-based or universally recognised handover mnemonics (Natafgi et al., 2017; Starmer, O'Toole, Rosenbluth, Calaman, Balmer, West et al., 2014) and minimum datasets to structure handover (Johnson, Jefferies, & Nicholls, 2012). There has also been a growing interest in the use of electronic tools to hand over patient information (Anderson et al., 2015b; Payne, Stein, Leong, & Dressler, 2012). An area that continues to fuel debate relates to interruptions and whether they enhance or impede clinicians' ability to deliver informative, accurate and timely handovers (McCurdie et al., 2017b; Sasangohar et al., 2015a).

While interruptions have been linked to error and even patient harm in some cases (Feil, 2013), other studies have shown that resident ~~doctors~~ physicians were resilient to distractions during handovers (Anderson et al., 2015a; Tapia, Fallon, Brandt, Scott, & Suliburk, 2013). Anderson and colleagues proposed that

handovers were impervious to interruptions and residents had either developed increased automatization of the handover process (from experience, with fewer cognitive resources required to complete the primary task) or a global ability to maintain focus, thereby developing tolerance to distractions (Anderson et al., 2015a). Consequently, the elimination of interruptions during handover was not considered a high priority during surgical residents' handovers (Anderson et al., 2015a). Further research is required to understand which interruptions are potentially harmful or advantageous to handovers and their association with patient outcomes.

Review of the literature

Interruptions occur when there is a break in performance of a human activity initiated by an internal or external source (Brixey et al., 2010; Westbrook et al., 2010). Handovers in health care facilities are frequently interrupted which has the potential to lead to the loss of critical patient information or hinder task completion (Rivera-Rodriguez & Karsh, 2010). While large scale studies have detected associations between interruptions and communication deficiencies compromising patient safety, the evidence for a direct causal connection between interruptions and undesirable outcomes is not strong (McCurdie et al., 2017a). Furthermore, the factors that make undesirable outcomes more likely or less likely are difficult to identify (Walter, Dunsmuir, & Westbrook, 2015). A greater awareness of the assumptions and inconsistencies in previous work will assist clinicians, quality improvers and researchers to conduct research to close the current gaps in knowledge (Walter et al., 2015).

Health care settings such as the intensive care unit (ICU) are chaotic, demanding, time constrained and patient needs can change with little warning. Research to date has focused on the influence of interruptions on medication administration (Thomas, Donohue-Porter, & Stein Fishbein, 2017), workflow (Weigl, Muller, Zupanc, Glaser, & Angerer, 2011), cognition (Rivera-Rodriguez & Karsh, 2010), and task completion (Rivera-Rodriguez & Karsh, 2010), but only one study was found that examined interruptions during nursing handover in the ICU (Spooner et al., 2015). Furthermore, no research relating to nursing team leader (TL) handover was identified. Team Leaders are responsible for the care of multiple ICU patients. Team Leaders oversee care provided by bedside nurses and liaise with members of the multidisciplinary team to coordinate the daily running of the ICU. It is important that handovers between oncoming and outgoing TLs are accurate, informative and timely to maintain continuity and quality of care.

Specific aims

A before and after quality improvement (QI) study was undertaken with the aim to improve the handover process and reduce interruptions.

METHODS

Setting

This QI study was conducted in a 21-bed (government funded) adult medical/surgical ICU, specialising in cardiothoracic surgery at a tertiary referral hospital, in Queensland, Australia. There are 180 registered nurses (RN)

employed in the ICU including 63 senior RNs working in TL roles. The ICU consists of three areas (ICU 1- cardiac surgical, ICU 2 and 3 – general); each area containing up to nine beds coordinated by one TL. Prior to the handover improvement strategy, nursing TLs conducted handover at the central ICU desk and discussed up to nine patients at change of shift. Ethical approval was obtained by the institutional (HREC/10/QPCH/5) and university (NRS/09/13) Human Research Ethics Committee for the conduct of the study.

