Barriers and facilitators to the implementation of an evidence-based electronic minimum dataset for nursing team leader handover: A descriptive survey

Amy J. Spooner RN, BN, Grad Dip ICU, PhD (Candidate)[b],

Leanne M. Aitken Int Care Cert, B HSc (Nurs) Hons, Grad Cert Mgt, Grad Dip Sc Med (Clin Epi), PhD, FACN, FAAN [a,b,c,d]

Wendy Chaboyer RN, BSc (Nurs) Honours, MN, PhD[a]

[a]NHMRC Centre of Research Excellence in Nursing, Menzies Health Institute Queensland, Griffith University, Gold Coast, Australia.

[b]School of Nursing and Midwifery, Griffith University, Nathan, Australia.

[c]Intensive Care Unit, Princess Alexandra Hospital, Woolloongabba, Australia

[d]School of Health Sciences, City University London, London, United Kingdom.

Corresponding author at:

Amy Spooner

Nursing and Midwifery Research Centre,

Royal Brisbane and Women's Hospital.

Herston. 4006

amyjspooner@gmail.com

Key words:

Intensive care unit, minimum dataset, handover, nursing, barriers, facilitators

Author contribution:

All authors declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere. We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship and are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us. We understand that the Corresponding Author is the sole contact for the Editorial process. She is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs.

ABSTRACT

Introduction

There is widespread use of clinical information systems in intensive care units however, the evidence to support electronic handover is limited.

Objectives

The study aim was to assess the barriers and facilitators to use of an electronic minimum dataset for nursing team leader shift-to-shift handover in the intensive care unit prior to its implementation.

Methods

The study was conducted in a 21-bed medical/surgical intensive care unit, specialising in cardiothoracic surgery at a tertiary referral hospital, in Queensland, Australia. An established tool was modified to the intensive care nursing handover context and a survey of all 63 nursing team leaders was undertaken. Survey statements were rated using a 6-point Likert scale with selections from 'strongly disagree' to 'strongly agree', and open-ended questions. Descriptive statistics were used to summarise results.

Results and Discussion

A total of 39 team leaders responded to the survey (62%). Team leaders used general intensive care work unit guidelines to inform practice however they were less familiar with the intensive care handover work unit guideline. Barriers to minimum dataset uptake included: a tool that was not user friendly, time consuming and contained too much information. Facilitators to minimum dataset adoption included: a tool that was user friendly, saved time and contained relevant information. Identifying the complexities of a healthcare setting prior to the implementation of an intervention assists researchers and clinicians to integrate new knowledge into healthcare settings.

Conclusion

Barriers and facilitators to knowledge use focused on usability, content and efficiency of the electronic minimum dataset and can be used to inform tailored strategies to optimise team leaders' adoption of a minimum dataset for handover.

INTRODUCTION

Clinical handover is an essential part of clinical care, that occurs several times in the day when there is a changeover of responsibility and accountability of some or all aspects of patient/s care from outgoing to oncoming health care clinicians and teams[1]. In the last decade, failures in communication during clinical handover have been identified as a major preventable cause of patient harm[2]. Gaps in communication have been linked to delays in diagnosis, patients receiving the wrong treatment, breakdown in continuity of care and life threatening adverse events leading to longer hospital stays and increased healthcare expenditure[1]. Improving communication during clinical handover is a major safety goal led by the World Health Organization[2], the Joint Commission in the USA[3] and more recently the Australian Commission on Safety and Quality in Healthcare (ACSQHC)[4]. This has led to the development of policies, guidelines and handover resources to standardise the content and process of clinical handover.

Although various handover tools have been implemented successfully in ward areas, there are limited resources available for use in the intensive care (ICU) setting. The ICU is an event-driven, time-pressured environment; patients are critically ill and require timely care at a moments notice[5]. The complex and multidisciplinary nature of the ICU environment renders it susceptible to medical errors. While there is published research related to ICU bedside nursing handover[6, 7], handover between theatre and ICU[8-11], emergency to ICU[12], multidisciplinary handover in the ICU[7], end of life care[13] and interruptions during handover[14, 15], little is known about ICU team leader (TL) handover or the use of electronic handover tools in the ICU.

