

✧ RESEARCH PAPER ✧

Impact of a modified nursing handover model for improving nursing care and documentation in the emergency department: A pre- and post-implementation study

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Impact of a modified nursing handover model for improving nursing care and documentation in the emergency department: A pre- and post-implementation study

The aim of this study was to evaluate whether implementation of a new nursing handover model led to improved completion of nursing care activities and documentation. A pre- and post-implementation study, using a survey and document audit, was conducted in a hospital ED in Melbourne. A convenience sample of nurses completed the survey at baseline ($n = 67$) and post-intervention ($n = 59$), and the audit was completed at both time points. Results showed significant improvements in several processes: handover in front of the patient ($P < 0.001$), patients contributed and/or listened to handover discussions ($P < 0.001$), and provision of adequate information about all patients in the department ($P < 0.001$). Nurses also reported a reduction in omission of vital signs ($P = 0.022$) during handover. Three hundred sixty-eight medical records were audited in the two study periods: 173 (pre-intervention) and 195 (post-intervention). Statistically significant improvements in the completion of two nursing care tasks and three documentation items were identified. The findings suggest that implementation of a new handover model improved completion of nursing care activities and documentation, and transfer of important information to nurses on oncoming shifts.

Key words: documentation, ED nursing, nursing handover, patient safety, quality improvement.

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INTRODUCTION

Handover in the health-care setting is recognized as an opportunity for error. Information can be lost,

inaccessible or forgotten during the interaction.¹ Shift-to-shift handover is a key process for the transfer of information. The Australian Commission on Safety and Quality in Health Care² (ACSQHC) (p. 4) defines clinical handover as '(t)he transfer of professional responsibility and accountability for some or all aspects of care for a patient, or group of patients, to another person or professional group on a temporary or permanent basis'.

Gaps in communication during handover can lead to serious adverse events, including medication errors, treatment and diagnostic delays, inappropriate treatment, and omission of care.³⁻⁵ In a report by the United States (US) Joint Commission,⁶ it was reported that breakdown in communication was the leading cause of delay in treatment, resulting in death or permanent loss of function, in the period 2004 to 2013. In Australia, Wilson *et al.*⁷ examined 14 000 hospital admissions for 28 hospitals in two states. An adverse event resulting in a disability or longer hospital stay occurred for 17% of cases. Of those, 11% were caused by some form of communication breakdown. Hence, handover problems are a global concern. Health-care quality bodies, including the US Institute for Healthcare Improvement (IHI),¹ ACSQHC,⁸ British National Patient Safety Agency⁹ and World Health Organization (WHO)¹⁰ advocate the implementation of standardized approaches, training on effective handover communication and development of strategies to enhance the ways in which clinicians communicate and acquire information during handover.

There has been considerable focus on inter-shift nursing handover over the past decade in Australia¹¹⁻¹³ and internationally.¹⁴⁻¹⁷ Handovers have been shown to be time consuming, inconsistent and varied in style.¹⁸⁻²⁰ Catchpole *et al.*²¹ identified that health-care professionals were concerned about poor awareness of handover protocols; poor team coordination; time pressure; lack of consistency in handover practice; and poor communication of important information.

Various strategies have been developed to enhance the effectiveness and efficiency of nursing handover, including standardized approaches,^{13,22-29} bedside handover^{11,15,30-33} and technology.³⁴ The majority of these models have been evaluated in inpatient settings; few have been conducted in EDs.^{29,35,36} In the UK, Currie³⁵ identified handover problems, including missing information, distractions and breaches of confidentiality. In Australia, Wilson²⁹ reported on the development of a mnemonic titled 'PVITAL' (P: present patient by name, V: vital signs, I:

input/output, T: treatment and diagnosis, A: admission or discharge, L: legal and documentation) that was designed to guide and improve handover processes in the ED setting. Respondents in that study reported benefits, including enhanced learning and patient experience and preference for a structured approach.

