

Review

Fragmentation of patient safety research: a critical reflection of current human factors approaches to patient handover

Tanja Manser

Department of Psychology, University of Fribourg, Switzerland

Significance for public health

While much of public health research has a preventive focus, health services research is generally concerned with the ways in which care is provided to those requiring treatment. This paper calls for a patient-centred approach to research on patient handover; a significant contributor to adverse events in healthcare. It is argued that this approach has the potential to improve our understanding of handover processes along the continuum of care. Thus, it can provide a scientific foundation for effective improvements in handover that are likely to reduce patient harm and help to maintain patient safety.

Abstract

The integration of human factors science in research and interventions aimed at increased patient safety has led to considerable improvements. However, some challenges to patient safety persist and may require human factors experts to critically reflect upon their predominant approaches to research and improvement. This paper is a call to start a discussion of these issues in the area of patient handover. Briefly reviewing recent handover research shows that while these studies have provided valuable insights into the communication practices for a range of handover situations, the predominant research strategy of studying isolated handover episodes replicates the very problem of fragmentation of care that the studies aim to overcome. Thus, there seems to be a need for a patient-centred approach to handover research that aims to investigate the interdependencies of handover episodes during a series of transitions occurring along the care path. Such an approach may contribute to novel insights and help to increase the effectiveness and sustainability of interventions to improve handover.

Background

About a decade ago most healthcare professionals had never heard the term *human factors*. Even today it is still not as familiar to many clinicians as most human factors experts would like to think. Nevertheless significant progress has been made in human factors science as well as in applications of human factors concepts aimed at healthcare improvement. The need for human factors expertise has been recognised widely in healthcare. But, as Russ and colleagues suggest in a recent article,¹ this may be based on widely held misconceptions of human factors concepts and approaches. Russ and colleagues discuss a number of *fictions* about human factors some of which may arise from the channels through which human factors science was introduced to healthcare (*e.g.* frequently using experts working in an environment heavily influenced by human factors research such as aviation to teach healthcare providers about human factors concepts rather than human factors sci-

entists). Stepping back, these misconceptions may also signal some of the specific challenges that will have to be addressed in taking human factors expertise forward in healthcare and they may provide learning opportunities for human factors experts. In his editorial to the article by Russ and colleagues,¹ Catchpole puts his finger on a sore spot for many human factors experts by stating:² *If we wish healthcare to be fundamentally changed by HF (human factors), we must also expect HF to be changed by healthcare. Collaboration between clinicians and HF professionals, with each shaping the views of the other, will develop and extend the use of HF for the unique demands of healthcare.* Following up on this thought of how key characteristics of healthcare might inspire change in human factors science this paper discusses the challenges of overcoming fragmentation of care. Research and intervention efforts aiming to understand and mitigate the effects of fragmentation of care on patient safety frequently focus on patient handover. Using examples of recent handover research we argue that the predominant research strategy is to focus on isolated handover episodes. This approach may actually hinder the development of an integrative framework that is urgently needed to effectively manage the risks associated with today's fragmentation of care. This paper does, however, not put forward such an integrated research framework. Instead it is a call to start a discussion of current areas of healthcare human factors that might benefit from a critical reflection of the predominant approach to research and improvement. Because the examples used to illustrate the need for such a discussion are drawn from handover research, the discussion will only cover selected aspects of fragmentation and additional or different challenges may be present in other areas of healthcare human factors. Nevertheless, we believe that this paper may inspire critical reflections of the blind spots inherent in certain research approaches used when addressing patient safety problems. In the future, these reflections might make a unique contribution to moving the field forward.

Fragmentation of healthcare requires patient handover at organisational interfaces

Healthcare organisations around the world manifest striking fragmentation and turbulence that impede their capacity to provide high quality care, to assure and improve patient safety, and retain the skilled professionals critical to both.³ Within hospitals, where the most acutely ill patients are treated and the greatest portion of healthcare costs are accrued, communication issues are among the most frequent contributory factors of adverse events.⁴ It has consistently been shown that communication is particularly vulnerable at organisational interfaces where handover occurs.

Handovers permeate the healthcare system and can occur at shift changes, when clinicians take breaks, when patients are transferred within or between hospitals, and during admission, referral or discharge (Figure 1).⁵ One study estimated that approximately 1.6 million han-

doers occur per year in a typical teaching hospital.⁶ Thus, handover communication at different levels of the organisation presents a major challenge for human factors research and interventions aiming at improved patient safety.