Unlike ICU bedside nurses who care for one or two patients per shift and discuss detailed patient information at handover, nursing TLs not only oversee care provided by bedside nurses, they are responsible for the coordination and management of multiple critically ill patients in the ICU. Currently in Australian ICUs, clinical information systems (CIS) are being rolled out and will lead to ICUs being paperless settings[16, 17]. While there are reported

benefits of CIS such as increased efficiency and decreased handover and ward round times, there is a severe lack of evidence-based handover tools within CIS, adding another layer of complexity to clinicians and nursing TLs being able to carry out structured, informative and succinct handovers in the ICU[18-20]. Previous work has identified the content required for nursing TL shift-to-shift handover, informing the development of an evidence-based electronic minimum dataset (MDS) for nursing TL shift-to-shift handover but integrating new evidence such as a MDS into practice may be challenging[21].

Translation of evidence into practice is a dynamic and interactive process aimed at strengthening the healthcare system by improving treatment and care provided to patients[22]. Knowledge translation however, can be hindered by a multitude of factors such as the size of the facility, cultural and social setting[23] leading to inadequate uptake of evidence-based practice in healthcare settings[24]. The use of knowledge translation frameworks is one strategy gaining popularity among clinicians to breakdown the knowledge-translation gap[25, 26]. Potential benefits include a structured and systematic process to integrate new knowledge into practice, resulting in greater likelihood of adoption and sustainability[26-29].

Knowledge To Action (KTA) is one of the most frequently used conceptual frameworks for knowledge translation[26]. Developed by Graham and colleagues in the 2000s, the KTA comprises of two components: Knowledge Creation and the Action Cycle. Each component involves several phases which overlap and can be iterative. Using the KTA framework (phase three of the action cycle), the aim of this study was to assess the barriers and facilitators to the use of an evidence-based electronic MDS for nursing team leader shift-to-shift handover to assist with the design of implementation strategies prior to its application in the ICU.

METHODS

Setting

A cross-sectional descriptive survey was conducted during December 2015 in a 21-bed (government funded) adult medical/surgical ICU, specialising in cardiothoracic surgery at a tertiary referral hospital, in Queensland, Australia. There were 180 registered nurses employed in the ICU including 63 senior registered nurses 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 (21 of 27 beds funded with staff to care for patients); and coordinated by one TL. Ethical approval was obtained by the institutional (HREC/10/QPCH/5) and university (NRS/09/13) Human Research Ethics Committee.

Participants

All senior ICU registered nurses (Grade 5 and 6 registered nurses) involved in TL handover (n=63) were invited to participate in the study. Grade 5 nurses have successfully completed the ICU transition program (a 12-month extended orientation program comprised of self-guided study modules and written assessments, clinical skills practice and practical assessments to facilitate and support nurses with little or no ICU experience) or equivalent and TL educational package, while grade 6 nurses have in addition a Graduate Certificate in Intensive Care Nursing. All TLs worked across the three ICU areas. Potential participants were told about the study at staff meetings and written consent was obtained prior to study commencement. Consent was also confirmed verbally at the time of data collection. Participant information sheets and consent forms were sent via internal mail to all nursing staff who met the inclusion criteria (senior ICU registered nurses involved in team leader handover).