Preliminary research at the ED in which this study was conducted³⁶ found that nursing handover often lacked important information, was rarely conducted in front of the patient and medication charts were rarely sighted during this activity.³⁶ Nurses also reported a preference for handover to be conducted for allocated patients only, to be performed at the patient's bedside, and systematically cover essential information including patient detail, presenting problem, treatment, nursing observations and the proposed future plan. Arising from these concerns, a structured and systematic handover framework was developed (Fig. 1). The framework was specifically modified to address deficits in nursing care practice. For example, emphasis was placed on viewing the patient's charts for medication, vital signs and fluid balance. This provides an opportunity for omissions of information, documentation, or care to be identified and addressed at the commencement of a shift.

The aim of this study was to evaluate whether implementation of a new nursing handover model resulted in improved completion of nursing care activities and documentation.

METHOD

Design

A pre- and post-implementation study was undertaken using a survey and audit.

Sample and setting

The study was conducted in a mixed adult and pediatric ED of a teaching hospital in Melbourne, Victoria, Australia. A convenience sample of nurses working in the department completed the survey. Eligible participants included all permanent and casual nursing staff employed on any shift during the designated 5 day data collection periods.

The sample size for each data collection approach was dependent on the proportion of patients and staff present during the study period, and funds restricted extension of the study period. Hence, a formal sample size calculation was not performed.

HANDOVER GUIDE			
1 Introduction & Alerts	Cubicle No: _____	ALERTS: <input type="checkbox"/> ID Band <input type="checkbox"/> Infections <input type="checkbox"/> Allergy <input type="checkbox"/> Behavioural <input type="checkbox"/> NFR	PSYCH PATIENTS: <input type="checkbox"/> Voluntary <input type="checkbox"/> Not voluntary
S Situation/problem			
B Background	<input type="checkbox"/> RELEVANT med. history e.g. COPD, IHD, Schizophrenic <input type="checkbox"/> Family History <input type="checkbox"/> Social History <input type="checkbox"/> Diabetes		
A Assessment & Progress			
N Nursing needs	<input type="checkbox"/> Fluid Restriction <input type="checkbox"/> Independently ambulant <input type="checkbox"/> Full Ward Test / Beta HCG	<input type="checkbox"/> Can eat/drink <input type="checkbox"/> Incontinent	
PLAN What is the plan? Outstanding issues/tests?	<input type="checkbox"/> Seen by Unit Unit: _____ <input type="checkbox"/> Care Coordination (IRS)		
CHECK Check Charts	<input type="checkbox"/> Fluid Balance Chart <input type="checkbox"/> IV Therapy Chart <input type="checkbox"/> Medication Chart <input type="checkbox"/> Nursing Chart	<input type="checkbox"/> IV Cannula <input type="checkbox"/> Next of Kin <input type="checkbox"/> Valuables	
ACT Nurse-in-charge or Senior Medical Officer notification required if:	The following clinical markers are documented: - Clinical concerns about a patient's condition - T > 38.5 - GCS ↓ by 2 - Pain > 3/10 AND vital signs recorded outside the parameters below		
Child < 1y SaO ₂ < 92% (on RA) RR > 60 HR < 100 or > 180 BP sys < 60	Child 1-4y SaO ₂ < 92% (on RA) RR > 40 HR < 90 or > 180 BP sys < 70	Child 5-12y SaO ₂ < 92% (on RA) RR > 30 HR < 80 or > 140 BP sys < 80	Adult or Child > 12y SaO ₂ < 92% (on RA) RR > 30 HR < 50 or > 120 BP sys < 90

Figure 1. The ED structured nursing handover framework.

Data collection

Survey

The 'Clinical Handover Staff Survey',^{12,19} was adapted for the study to better fit the ED setting. Details about the structure of the survey, used in a pilot study at the same organization, have been previously reported.³⁶ However, for this study, only two of the three previously used sections were used. The omitted section included general questions which elicited opinions about nursing handover which was not an objective of the current study. The first section collected six demographic items of data (age, gender, duration of registration as a nurse, duration of employment within the organization, current position and employment status). In the second section, participants responded to a series of statements ($n = 21$) related to perceptions of nursing handover using a Likert-type scale

of seven categories, ranging from 'strongly disagree' (1) to 'strongly agree' (7). Questions such as 'Information was presented in a systematic and organized way' and 'The way in which information was provided to me was easy to follow' were asked.

