Review: bringing patient safety to the forefront through structured computerisation during clinical handover

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Aims and objectives. This review aims to examine critically, the methods and modes of delivery of handover used in contemporary health care settings and explore the feasibility of a computerised handover system for improving patient safety.

Background. Clinicians play a critical role in promoting patient safety, and the handover ritual is recognised as important in exchanging information and planning patient care. Communication failures have been identified as an important cause of adverse incidents in hospitals.

Design. Integrative literature review.


Discussion. To date, the focus of research has primarily been on the vehicle of the handover, rather than the content and processes involved in ensuring the reliability and quality of clinical information. Employing a computerised handover system in the clinical arena has the potential to improve the quality and safety of clinical care.

Conclusions. Whilst the handover performed from shift-to-shift is a valuable communication strategy, ambiguities and incomplete information can increase the risks of adverse events. Given the importance of effective communication, its key link to patient safety and the frequency of nursing handover, it is imperative that clinical handover undergo increased scrutiny, development and research.

Relevance to clinical practice. This review underscores the challenge in clinical handover and recommends the use of technological solutions to improve communication strategies.

Key words: communication systems, computerised, nurses, nursing, patient safety, shift handover

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Background

Errors in health care resulting in adverse events are the leading cause of death and injury in hospitals (Rothschild et al. 2005). Annually in the USA, as many as 98,000 deaths occur as a consequence of errors and the associated cost for these errors is $US8 to $US29 billion per annum (Kohn et al. 2000). The reasons for the high rates of adverse events are multifactorial and can be attributed to system, clinician and patient factors, including the complexity of making effective decisions and judgments in the clinical setting (Dowding & Thompson 2003). Ensuring continuity and consistency of information flow between health providers is one strategy of preventing adverse events and ensuring patient safety.
Nurses play a pivotal role in health care provided to patients on a 24 hour basis. This places crucial importance in optimising intershift communication strategies. In spite of the frequency of intershift communication, minimal guidelines exist to facilitate effective practice and as a consequence there is an exploration of novel strategies. Being able to provide reliable, quality information in a timely fashion has challenged nurses for decades (Lardner 1996). In addition to the communication undertaken with other health professionals, the communication between nurses has long been seen as an important element to the planning and evaluation of patient care.

Aim

This article aims to review the literature on methods and modes of delivery of handover used in current health care settings. It also explores the evolving practice of clinical handover and the recent trends in e-health and communication strategies driven by regulatory advisory bodies to improve the safety for patients. Taking these strategies further, it will explore the proposition that a structured computerised handover system could potentially have positive effects on enhancing data transfer and improving patient safety.

Method

This is a position article informed by an integrative literature review, outlining that existing methods of clinical handover are limited in their ability to provide a structured and standardised handover, that is justified as a requirement through many studies to maintain patient safety goals. An integrative literature review is a method that allows for the inclusion of studies, both experimental and non-experimental as well as commentaries and reviews, to provide an inclusive appraisal of a particular topic (Whittemore & Knafl 2005). This approach allows a less restrictive focus using the systematic review method but also provides a structure and process to ensure rigour. The electronic data bases CINAHL, Medline, Embase and Pubmed were interrogated using the key terms: nursing handover, handoff, shift-to-shift report/ing and change of shift report for articles in English. The World Wide Web was also searched using the Google Search Engine to provide information for this literature review. In addition, information relating to patient safety, quality of care and theoretical propositions relating to clinical decision-making have been investigated to provide a conceptual framework to inform the discussion of the clinical handover.

Using the method of the review, a total of 304 sources were retrieved including the published and grey literature. The key search terms were used along with manual searching, and 126 published articles were identified. There has been a steady increase in the published literature over recent decades, for example, six articles satisfied the search strategy in 1997 and 30 in 2008 reflecting the recognition of communication in patient safety.

The handover process

Handovers take place routinely at health care facilities and are central for the continuity of patient care. Information
shared during the nursing handover includes clinical information, functional status changes in clinical status and plan of care as well as psychological and social issues (Adamski 2007). To achieve optimal care as well as to maintain patient safety, this information needs to be accurately communicated during handover (Patterson et al. 2004). Identifying patients who are clinically unstable or deteriorating and the communicating of specific concerns and forwarding pending tasks that are required for continuity of care should be the key priorities for clinical handover (Patterson et al. 2004, Goetz 2006). Nursing handover has also been shown to be vital in building good team morale and facilitating cohesiveness of the nursing unit (Lally 1999).