In terms of the organisational interfaces where handovers have been studied, most studies have investigated care transitions between health-care organisations (admission and discharge), handovers during shift changes of nurses or physicians' handovers in hospital settings where multiple patients are handed over within the same profession.^{7,8} Intra-hospital transitions, or handovers of single patients between departments/units frequently involving different specialties and/or professions, have received far less research attention.⁹⁻¹¹ However, these interfaces also contribute significantly to the fragmentation of care because the responsibility for the patient and for the continuity of care is shared by many healthcare providers.¹²

Handover as a priority area of patient safety research

Handover is defined as the *transfer of professional responsibility and accountability for some or all aspects of care for a patient, or groups of patients, to another person or professional group on a temporary or permanent basis* aiming at informational,¹³ relational and management continuity in patient care.¹⁴ With an increasing number of studies tracing the causes of adverse events and delays in treatment to inadequate handover and coordination of care,^{15,16} patient handover has been recognized internationally as a high-risk process. Thus, handover has repeatedly been identified as a priority area for patient safety research and improvement.^{13,15}

This has led to an increase in initiatives aimed at raising awareness and political commitment to improve handover. For example, effective handover is a patient safety goal that has recently been included in hospital accreditation in Australia.¹⁵ Also, prevention of handover error is one of the five solution areas of the *High 5s initiative*, a mechanism established in 2006 through collaboration between the Commonwealth Fund, the WHO World Alliance for Patient Safety and the WHO Collaborating Centre for Patient Safety, to implement innovative patient safety solutions over five years.¹⁷ As a consequence, handover research in healthcare has increased significantly in recent years.¹⁶ In fact, the claim that healthcare is lagging behind other high-risk industries in which handover has received considerable attention from human factors research for many years can no longer be made.¹⁸ Recent research in healthcare has highlighted the complexities of handover that have not yet been acknowledged by other industries.¹⁶ Now may be the time to pause and consider if the approaches applied by human factors researchers may have missed a critical element.

The dominant approach to handover research

The goal of any handover is the transfer of primary responsibility for the patient and of information necessary for continuing safe patient care across organisational interfaces.^{13,14} This may include information that is not needed immediately but at a later stage in the care process and thus needs to be remembered and transmitted when required. The handover can occur written, verbally or both and should ideally be a moment of shared cognition between clinicians providing opportunities for collaborative cross-checking.^{18,19}

Handover research usually focuses on the information transfer aspect and investigates a single type of handover occurring at a specific inter-

face within the care process. In so doing, studies mostly use idiosyncratic measures limiting the comparability of findings and the generalizability of recommendations for improvement. Thus, while the research activity on handover has increased significantly in healthcare, it seems that the methodological approaches taken so far replicate the problem of fragmentation of care rather than solve it.

In reviewing the handover literature for research methods, six frequently used approaches can be identified across various clinical settings and sometimes combined in a single study: general clinician self-assessment of handover practice using surveys, interviews or focus groups,⁸ clinician self-assessment after a specific handover episode,²⁰ behavioural observation during handover,^{10,21} including ethnographic field-study approaches,²² retrospective adverse event studies and observational and experimental effect studies.²³⁻²⁵ While the studies using this rather broad range of methodological approaches have significantly contributed to an improved understanding of factors impacting on safe handover, there is a lack of a common framework integrating these approaches into a coherent set of analytical techniques.

Integration seems necessary for mainly two reasons. Firstly, studies using different methods for investigating handovers at the same organisational interface have often generated contradictory results. A common framework would facilitate the detection and interpretation of such contradictions and potentially allow for choosing the analytical techniques most appropriate for a particular type of handover occurring at a particular organisational interface. Secondly, handover occurs many different forms at many different times during a patient's journey through the hospital (Figure 1). Therefore, measurement approaches need to reflect the interrelatedness of handover episodes throughout the continuum of care. In recent years, first studies have attempted to incorporate a more process-oriented approach to handover.^{12,26} These attempts can be broken down into a clinician centred approach and a process- or patient-oriented approach. The *clinician centred approach* was used in a study of clinician workflow surrounding the handover in a Medical Intensive Care Unit.¹² The focus here was on the preparatory tasks by the outgoing staff before the handover and the tasks to be done by the receiving staff after the handover. Focusing on the continuum of surgical care, another study followed patients throughout the perioperative setting and recorded all handovers during that period.²⁶ Although this study covered only a limited period of the care process and was narrowly focused on completeness and accuracy of information transmission, it can serve as a basic model for a more comprehensive analysis of safe handover along the care path.