Survey data were collected across two distinct 5 day phases: pre-implementation (pre) February 2011, post-implementation (post) December 2011. To enhance memory recall in each phase, nurses were asked to complete the questionnaire within 2 h of completing nursing handover and performing a clinical assessment of their assigned patients.

Audit

Audit data were collected, on an explicit data form, by reviewing current ED patients' records and by direct

observation (identification bracelet, allergy bracelet). No demographic or health information was collected. Rates of completion of nine routine nursing activities, identified by the research team as important activities for the ED setting, were included in the audit: five nursing practice activities (confirmation of medical prescriptions for intravenous therapy and medications, medications administered as prescribed, patient identification bracelet *in situ*, allergy identification bracelet *in situ*, as required) and four relating to nursing documentation (intravenous cannula insertion, next of kin details, management of valuables, intravenous therapy in progress). These nursing practice items were specifically identified as tasks that could be enhanced by a modified handover practice. In regard to whether a medical prescription was available for intravenous therapy and medications, it was considered a nursing responsibility to ensure that a prescription was present for medication that was administered.

Audit data were collected across two distinct 5 day phases: pre-implementation (pre) June 2011, post-implementation (post) December 2011. In each phase, nurses were aware that nursing notes were being examined; however, they were not informed about the specific variables being collected.

Procedure

Prior to introduction of the new structured handover model, the process was undertaken in a large glass enclosed area located away from the clinical area, and was carried out by the nurse-in-charge of the outgoing shift to those on the incoming shift. Shift-to-shift nursing handover in the ED generally occurs three times per day: morning, afternoon and night. Preliminary data suggested that there were problems with completeness of nursing documentation and some aspects of nursing care.³⁶ In that study, nurses employed in the ED identified that previous handover structures threatened continuity of care. The ED structured nursing handover framework was developed and introduced as a deliberate strategy to enhance the quality of nursing handover, nursing practice and documentation in the organization in which this study was conducted. The notepads (Fig. 1) encouraged nurses to use a standardized approach to the delivery of handover, which included emphasis on nursing care needs, the treatment and disposition plan, and prompts for important nursing care elements (medication chart, vital signs, fluid balance, vital signs).

The new model (Fig. 1) was based on the ISBAR (Identify, Situation, Background, Assessment and Recommendation) handover approach, recommended by Thompson *et al.*,²⁷ and subsequently modified specifically to address deficits in nursing care practice in this ED context. The new model, introduced in August 2011, and previously reported by Klim *et al.*,³⁶ includes the following features: (i) a systematic approach; (ii) conducted at the bedside; (iii) involvement of the patient and/or relative; (iv) viewing of patient charts during handover; and (v) a preliminary group handover for general information about unstable patients and overall status of the department. The model also emphasizes nursing care needs and the treatment and disposition plan, and includes prompts for important nursing care elements (medication chart, vital signs, fluid balance, vital signs). The notepads, individual forms in a pad for separate use, were designed to provide prompts for the nurse to inform the nurse-in-charge or treating doctor of the deteriorating patient. The structure of the new model follows recommendations for minimum datasets for clinical handover.^{34,37}

Ethical issues

Ethics approval was obtained from the institutional ethics panel from the organization in which the study was performed. For the survey, eligible participants were informed about the study via written information that provided detailed information about their participation. Completion and submission of the survey was interpreted as implied consent. For the audit, individual patient consent was not required as the study was considered a quality improvement activity, and no identifying information was collected.

Data analysis

Survey and audit data were entered into an Excel spreadsheet (Microsoft, Mountain View, CA, USA) and then imported into IBM SPSS³⁸ for analysis. For the survey, chi-square was used to compare categorical data, and *t*-test was used to compare continuous data. To eliminate categories that have a small number of observations, responses were collapsed into three categories for analysis: negative ('strongly disagree', 'disagree', 'slightly disagree'), neutral ('neither agree nor disagree') and positive ('slightly agree', 'agree' and 'strongly agree') response. For the audit, data were compared for rates of completion of nursing care activities and documentation items in each phase. Chi-square was used to compare categorical data,

and Fisher's exact test was used where cells contained less than five responses.