Although the importance of nursing handover is well-recognised (Goetz 2006), this process is often lacking structure with the potential for irrelevant and subjective information given during this process (Webster 1999, Sexton et al. 2004). In addition, the time spent in handover can be excessive, resulting in taking nurses away from direct clinical care during this time (Baldwin & McGinnis 1994). To streamline and improve the handover process, different types of handover techniques and delivery methods have been developed and are documented in nursing literature (Anderson & Mangino 2006, Castledine 2006, Clemon 2006, Davies & Priestly 2006). Traditionally, there are two mainstream methods identified as verbal (Liukkonen 1993, Thurgood 1995, Malestic 2003) and written (Wallum 1995, Hardey et al. 2000, Arora et al. 2005).

To date, limited data are available on each of these two methods as individual entities. Many published studies report combinations and variations of these delivery techniques (Pothier et al.) reported on these approaches (verbal, written and a combination of verbal and written) and the loss of important data with each style. For the verbal handover, it was identified as a loss of all data, for written, there was a loss of 31% and a minimal loss for written and verbal combination (Pothier et al. 2005). With these data loss figures, variations of these were developed and subsequently studied for their potential benefit to an imperative part of nursing practice and patient safety.

The variations of these mainstream methods identified in the literature are first, the tape-recorded handover used to reduce the amount of irrelevant information and produce a succinct handover (Prouse 1995). Second, is bedside handover. The goal of this variation is to achieve patient-centred care (Webster 1999, Anderson & Mangino 2006). Third is care planning highlighted to allow the continuity of care required without the problems that arise with traditional handover (Clemon 2006). A recurrent theme in the literature is that all methods of delivery have their strengths and limitations with Kerr imploring that managing competing demands and tensions, such as maintaining confidentiality while practising family-centred care, that compete against each other is a critical factor of achieving an effective handover (Kerr 2002). To achieve efficiencies, the handover process requires tailoring to establish set process and content guidelines and must incorporate a quality evaluation plan to periodically review for effectiveness (Arora & Johnson 2006, Australian Medical Association 2006, Davies & Priestly 2006). Changing handover practices and the inherent change management processes has been explored in some studies. A three phase change step incorporating unfreezing, moving and refreezing was used to guide studies through the change process (Caruso 2007). Open communication through voicing opinions and sharing concerns enable individuals to participate in the change process and reduce resistance to change (Caruso 2007).

**Theoretical propositions involved in the handover process**

Interventions that are based on conceptual foundations have the greatest potential for success. Theoretical perspectives relating to both clinical decision-making and communication can inform a discussion of handover practices and identify important factors to consider when developing nursing interventions. Although a detailed discussion of these issues is beyond the scope of this review, a brief discussion of these concepts is useful in improving the process of handover. Clinical decision-making is moderated by a range of factors such as access to information, contextual factors influencing interpretation of information, social relationships and dynamics in the clinical setting, research evidence available to inform practice as well as the level of experience, values and beliefs of the individual clinicians (Dayton & Henriksen 2007). A range of theoretical perspectives are reported in the literature including information-processing theory and decision analysis theory (Tanner et al. 1993, Taylor 2000, Thompson 2002, Bucknall 2003). Information provided in the handover process can influence how a clinician approaches a clinical problem. Therefore, the less subjective the clinical handover is and the more reliable and valid the information given, the greater likelihood of a robust handover to inform clinical decision-making (Baldwin & McGinnis 1994). To date, the majority of the research undertaken in the handover method has focussed on the mode of delivery rather than the nuances of communication and the social dynamics that are integral to interaction in the workplace (Dracup & Morris 2008).
Developing communication strategies to improve patient safety

It is increasingly recognised that despite the long-standing routine practice of handover, not enough attention and research has been directed at improving communication to promote patient safety (Johnson & Barach 2009, Silvester & Carr 2009). As a consequence, it is attracting the attention of opinion leaders (Bomba & Prakash 2005, Australian Medical Association 2006, Australian Commission on Safety and Quality in Health Care 2008). Numerous studies have shown that the handover process is unstructured, informal and error prone, with no standard or formal procedure for handover (Bomba & Prakash 2005).

The health sector can benefit from the science of communication developed in other high-risk industries (Kohn et al. 2000, Patterson et al. 2004). An area where health care can adapt and therefore learn greatly from is their pioneering work in shift handover. JCAHO has looked to the aviation industry and directly to crew resource management (CRM) to develop appropriate methods for communication misgivings (Hohenhaus et al. 2006). CRM focuses on communication, decision-making, coordination of staff, leadership and relationships (Hohenhaus et al. 2006). Given the success of this initiative in aviation, JCAHO adopted many of these principles for patient safety initiatives (Hohenhaus et al. 2006). CRM principles are extendable across industries, for example, the offshore oil operations industry have drawn on these concepts and mathematical theory of communication, cognitive psychology as well as organisational behaviour whereby human communication has been studied to understand how effective and reliable communication is best achieved (Lardner 1996). In the health sector, according to Lardner (1996), key points identified in the promotion of effective shift handover communication include: (1) presenting information in multiple media (e.g. verbal and written); (2) two-way communication with feedback to increase accuracy of communication; (3) hence verbal face-to-face handover is desirable; (4) as successful communication is facilitated by shared mental model, it can be expected that handover between experienced staff will take more time and (5) present only key information with the exclusion of irrelevant information. As with CRM, the use of checklists and documented emergency procedures lend themselves to the use of computers.