The dominant approach to handover improvement

Based on the evidence of information loss and idiosyncratic handover practices at many organisational interfaces within healthcare, handover improvements have been suggested that focus on a standardisation of handover content and sometimes provide procedural support using a basic handover structure.^{9,21,27} Despite the widespread use and the intuitive plausibility of standardised handover protocols, for example, the empirical evidence on their effects beyond mere adherence to the protocol (*i.e.* effects on subsequent patient care) is scarce.²⁸

While medical research relies heavily on randomized controlled trials to establish scientific evidence, it is surprisingly uncommon to test and refine organisational interventions systematically before implementing them in the clinical setting. Few studies have tried to link process characteristics such as handover structure with outcome measures such as retention of patient care information, uncertainty during patient care decisions, a need to obtain information from other sources and repeti-

tion of clinical tasks.²⁵ Overall, the available evidence is not sufficient to draw reliable, valid conclusions because of the heterogeneity of organisational interfaces and handover protocols used in these studies. More specifically, it is unknown which component of standardisation efforts (*e.g.* clear distribution of roles, separation of clinical tasks and handover communication, checklist of items to be discussed, general structure of the handover communication) has which effect.⁹ Moreover, dismissing other interventions that have not been studied extensively prematurely may be a missed opportunity for patient safety improvement.

A patient-centred research strategy focussing on interdependencies along the care path

The scientific discipline of human factors strives for a holistic approach to understanding and solving problems that highlights relationships and interactions and thus departs from the out-dated reductionism that decomposes wholes into individual elements. But do we really walk the talk? While there is much rhetoric about the importance of handover for the continuity of care, handover research has mainly focused on isolated handover episodes at single organisational interfaces. The limited consideration of the embeddedness of handover in the overall process of patient care has led to problems concerning: i) *idiosyncratic measurement approaches*, *i.e.* measures that are tailored towards a specific handover episode and do not necessarily allow for comparison across different organisational interfaces that may involve handover of individual or multiple patients; ii) *fragmented research evidence*, *i.e.* descriptions of a heterogeneous spectrum of handover episodes without systematic characterisation of the handover context that could provide a frame of reference for comparing and integrating research evidence, and iii) *narrowly focused intervention strategies*, *i.e.* strong push towards standardisation of han-

dover communication without convincing evidence or scientific understanding of the contribution of the individual components of a standardisation effort.

In summary, the focus of current handover research on isolated handover episodes is too narrow to truly understand the impact of handover on the continuation of safe patient care while the patient transitions a series of organisational interfaces. Thus, the current research strategy may even reinforce a fragmented view of patient care instead of providing scientific evidence to effectively bridge the potential gaps along the care path. If we design handover episodes based on studies that did not consider the embeddedness of this specific handover in the process of care and in the associated succession of handovers, the impact of this intervention is bound to be very limited. There are several ways in which a patient-centred research strategy might change the study of patient handover. For example, extending the focus of analysis beyond the actual handover meeting can provide additional information on factors contributing to safe care.¹² Currently, the evaluation of handover quality defined as complete and accurate transfer of information occurs immediately after the handover is complete. But two hours later or at the end of the shift the evaluation of that very handover might generate different evaluations.²⁹ Also, if the handover – and the corresponding evaluation of handover quality – was tailored to the goal of transferring the information required by the next care provider for effectively and safely carrying out their tasks, it may not address the needs of the clinicians involved in later stages of the care process. One possible way to overcome this fragmentation is to develop a patient-centred research strategy focussing on the interdependencies of handover episodes during a series of transitions occurring along the typical care path. Such a framework would facilitate an exploration of issues concerning the timing and synchronisation of various handover channels at interfaces. It could also serve as a foundation for a methodological approach for assessing handover systematically along the care path as well as for an integrative strategy to develop and test interventions spanning across organisational boundaries. If we consider the