RESULTS

A total of 126 surveys were completed in the two study periods: pre ($n = 67$) and post ($n = 59$). The majority of respondents were women (92.9%, $n = 117$) and more than half were less than 29 years of age (56.3%, $n = 71$) (Table 1). No differences were observed between the two groups in relation to age group, gender, employment position, full-time employment or registration and employment duration.

For survey items, statistically significant differences were observed for four items (Table 2). Nurses reported

Table 1 Comparison of participant characteristics for pre- and post-intervention phases

Variable	Pre		Post		<i>P</i> value	
	<i>n</i>	%	<i>n</i>	%		
Female gender	61 [†]	91.0	56	94.9	0.500	
Age group					0.782	
< 25	17	25.4	14	23.7		
25 to 29	20	29.9	20	33.9		
30 to 34	9	13.4	10	16.9		
35 to 39	4	6.0	4	6.8		
> 39	15	22.4	11	18.6		
Position					0.512	
ANUM	1	1.5	0	0.0		
CNS	5	7.5	3	5.1		
Grad	8	11.9	7	11.9		
RN	50	74.6	44	74.6		
EN	3	4.5	3	5.1		
Hours employed					0.896	
Full-time	10	14.9	10	16.9		
Part-time	48	71.6	40	67.8		
Bank	9	13.4	9	15.3		
		Mean	SD	Mean	SD	
Registration duration		7.8	8.0	7.3	5.7	0.373
Employment length at WH		5.5	5.3	4.5	3.4	0.236

[†] Not all respondents completed all survey items; hence, for some items figures do not reflect the total score. ANUM, associate nurse unit manager; CNS, clinical nurse specialist; EN, enrolled nurse; Grad, first year graduate nurse; RN, registered nurse.

that 'handover was conducted in front of the patient' (pre: 62.5%; post: 93.1%; $P < 0.001$) and that 'patients had the opportunity to contribute and/or listen to handover discussions' (pre: 42.2%; post: 80.7%; $P < 0.001$) at an increased rate after implementation of the new handover approach.

Respondents were less likely to report that 'important vital sign observations are often omitted from nursing handover' (pre: 50.0%; post: 32.2%; $P = 0.022$) after implementation of the new handover approach. In addition, a greater proportion of nurses reported that they had been provided with adequate information about all patients in the ED in the post-intervention phase (pre: 26.6%; post: 67.8%; $P < 0.001$).

A total of 368 medical records and patient observations were audited in the two study periods in the ED: 173 in the pre-intervention phase and 195 in the post-intervention phase. As shown in Table 3, statistically significant improvements in completion of two nursing care tasks and three documentation items were identified. Firstly, patients with allergies to medication were more likely to be wearing an allergy alert band (pre: 51.2%, post: 82.0%; $P = 0.002$). Secondly, patients were more likely to be wearing an identification bracelet (pre: 80.3%, post: 94.4%; $P < 0.000$). Finally, increased rates of documentation were observed for intravenous cannula insertion (pre: 82.6%, post: 94.1%; $P = 0.002$), management of valuables (pre: 46.5%, post: 65.9% $P = 0.001$) and intravenous therapy recorded on the fluid balance chart (pre: 38.7%, post: 60.8%; $P = 0.018$).

DISCUSSION

This paper has described perceived (survey responses) and observed (medical record and patient observation audit) improvements in the quality of the handover process, as evidenced by enhanced completion of nursing care tasks and documentation after the introduction of a new model of ED nursing handover. Nurses reported that handover was more likely to occur at the patient's bedside in the ED cubicle, and that the patient was able to contribute to the handover episode. It was also their perception that they were more likely to receive important patient information regarding medication and vital signs, and essential information about all patients in the ED. The audit found improvements in aspects of nursing practice (patient identification and allergy bracelet) and documentation (intravenous cannula, intravenous therapy, and valuables). The new handover model in the ED setting

Table 2 Comparison of survey responses for survey participants in pre- and post-implementation phases