Developing e-health solutions

E-health sees clinical practice being supported by electronic processes and is increasingly being looked to as a solution to challenges in communication. For example, electronic methods of prescription, particularly those that provide decision support, have decreased the number of adverse events (Ammenwerth et al. 2008). As a consequence, electronic support tools are being sought to improve the process of clinical handover (Cheah et al. 2005, Quin et al. 2009, Silvester & Carr 2009). Potential advantages of electronic tools include the standardisation of data definitions, consistency with the information communicated, the minimisation of ambiguities and the potential to increase process efficiencies. Of course the efficacy of this method is dependent on the quality of the program and its design. Therefore, there needs to be greater attention on what are the integral elements of a nursing handover from a comprehensive and patient-centred approach. The design and development of these programs should be informed by communication theory, considering cultural and linguistic factors. By determining key factors that predict patient outcomes, the identification of triggers for adverse events is established. It is also important that the handover communicates not only biomedical information and treatment modalities, but also provides the opportunity to outline the psychological and social needs of patients and their families in the facility and in discharge planning.

In line with effective communication theory outlined previously, JCAHO has identified strategies to improve handover communication. These include first, keeping the information patient-centred while avoiding irrelevant or redundant information, second, standardising shift-to-shift reporting and third, providing consistent and accessible information about patients and their care. For example, information related to a diagnostic test, whether a newly prescribed medication has been administered and if a do-not-resuscitate orders order has been communicated during handover (Joint Commission Perspectives on Patient Safety 2005b).

Structured computerisation for clinical handover

By implementing a standardised handover, nursing staff are able to have common expectations of what is to be communicated, the presentation of information requirements and knowledge elements to be incorporated. An electronic computerised handover system could be an approach that is capable of taking these strategies into consideration and improve the communication in handover. This would involve the development of a minimum dataset that could be provided in a computer-generated handover tool. Although this type of handover system has been shown to reduce overall time spent during medical handover and provided the necessary information required for medical clinical
decision-making (Cheah et al. 2005), this type of computer-generated handover system has yet to be systematically evaluated for nursing handover.

Conclusion

Increasing recognition of the risks associated with interactions in the health care setting, particularly associated with hospitalisation is motivating clinicians, policy makers and researchers to address system-based factors that can improve the patient’s journey and influence, not only satisfaction with care, but health-related outcomes. In the health care arena, there are numerous interactions. In the form of handover, each takes time, costing money and are potentially a high-risk opportunity for communication failure. Communicating information regarding patient progress and care needs between providers is a critical dimension of clinical care. Whilst there are multiple variations and differing modes to nursing handover, the literature clearly lacks studies to identify the content and standardisation requirements of handover, the core elements of computerisation. To develop e-health solutions that will move nursing forward into an information technology age, understanding the content and the nuances of the nursing handover is crucial.

Relevance to clinical practice

Clinical handover is an entrenched nursing activity and is widely perceived as a valuable communication tool for providing quality nursing care and professional support. However, processes and outcomes of this activity and the relationship to clinical outcomes remain poorly understood. Increasing strategies to systematise information as well as employing quality assurance mechanisms to monitor the reliability and validity of clinical information are the key recommendations on the basis of this review. Important areas for future research include developing a minimum dataset requirement for handover and the design and development of technological solutions to improve the quality, standardisation and efficiencies of handover data and subsequent delivery in the clinical setting. Further research is needed to develop efficient mechanisms of nursing handover that provide reliable and valid information. Considering communication theory and factors impacting on effective clinical decision-making should also be considered when developing nursing handover strategies. The evaluation of methods of clinical handover need to be linked to measures of patient safety, particularly relating to communication of risks, such as falls, medication errors or pressure ulcers. Given the importance of effective communication, its key link to patient safety and the frequency of nursing handover, it is imperative that clinical handover undergo increased scrutiny, development and research.

Contributions

Study design: JM; data collection and analysis: JM, PMD, YS and manuscript preparation: JM, PMD, YS.

Conflict of interest

There were no conflicts of interest in the preparation and writing of this paper.

References