Data collection

Surveys were distributed to all TLs and an opaque envelope to collect completed surveys was provided. Eligible participants were reminded to complete the survey via weekly emails and coloured posters in each ICU area for a month (i.e., four reminders). The 36-item survey instrument “Attitudes Regarding Practice Guidelines” was originally developed by Cabana and

colleagues to examine general knowledge, attitudes and behaviours of healthcare professionals towards practice guidelines in general and specific areas of interest like the Hand Hygiene Guideline[30, 31]. This survey tool has been successfully used to identify barriers and facilitators to knowledge use in several studies[32, 33] and was adapted to the ICU clinical handover context. Wording of questions was modified to include ICU specific content to identify barriers and facilitators to MDS use amongst TLs. The tool used a 6-point Likert scale with selections from 'strongly disagree' to 'strongly agree', and consisted of three sections 1) demographics (gender, employment position and level, total number of years as a registered nurse, TL and years worked in the ICU), 2) attitudinal statements about general ICU guidelines (14-items) and 3) attitudinal statements (20-items) and dichotomous questions relating to ICU handover guidelines. In addition, participants were asked four open ended questions regarding factors that would either facilitate the use of a 1) structured handover tool or 2) an electronic MDS or impede the use of a 3) structured handover tool or 4) an electronic MDS at handover and to self-report how often electronic and paper handover templates were used during handover.

Construct validity of the tool's domains was originally confirmed by hypothesis testing in Cabana and colleagues' previous work[31]. The survey tool was modified for use in the current study and underwent further scrutiny by a panel of ICU experts including a PhD supervisor, a Quality and Safety Clinical Nurse Consultant, Clinical Nurse, Clinical Nurse Teacher, Clinical Nurse Consultant and Nurse Researcher in ICU. The panel assessed readability, understandability, ease of response, and content validity (face validity and content validity index) and relevant revisions were made until the content validity index reached more than 0.8 agreement[34, 35]. The survey tool was pilot tested at two different time points by ten TLs in the ICU and reliability percentages were calculated to examine both test-retest reliability and internal consistency (93% of nursing team leaders had perfect agreement or 1-point difference in responses at two time points) of overall barriers and facilitators.

Data analysis

Descriptive statistics were calculated to provide a summary of barriers and facilitators to knowledge use relating to general ICU and handover ICU work unit guidelines, handover structure and electronic MDSs. Because of a lack of evidence in this area there was no rationale to develop or test hypotheses. Thus, the analysis was descriptive. Data are presented as median, interquartile range and frequencies (percentages) (Fink, 2009). The frequency of recurring responses to dichotomous and open ended questions were also summarised.

RESULTS

At the time of data collection, 63 TLs were employed in the ICU. Thirty-nine TLs completed the survey, for a response rate of 62%. Most participants were female and experienced registered nurses that had been working in ICU for more than 15 years in part-time or full-time positions (Table 1). Respondents predominantly used a paper handover form (n=36) to conduct handover as well as templates from the CIS (n=16) and other prompts (n=8) (e.g. a typed medical handover summary, Wardview database). One TL used no prompts (no paper or CIS templates) to carry out handover.

Table 2 reports on the barriers and facilitators to the use of an electronic MDS for nursing TL handover. Most nursing TLs were familiar with ICU work unit guidelines and agreed they were readily available, important, standardised care, improved nurses' knowledge and patient outcomes (median 5) however, just over half of the respondents were aware or had read the ICU clinical handover work unit guideline. Although the use of general work unit guidelines rated higher than handover guidelines, most TLs considered the introduction of a structured, electronic handover tool would be beneficial to ICU patients. TLs surveyed agreed that the ICU clinical handover work unit guideline would assist TLs to deliver handovers containing relevant content and decrease the likelihood of miscommunication during handover (median 4).

Thirty-two TLs surveyed made recommendations to facilitate use of a structured, electronic handover tool (Table 3). Items recommended more than three times relating to the structure of the MDS included: a tool that was user friendly, containing relevant patient information, structured, consistent and saves time. Items relating to the electronic handover tool included: a tool that was user friendly, containing relevant and up to date patient information.

Twenty-six nurses surveyed suggested factors that would impede the use of a structured, electronic handover tool (Table 4). Barriers to the use of a structured handover tool included: a tool that is not user friendly, contains too much information and is time consuming. Factors that would impede the use of an electronic handover tool included: a MDS that was time consuming, slow to upload and not user friendly.