Survey question	Pre-implementation (n, %) (n = 67) [†]			Post-implementation (n, %) (n = 59)			P
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	
I have been provided with sufficient information about patients in my care.	1 (1.6)	2 (3.2)	60 (95.2)	1 (1.7)	0 (0.0)	58 (98.3)	0.400
I have been provided with adequate information about all patients in the ED.	38 (59.4)	9 (14.1)	17 (26.6)	10 (16.9)	9 (15.3)	40 (67.8)	< 0.001
Handover was too long.	46 (71.9)	12 (18.8)	6 (9.4)	41 (71.9)	7 (12.3)	9 (15.8)	0.406
Information was presented in a systematic and organized way.	10 (15.6)	2 (3.1)	52 (81.2)	2 (3.4)	6 (10.3)	50 (86.2)	0.029
I feel that important information was not given to me.	48 (75.0)	8 (12.5)	8 (12.5)	47 (79.7)	3 (5.1)	9 (15.3)	0.343
I was given information that was irrelevant and/or inappropriate during patient handover.	46 (71.9)	6 (9.4)	12 (18.8)	49 (83.1)	5 (8.5)	5 (8.5)	0.238
The ED charts were available during handover to clarify information provided to me.	8 (12.5)	2 (3.1)	54 (84.4)	4 (6.9)	2 (3.4)	52 (89.7)	0.583
The ED charts were reviewed during handover, e.g. drug chart, vital signs, patient allergy, FBC.	13 (20.3)	2 (3.1)	49 (76.6)	8 (13.8)	3 (5.2)	47 (81.0)	0.566
The way in which information was provided to me was easy to follow.	5 (7.8)	2 (3.1)	57 (89.1)	4 (6.8)	1 (1.7)	54 (91.5)	0.851
I was unable to keep my mind focused during handover due to excessive noise.	35 (54.7)	8 (12.5)	21 (32.8)	32 (54.2)	9 (15.3)	18 (30.5)	0.895
Handover was given using effective communication skills, e.g. clear speech, not too fast.	2 (3.1)	3 (4.7)	59 (92.2)	3 (5.1)	4 (6.8)	52 (88.1)	0.748
Handover was interrupted by patients, their significant others or other staff.	34 (53.1)	4 (6.2)	26 (40.6)	33 (56.9)	6 (10.3)	19 (32.8)	0.546
The information I received was up to date.	1 (1.6)	2 (3.1)	61 (95.3)	1 (1.7)	3 (5.1)	55 (93.2)	0.857
Handover was conducted in front of the patient.	17 (26.6)	7 (10.9)	40 (62.5)	1 (1.7)	3 (5.2)	54 (93.1)	< 0.001
Patients had the opportunity to contribute and/or listen to handover discussions.	30 (46.9)	7 (10.9)	27 (42.2)	7 (12.3)	4 (7.0)	46 (80.7)	< 0.001
I had to seek further information about my patient/s from a nurse or nurse-in-charge after the handover.	46 (71.9)	8 (12.5)	10 (15.6)	48 (81.4)	4 (6.8)	7 (11.9)	0.426
I had the opportunity to ask questions about things I did not understand during handover.	3 (4.7)	3 (4.7)	58 (90.6)	0 (0.0)	3 (5.1)	56 (94.9)	0.242
As a result of handover, I have a clear understanding of the plan (diagnosis, treatment, discharge) for the patient/s.	0 (0.0)	3 (4.7)	61 (95.3)	2 (3.4)	2 (3.5)	55 (93.2)	0.315
I received adequate information about nursing care during handover, e.g. mobility, nutrition/hydration, pain, hygiene, elimination, pressure care, resuscitation status.	11 (17.2)	3 (4.7)	50 (78.1)	6 (10.3)	7 (12.1)	45 (77.6)	0.218
Important vital sign observations are often omitted from nursing handover, e.g. BP < 100, Oxy sat < 93%.	21 (32.8)	11 (17.2)	32 (50.0)	34 (57.6)	6 (10.2)	19 (32.2)	0.022
Important information about medication is often not given during handover, e.g. withheld, allergy, unavailable.	28 (43.8)	13 (20.3)	23 (35.9)	35 (59.3)	11 (18.6)	13 (22.0)	0.172

[†] Not all participants responded to all statements; hence, some figures might not equate to total numbers.