Participants

Senior ICU RNs involved in TL handover were recruited. Potential participants were told about the study at staff meetings and participant information sheets and consent forms were sent via internal mail to all nursing staff who met the inclusion criteria (Senior ICU RNs involved in TL handover). Written consent was obtained prior to study commencement and consent was confirmed verbally at the time of data collection.

Improvement Intervention

During previous research studies examining handover practices at this site, TLs voiced their frustrations with the frequency of interruptions and dissatisfaction with current handover practices. Therefore a team was assembled to better understand the current process to determine opportunities for improvement. To align with the Australian National Safety and Quality Health Service Standard on clinical handover and improve nursing TL handover processes, a handover

improvement strategy was introduced between January and March 2016. Components of the handover strategy included 1) relocating TL handover from the central ICU desk space to the patient bedside and 2) TLs using an evidence-based structured electronic minimum dataset (eMDS) that was printed from a clinical information system (CIS) to facilitate walk around bedside handover and to provide TLs with a prompt if they were interrupted. The content of the eMDS was determined in a previous study (Spooner et al., 2018b) and was structured using the ISBAR (Identify-Situation-Background-Assessment-Recommendation) mnemonic. It also included additional items considered important by TLs to include in handover such as unit flow and management (admissions, discharges, staffing etc), patient alerts (infectious status, site of infection) and patient updates (End of life plan). Most content in the eMDS was auto-populated from multiple sources within the CIS (nursing and medical notes, observations, medications), dramatically reducing TL handover preparation time. The eMDS was printed just prior to handover and contained the most up to date patient information. This is the first time the eMDS was implemented for use in an ICU.

To implement the handover strategy, education sessions were carried out with all TLs. Education included techniques to minimise personal or work-specific interruptions (e.g., outgoing floats/access nurses intercepting and troubleshooting non-urgent interruptions that could be relayed to the oncoming TL at the completion of handover), increase nurses' awareness around interruptions (e.g., only interrupting handovers if critical to patient care), nurses critically discussed handover scenarios and were given hands on training using the eMDS. Nurse champions were appointed to assist with education and implementation of the eMDS. Reminders were used to update nurses about

handover changes and a research nurse audited adhoc handovers to provide nurses with feedback on their use of the eMDS. Interruptions were assessed before and after the handover intervention was implemented, to establish current practice and to evaluate any change associated with the handover intervention.

Data Collection

Before and after implementation of the handover intervention, the frequency, source and reason interruptions occurred (Spooner et al., 2015) were examined. Prior to implementation 40 TL handovers (40 TLs giving handover, 40 TLs receiving handover) were audiotaped at the central ICU desk, during May-June 2011. To minimise the Hawthorne effect the research nurse positioned the audio recorder on the desk where handover occurred and the TL pressed record once handover commenced. Three months after the handover intervention had been implemented, 49 TL handovers (49 TLs giving handover and 49 TLs receiving handover) were observed during April-June 2016. As TLs were unable to carry the audio recorder as well as handover notes during bedside handover, data collectors attended walk around bedside handovers with the oncoming and outgoing nursing TLs to collect the data.

To reduce the chance of bias, a random number generator was used to randomly sample 1 TL handover from the 3 areas within ICU during the night to day (1900-0730hrs) and the day to night shift (0700-1930hrs) handover between Monday and Friday. Handovers were audiotaped or observed if the oncoming and outgoing nurses both provided consent to participate and had not been previously recorded or observed handing over. If the TL did not provide consent

or had been studied previously, the next randomly selected pair were approached and studied. Nurses were recorded or observed once giving handover and any number of times receiving handover. An interruption was defined as any sound or conversation that caused the handover to stop momentarily (Brixey et al., 2010; Westbrook et al., 2010). An audit tool was developed and included the frequency, source and reason for the interruption (Spooner et al., 2015) which was tallied from transcribed audio recordings or observed handovers. Demographic data collected included ICU area, gender, nursing level and hours worked of the outgoing TL handing over. The audit tool was scrutinised by an expert panel of six experienced nurses including 2 PhD prepared Nurse Researchers, a Quality and Safety Clinical Nurse Consultant, Clinical Nurse, Clinical Nurse Teacher and Clinical Nurse Consultant in ICU for face validity. There was 1 consistent observer that reviewed and categorised audio recordings and observed handovers in both phases of data collection. Audio recordings from audits carried out prior to implementation of the handover intervention were categorised by 1 Nurse Researcher and further scrutinised by 2 senior researchers. Following the handover intervention, 10 handovers were observed and audited by 3 nurses and answers were compared for agreement. Inter-rater reliability was established at ≥ 0.8 between all observers before data collection commenced.