DISCUSSION

The KTA framework influenced the investigators' decision to examine the barriers and facilitators to nursing team leaders' uptake of an electronic MDS for shift-to-shift handover in preparation for implementation in the ICU. Participants were experienced nurses that had been working in ICU and team leading for many years and used a variety of paper and electronic templates to conduct handover. Overall, TLs used general ICU work unit guidelines to inform practice however, TLs were less familiar and likely to use the ICU handover work unit guideline to guide handovers. This was unexpected because TLs would be expected to model best practices including the use of unit protocols and work unit guidelines. Several barriers and facilitators related to the usability of the MDS, content and efficiency of the handover tool.

Identifying the complexities of a healthcare setting prior to the implementation of an intervention is one of several phases in the KTA framework that assists researchers and clinicians to integrate new knowledge into healthcare settings[27]. Through engaging with key stakeholders, barriers and facilitators to change can be identified. In this context nurses

identified barriers related to the structure of the handover tool which can be used to inform the format and layout of MDSs prior to use in the ICU. In addition, they identified barriers relating to knowledge deficits around ICU handover work unit guidelines and nurses reported using multiple templates to conduct handover. The use of multiple templates to conduct handover limits nurses' ability to carry out structured handovers and has the potential to lead to inaccurate or omission of critical patient information which could result in serious adverse patient events[9, 36]. These findings can inform implementation strategies targeting barriers (e.g. knowledge deficits) to optimise knowledge and handover practices and promote adoption of the MDS to improve handover and patient safety in the ICU.

Knowledge translation in healthcare settings is imperative to ensure clinicians are providing a high standard of patient care that optimises patient outcomes however, it is also important to ensure evidence-based interventions are relevant to the user and clinical setting to enhance clinician adoption[25]. Although the content of the electronic MDS for ICU nursing TL handover was based on a previous study that identified the content items required in a MDS to meet TL needs, the results indicate that usability, structure, consistency and efficiency of the tool were key determinants that would facilitate nurses' uptake of the tool. These findings highlight the importance of creating an electronic MDS interface within the CIS that facilitates seamless and time-saving handovers and content that is pertinent to the clinician and clinical setting.

The introduction of CIS containing applications for electronic clinical handover is gaining popularity with some studies reporting increased efficiency, reduced time spent handwriting notes, decreased duration of handovers and ward rounds, increased adherence to handover protocols and finishing work on time[18, 37]. The findings however, indicate that an inefficient electronic MDS (time consuming, slow to upload and not user friendly) would impede nurses' acceptability and willingness to use an electronic MDS for handover; and the advantages of electronic applications listed above would not be realised. According to Davis' Technology Acceptance Model, perceived usefulness and ease of use are main predictors of patient

acceptance of consumer health information[38]. This may also apply to nurses and other health professionals' motivation to use an electronic MDS for handover. Usability is achieved through ensuring the program (electronic MDS) can be used by a population (nursing TLs in ICU) to achieve goals with effectiveness, efficiency and satisfaction within a specific context (handover) [39]. Therefore, when developing and implementing electronic handover tools it is important to form interdisciplinary partnerships, work with a skilled information technology team to build a flexible interface that can be modified to accommodate user needs, meet national and local standards and support the application's reliability and end-user satisfaction[39-41].

Recommendations for practice

Identifying the barriers and facilitators to knowledge use, a phase in the KTA framework, is imperative to identifying the challenges researchers and clinicians may face when implementing a new intervention into practice. These findings will inform future research to select and develop strategies to translate knowledge into practice[27]. It is clear these strategies will need to complement the facilitators and target the barriers identified in this study such as knowledge deficits relating to handover and the structure and usability of the tool prior to implementation in the ICU. Further, managers and directors can use these findings to provide leadership and resources to support researchers and clinicians with the implementation of evidence-based strategies into healthcare settings, thereby improving patient care and outcomes.

Paperless ICUs that rely on CIS is the way of the future[42]. The integration of evidence-based handover interfaces into CIS is critical to ensuring nursing TLs are communicating effectively during handover, carrying out a high standard of care and maintaining patient continuity despite multiple shift changes. The use of theoretical frameworks that focus on user-task-system-interaction to promote usability is needed to guide the implementation and evaluation process of electronic interfaces in healthcare settings[39, 41, 43].