Table 3 Comparison of completeness of nursing care processes and documentation for pre- and post-implementation phases

Variable	Pre		Post		P value
	n	%	n	%	
Medical order for intravenous therapy	75/75	100	50/51	98.0	0.405
Medical order for medications administered	128/130	98.5	150/150	100.0	0.215
Medications administered as prescribed	125/128	97.7	149/151	98.7	0.644
Intravenous cannula insertion documented on nursing notes	123/149	82.6	144/153	94.1	0.002
Identification bracelet <i>in situ</i>	139/173	80.3	184/195	94.4	0.000
Allergy identification bracelet <i>in situ</i> for those with an allergy	22/41	51.2	50/61	82.0	0.002
Next of kin documented in nursing notes	87/173	50.3	76/183	41.5	0.111
Valuables documented in nursing notes	79/170	46.5	89/135	65.9	0.001
Intravenous therapy documented on fluid balance chart	29/75	38.7	31/51	60.8	0.018

enhanced continuity of nursing care, and aspects of the way in which care was implemented and documented, which might translate to reduced incidence of adverse events in this setting.

Establishment of clear processes and structure for handover have been modelled on other industry processes such as aviation and speed car racing. Catchpole *et al.*²¹ incorporated elements of hand-off models in the aviation industry and Formula One car racing to develop a protocol for handoff of congenital heart disease patients. They were able to demonstrate a significant reduction in communication errors and duration of handover. Agarwal *et al.*³⁹ was able to demonstrate clinical improvements (reduction in postoperative complications, improved 24 h outcomes) after the introduction of a standardized handover tool in the intensive care setting. They also reported improvements in transfer of adequate information and enhanced quality of information during inter-hospital transfer. The findings from these studies, in combination with the findings of the present study, demonstrate that minimum datasets and systematic approaches improve accuracy and consistency of information during handover. Improvements observed in this current study, such as application of identification and allergy bracelets, might help to prevent adverse events, including medication errors.

Another component of the new handover model was that handover should be conducted in the cubicle at the bedside and involve the patient and/or their relative. Preliminary data³⁶ showed that there was mixed opinion regarding the appropriate environment for inter-shift handover in the ED setting: 36% of nurse respondents expressed a preference for handover to be performed at the

bedside, whereas 32% preferred handover in a 'quiet environment' away from the patient. Patients and their families are often viewed as a source of distraction and they might interfere or interrupt handover conversations.⁸ Previous studies also show that nurses are concerned about privacy and confidentiality of patient information during bedside handover.^{11,12,35} There is compelling evidence, however, that bedside handover is an acceptable form of performing handover for patients in both the inpatient^{15,30,40-43} and ED setting.³³ More recently, it has been shown that family members also value the opportunity to participate in handover which promotes family-centred care.^{29,44} Hence, there are disparate opinions between nurses, patients and their family about whether patients should participate in handover. Florin *et al.*⁴⁵ suggest that nurses should establish patient preferences for the degree of the latter's participation in their care. In a phenomenological study, Frank *et al.*⁴⁶ found that ED patients want to be acknowledged; however, they struggle to become involved in their care. In this current study, handover was more likely to be conducted in front of the patient, and more patients had the opportunity to contribute to and/or listen to handover discussion after the introduction of the ED structured nursing handover framework. Two aspects of the new handover model—that it is conducted in the cubicle at the bedside and involves the patient and/or relative—might enhance the patient's experience while receiving care in the ED.

This study had several limitations. Firstly, approximately 140 staff were employed in the study ED at the time of the study. In each phase, slightly less than half completed the survey: pre-intervention ($n = 67$, 48%)

and post-intervention ($n = 59$, 42%). However, the sample is likely to be representative of the population of nurses employed in the ED who work within a rotating roster across 7 days per week and three different (morning, afternoon, night) shifts. Secondly, although improvements were observed in completion of nursing care tasks and documentation, actual evidence of improved patient outcomes were not measured in this study. Future research might test whether introduction of this handover model in the ED setting results in actual enhanced patient safety, including reduction in medication errors.

CONCLUSION

The ED structured nursing handover framework focused on a standardized approach, including checklists, with emphasis on nursing care and patient involvement. This straightforward and easy-to-implement strategy has the potential to enhance continuity of care and completion of aspects of nursing care tasks and documentation in the ED setting. Translation of these findings for enhanced patient safety should be measured in the future, along with sustainability of the new nursing process and external validation of the findings in other settings.

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