Analysis

Descriptive statistics were used to summarise data from transcribed audio recordings and observed handovers. Interruptions were categorised into patient-

specific (interruptions that convey information relevant to overall patient safety) or personal and work-specific interruptions (interruptions with personal content or work-related content e.g., tasks not related to the patient) (Myers et al., 2016; Sasangohar et al., 2015a). Data are presented as median, interquartile range, frequency and percentages. A t-test was performed to identify any differences in interruptions before and after the intervention.

RESULTS

Before implementation of the handover improvement strategy

A total of 277 patient handovers were recorded at the central ICU desk, and included 64 interruptions or the equivalent to one interruption every 23 minutes or every fourth patient. Thirty (75%) of 40 TL handovers observed were interrupted (Table 4.4.3.1). Registered nurses (50/64, 78%), medical staff (5/64, 8%) and phone calls (4/64, 6%) were the main sources of interruptions (Table 4.4.3.1). Other sources to interrupt handover occurred two times or less (e.g., alarms, administration officer, patient buzzer, bedside emergency). The main reasons interruptions occurred were to discuss personal or work-specific content such as: greetings exchanged between nurses and the TL (e.g., thanking the TL for a good shift/asking permission to go home/saying goodbye); organisational discussions (admissions/discharges/sick calls) and personal conversations with minimal patient-specific interruptions such as patient updates (e.g., change in patient's management plan or health status during handover) (Table 4.4.3.2).

Table 4.4.3.1 ***Frequency of interruptions during Team Leader handovers at the ICU desk and bedside***

	ICU desk handover (n=40)				Bedside handover (n=49)			
	Total	Median	IQR	n (%)	Total	Median	IQR	n (%)
Handover time (mins)	896	23	8		1383	29	9	
Number of patients	277	7	2		322	7	3	
Number of interruptions	64				52			
Handovers interrupted				30 (75)				28 (58)

Table 4.4.3.2 ***Reasons nursing Team Leader handovers were interrupted***

	Desk handover (n=64) n (%)	Bedside handover (n=52) n (%)
Personal or work specific interruptions		
Greetings (Thank you, goodbye, permission to leave)	22 (34)*	21 (40)*
Organisational (Staffing, admissions)	16 (25)*	6 (12)*
Personal discussions	7 (11)*	3 (6)
Trolley (Kitchen, linen and stock trollies)	0	5 (10)*
Inquiries/assistance required	4 (6)	1 (2)
Patient specific interruptions		
Patient update	7 (11)*	5 (10)*
Emergency (MET call/patient arresting in ICU)	2 (3)	2 (4)
Investigations/results	1 (2)	3 (6)

*Top four reasons handover was interrupted

After implementation of the handover improvement strategy

A total of 322 patient handovers were observed at the bedside, and included 52 interruptions or the equivalent to one interruption every 29 minutes or every sixth patient. Twenty-eight (58%) of 49 TL handovers were interrupted (Table 1). Similar to handovers pre-implementation, nurses (36/52, 57%) and phone calls

(3/52, 6%) were the main source to interrupt handovers. However, other sources included wards people (orderlies) (5/52, 10%) and kitchen staff (4/52, 8%). Other sources to interrupt handover occurred three times or less (e.g., medical staff, alarms, administration officer and patient). While interruptions containing personal or work specific content, such as greetings exchanged between nurses and the TL (e.g., thanking the TL for a good shift/asking permission to go home/saying goodbye) and organisational discussions (admissions/discharges/sick leave calls) were common in both groups, other interruptions included linen and food carts wheeled through the handover group. There were also minimal interruptions containing patient-specific content such as patient updates (e.g., change in patient's management plan or health status during handover) (Table 4.4.3.2). While fewer interruptions occurred following the handover intervention, the difference in the frequency of interruptions between groups was not statistically significant (p-value=0.08).