Limitations of the study

The study was conducted in one ICU therefore the barriers and facilitators may not be generalizable to other ICUs. However, the barriers and facilitators resonate with the theoretical literature and empirical evidence on the need for user friendly CIS in general. The CIS is currently being rolled out in ICUs globally and the study could be replicated at other sites prior to implementation of electronic interfaces. Furthermore, the lack of knowledge in this area led to a descriptive study. This, along with the small sample size precluded hypothesis testing. Despite a small sample size there was a good response rate and the findings are representative of nursing TLs' in the ICU. Also, the original survey tool was modified for the ICU context, therefore the survey underwent further psychometric testing and demonstrated evidence of its reliability and content validity.

CONCLUSION

It is essential that researchers and clinicians understand the complexities of healthcare settings prior to implementing practice changes. Our findings indicate that handover knowledge, usability, relevance of information and efficiency of the electronic MDS are factors that either impede or facilitate TLs' adoption of the tool. This knowledge enables researchers and clinicians to develop strategies that target barriers (e.g. education) and complement facilitators (MDS contains relevant content) to optimise clinician uptake of change. Theoretical frameworks help to streamline the implementation and evaluation process, thereby reducing the knowledge-translation gap. Study findings will inform future strategies used to implement an electronic MDS for nursing team leader shift-to-shift handover.

ACKNOWLEDGEMENTS

The investigators would like to thank Mary Wheeldon, Leanne Parsons, Nicola Sharpe, India Lye, Amanda Corley, Marc Ziegenfuss, and medical and nursing staff from the ICU for their support, encouragement and participation in this project.

FUNDING SOURCE

This work was supported by the Babe Norman PhD Scholarship awarded by the Nurses Memorial Centre which is greatly appreciated.

CONFLICT OF INTEREST

There are no conflicts of interest to declare.

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Table 1 Participant demographics (n=39)

Demographics	Frequency (%)	Median	IQR
Work status			
Full-time	16 (41)	36hrs/wk	10
Part-time	22 (56)		
Age			
≤ 25	0 (0)		
26-30	2 (5)		
31-35	7 (18)		
35-40	7 (18)		
41-45	9 (23)		
46-50	5 (13)		
51-55	4 (10)		
56-60	2 (5)		
61-65	2 (5)		
≥ 66	0 (0)		
Gender			
Male	3 (9)		
Female	31 (91)		
Nursing grade			
Grade 5 Registered Nurse	10 (28)		
Grade 6 Clinical Nurse	26 (72)		
Number of years nursing			
≤ 5	0 (0)		
6-10	6 (16)		
11-20	14 (37)		
≥ 21	18 (47)		
Number of years working in ICU		15	8
Number of years working as a team leader		13	8

Table 2 Barriers and facilitators to the use of an electronic minimum dataset (n=39)