DISCUSSION

This study compared the frequency, source and reasons interruptions occurred during nursing TL handover, both before and after the implementation of a handover intervention. Although there was a trend towards fewer interruptions after the handover intervention, the difference in frequency of interruptions was not statically significant. While most interruptions were initiated by nurses greeting the TL in both groups, interruptions varied between locations. Also, most interruptions before and after the handover intervention related to personal or work-specific content (greetings, personal discussions and

organisational), potentially contributing to miscommunication during handover and compromising patient safety.

The last decade has seen major changes to handover processes to improve communication and reduce adverse patient events. One of these initiatives is to relocate handovers from office and desk spaces to the bedside (Bradley & Mott, 2014; Jeffs et al., 2013). Unlike handovers conducted away from the bedside, bedside handovers allow nurses to visualise patients, conduct safety scans and prompts questions (Chaboyer et al., 2009). These changes have been associated with improved patient care and improved patient outcomes such as a reduction in medication errors, falls and skin tears (Bradley & Mott, 2012; Mardis et al., 2016). This study also showed that bedside handovers were associated with a trend towards fewer interruptions from clinicians, which may have been attributed to clinicians perceiving bedside handover as more official than handover at the desk and were less likely to interrupt handovers.

Along with a trend towards fewer interruptions following the handover improvement strategy, interruptions remained frequent. Sasangohar and colleagues identified that clinicians attempting to interrupt a nurse will regulate their interruptions based on the tasks being performed by the nurse (Sasangohar et al., 2015b). For instance, a light-emitting diode (LED) erected on top of the ICU room door, illuminated with the words “do not disturb” during high-risk tasks (e.g., medication administration, infusion set up, a procedure etc), showed a significant reduction in interruptions demonstrating that clinicians will delay nonurgent interruptions until a more suitable time (Sasangohar et al., 2015a). Perhaps the frequency of interruptions in our study could be attributed to the interrupter’s lack of information or understanding of the importance or level of risk associated with

handover. Interventions such as LED lighting informing clinicians not to interrupt handovers, may assist to reduce interruptions containing personal or work-specific content during nursing TL handover (Sasangohar et al., 2015a).

Alongside the frequency of interruptions, our findings indicate that the source and reasons interruptions occurred varied between locations. For instance, desk handovers attracted more interruptions from nursing and medical staff, while bedside handovers were interrupted by equipment such as kitchen and linen carts being wheeled through the middle of the handover group. Although bedside, face-to-face handovers are considered the most effective and safe approaches to carrying out high quality handovers (Chaboyer et al., 2009), the findings indicate positioning of the handover group during bedside handover should be considered to avoid work-specific interruptions and to also minimise the impact of bedside handover on other clinicians. A study examining nursing bedside handovers in the ward environment found that the geographical layout of some wards was not conducive to bedside handover without environmental changes to reduce local noise (Johnson & Cowin, 2013). Further work is required to understand and promote an environment that optimises bedside handover.

While interruptions are common, their effect on handover quality is uncertain (Feil, 2013). Several researchers have recommended categorising interruptions into patient-specific (positive, critical, necessary) and work-specific (nonurgent, waste, unnecessary) or personal to understand the frequency and impact of distractions in health care settings as an alternative to labelling all interruptions negatively (Myers et al., 2016; Rivera, 2014; Sasangohar et al., 2015a). Although interruptions were frequent in one study conducted in a cardiovascular ICU, most interruptions experienced by nurses were positive and conveyed information

about the patient or other work-related information indirectly affecting the patient (Sasangohar et al., 2015b). This study however, showed that personal or work-specific interruptions (greetings, organisational updates, personal discussions) outweighed patient-specific interruptions (patient updates, emergencies, test results) during nursing TL handover. Myers and colleagues suggest interruptions that provide value to patients should be supported through process improvements and those detrimental to patients should be targeted by continuous improvement efforts (Myers et al., 2016). Personal or work-specific interruptions may be challenging to reduce or eliminate due to policies, organisational and culturally embedded clinical practices however efforts to eliminate these distractions may be critical to ensuring nursing TLs provide informative, quality and timely handovers (Myers et al., 2016).

Implications for practice

This study demonstrated that a strategy to improve handover was associated with a trend towards fewer interruptions and variations between locations in the source and reason interruptions occurred. Also, most interruptions in both locations were personal or work-specific such as greetings exchanged with TLs. There are several strategies that can be introduced to minimise interruptions during handover. These include education about patient safety, incorporating an alert system that informs staff that an important task is underway and interruptions are not recommended and to utilise other nurses such as outgoing float/access nurses or bedside nurses that have finished handover, to intercept and manage interruptions during handover (Craig, Clanton, & Demeter, 2013; Sasangohar et al., 2015a).

Other strategies can be employed to reduce the impact of interruptions during handover. These include using a written or printed document or portable device containing structured handover information to accompany handover so that clinicians can revisit their notes if they are distracted, minimising memory loss and omission of critical information due to the interruption (Myers et al., 2016; Rivera-Rodriguez & Karsh, 2010; Thomas et al., 2017). McCurdie et al recommends education programs and quality improvement projects should focus on building resilience amongst nurses to buffer unsafe consequences of interruptions (McCurdie et al., 2017b). These strategies may benefit inexperienced clinicians that have had minimal exposure to busy clinical settings, to effectively manage interruptions and the delivery of high quality handovers.

Further work is needed to develop and test strategies to minimise interruptions that contain personal or work-specific content and to translate these strategies into practice. Conducting education sessions with nursing management, TLs and bedside nurses to reduce unnecessary interruptions appears warranted. During nursing TL bedside handover, TLs may consider a quick walk around the ICU bedside to greet staff prior to commencing handover, ensure the handover group is positioned away from the path of linen and kitchen carts accessing ICU areas and from bedside nurses conducting handovers. Also, as each health care setting is unique, interruptions will differ between settings. Interruption classification, along with the environment of the setting need to be considered to effectively reduce or manage the impact of interruptions in handover locations such as the ICU.

Limitations

The study was conducted in one ICU and contained a small sample size, therefore the results may not be generalizable but this ICU is typical of many Australian ICUs, with TLs overseeing the care of many patients, and specific handover times. Consequently, the data are likely to be reflective of many Australian ICUs and the findings provide a beginning to understand interruptions in this context. Also, nurses may have changed their behaviour during observational audits of handover. The quality and safety team however, conduct audits routinely in the unit and staff are used to being observed in practice. Although task completion during handovers was not examined, most nursing TLs used written or pre-printed handover notes that they could refer to reducing the likelihood of omitting information following an interruption. Furthermore, assessing the lag time to resume handover following an interruption may have provided insight into whether nurses compensated for the delay, if they were able to resume their task, if handover times changed and the quality of information delivered at handover.(Grundgeiger, Sanderson, MacDougall, & Venkatesh, 2010) As the handover intervention contained several elements, it is difficult to establish whether reductions in the frequency of interruptions during bedside handover were associated with the implementation strategy such as education sessions or the handover intervention such as the change in location from the desk to bedside or the use of a structured handover tool. Also, other factors occurring within the setting at the time of the study may have influenced the findings such as the busyness of the ICU, staffing levels and acuity of patients.

CONCLUSION

This QI study identified that interruptions during TL handover were frequent and were often personal or work-specific in nature. Relocating handover to the bedside, along with using a standardised eMDS to handover critical patient information that can be referred to following interruptions, may have the potential to reduce communication failures during handover but requires further investigation. Further measures are needed to reduce interruptions containing personal or work-specific content and to build resilience amongst nurses to manage the impact of interruptions during clinical handovers.

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