Questions	Median	IQR	Frequency (%)
ICU WUGs			
I am familiar with work unit guidelines in ICU	5	1	
WUGs help to improve my knowledge in ICU	5	0	
There are so many WUGs it is nearly impossible to keep up	2	2	
In ICU, I find WUGs readily available	5	1	
I don't have time to stay informed about available WUGs	1	1	
WUGs are practical to use	4	1	
Generally, WUGs are cumbersome and inconvenient	1	1	
WUGs are difficult to apply to my specific practice	1	1	
In ICU, WUGs are important	5	0	
WUGs improve patient outcomes	5	1	
WUGs interfere with my professional autonomy	1	1	
Generally, I would prefer to continue my routines and habits rather than use WUGs	1	1	
I am not really expected to use WUGs in ICU	0	1	
WUGs help to standardise care	5	1	
Clinical handover WUGs			
I am aware that Clinical Handover ICU WUG exists			26 (67)
I have read the clinical handover ICU WUG			24 (62)
I conduct handover in line with the ICU Clinical Handover WUG			24 (65)
The Clinical Handover WUG is readily accessible if I want to refer to it	4	2	
If I use the Clinical Handover WUG in ICU, it will decrease the likelihood of miscommunication during nursing team leader handovers	4	1	
If I follow the Clinical Handover WUG it is likely that my TL handovers will contain relevant information	4	0	
Handover structure			
A structured TL handover tool would be beneficial to ICU patients	4	0	
The ICU NUM/CNC expects me to use a structured handover tool during TL handover	4	1	
Use of a structured handover tool will be based on sound scientific evidence	4	1	
I don't wish to change my handover practices, when a structured handover tool is implemented for TL handover	1	1	
A structured handover tool for TL handover has the potential to be cumbersome and inconvenient	1	2	
I do not have time to use a structured handover tool for TL handover	1	1	
Electronic handover tool			
An electronic handover tool would be beneficial to ICU patients	4	1	
I do not wish to change my handover practices, when an electronic handover tool is implemented for TL handover	1	1	
An electronic handover tool has the potential to be cumbersome and inconvenient	3	2	
I would prefer to use an electronic handover tool rather than a paper based handover tool	3	2	
I do not wish to carry out TL handover at the bedside	1	2	
At TL handover, I use the following items to conduct handover			
Paper handover form	(3 unknown)		36 (100%)
Metavision templates	(3 unknown)		16 (44%)
Nothing			0
Other	(3 unknown)		8 (22%)

0=Strongly disagree, 1=Disagree, 2=Somewhat disagree, 3=Somewhat agree, 4=Agree, 5=Strongly agree
*WUG – work unit guideline
**TL- team leader
*** NUM – Nurse Unit Manager
****CNC – Clinical Nurse Consultant

Table 3 Facilitators to the use of a structured electronic minimum dataset for nursing team leader handover (n=32)

Structure	Frequency (%)	Electronic MDS	Frequency (%)
User friendly (simple)	11 (32%)[+]	User friendly	15 (47%)[+]
Saves time	8 (25%)[+]	Contains relevant information	7 (22%)[+]
Containing all information	7 (22%)[+]	Up to date	4 (13%)[+]
Consistent	6 (19%)[+]	Saves time	4 (13%)[+]
Structured/comprehensive	6 (19%)[+]	Quick to use	3 (9%)
Succinct	3 (9%)	Succinct	3 (9%)
Reduced interruptions	2 (6%)	Reliable	2 (6%)
Dependent on number of patients in ICU	1 (3%)	Structured	2 (6%)
Easy to access	1 (3%)	Easy to add information	1 (3%)
Flexible	1 (3%)	Facilitates bedside handover	1 (3%)
Improved patient outcomes	1 (3%)	Limited abbreviations	1 (3%)
Supported from line managers	1 (3%)		
Tried and tested	1 (3%)		
Up to date	1 (3%)		

[+] Items recommended more than three times by team leaders

Table 4 Barriers to the use of a structured electronic minimum dataset for nursing team leader handover (n=26)

Structure	Frequency (%)	Electronic MDS	Frequency (%)
Not user friendly	7 (27%)[+]	Slow to upload	6 (23%)[+]
Time consuming	5 (19%)[+]	Time consuming	6 (23%)[+]
Too much information	5 (19%)[+]	Not user friendly	4 (15%)[+]
Access	2 (8%)	Access	2 (8%)
Different structure	2 (8%)	Font big enough to read	2 (8%)
Missing information	2 (8%)	Information in different areas	2 (8%)
Cluttered	1 (4%)	Information not accurate	2 (8%)
Not up to date	1 (4%)	Learning how to use it	2 (8%)
Staff resistant to change	1 (4%)	Staff resistant to change	2 (8%)
		Cumbersome	1 (4%)
		Device not working	1 (4%)
		Losing device	1 (4%)
		Need a mobile device	1 (4%)
		Time to prepare	1 (4%)
		Uniformity	1 (4%)

[+] Items recommended more than three times by team leaders