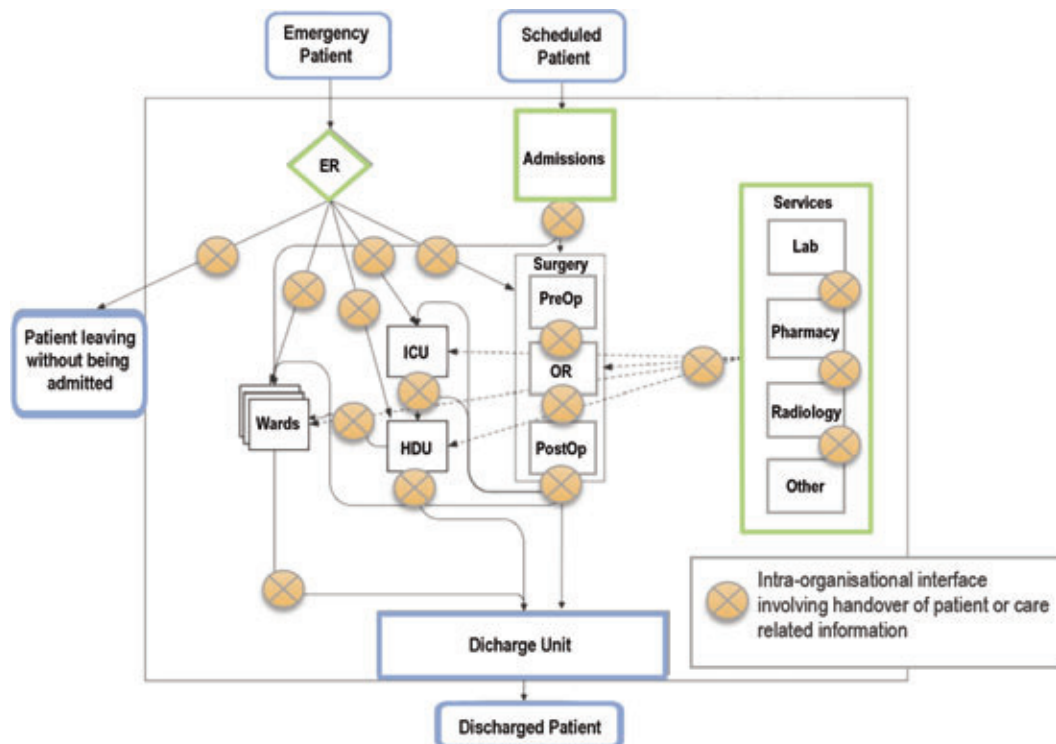


Figure 1. Simplified overview of organisational interfaces requiring handover of patient or care related information (adapted from Hall *et al.*, 2006).⁵

simplified overview of handovers occurring along typical care paths in Figure 1, a multitude of methodological and practical challenges come to mind. Collecting information on a series of handovers related to a single patient using a combination of methods such as chart reviews, observations, clinician self- and peer-assessments will generate huge amounts of data that need to be interpreted within a common framework. Moreover, designing the instruments for data collection and deciding on the timing of data collection and the allocation of researchers for collecting data requires a high level of pre-existing understanding of each handover episode. Last but not least, the feasibility of such a study design will depend on balancing researcher availability at the time and location of a given handover and the need for knowledge about previous handovers (e.g. to detect omissions of previously discussed items). Despite the challenges associated with developing and implementing such a framework, the development of a patient-centred research strategy has the potential to significantly influence future handover research. In addition to large scale projects aiming at understanding the interdependencies of handover episodes along the care path, an overarching framework can also be applied when isolating research questions for small scale projects and allows for acknowledging the wider system when interpreting the results of these more focused studies and when designing interventions. An integrative framework of handover episodes along the care path is urgently needed to effectively manage the risks associated with today's fragmentation of care and to develop scientific methods for systematically assessing the needs for, and the effects of, patient safety solutions. This will result in novel insights into safe handover that will lay the foundation for optimising the continuum of care across the multiple organisational interfaces patients encounter, as part of their journey through a hospital.

Correspondence: Tanja Manser, Department of Psychology, University of Fribourg, Rue de Faucigny 2, 1700 Fribourg, Switzerland.

Tel. +41.26.300.7483 - Fax: +41.26.300.9712

E-mail: tanja.manser@unifr.ch

Key words: human factors, patient safety, handover, research.

Contributions: the authors contributed equally.

Conflict of interests: the authors declare no potential conflict of interests. Funding: the writing of this article was supported by a grant from the Swiss National Science Foundation (grant number, PP00P1_128616).

Received for publication: 1 November 2013.

Accepted for publication: 1 November 2013.

©Copyright T. Manser. 2013

Licensee PAGEPress, Italy

Journal of Public Health Research 2013; 2:e33

doi:10.4081/jphr.2013.e33

This work is licensed under a Creative Commons Attribution NonCommercial 3.0 License (CC BY-NC 3.0).

References

- Russ AL, Fairbanks RJ, Karsh BT, et al. The science of human factors: separating fact from fiction. *BMJ Qual Saf* 2013;22:802-8.
- Catchpole K. Spreading human factors expertise in healthcare: untangling the knots in people and systems. *BMJ Qual Saf* 2013;22:793-7.
- Kohn LT, Corrigan JM, Donaldson MS, eds. *To err is human: building a safer health system*. Washington DC: National Academy Press; 1999.
- Pronovost P, Thompson D, Holzmueller CG, et al. Toward learning from patient safety reporting systems. *J Crit Care* 2006;21:305-15.
- Hall O, Belson D, Murali P, Dessouky M. Modeling patient flows through the healthcare system. In: Hall RW, ed. *Patient flow: reducing delay in healthcare delivery*. New York: Springer Verlag US; 2006. pp 1-45.
- Pezzolesi C, Manser T, Schifano F, et al. Human factors in clinical handover: development and testing of a handover performance tool for doctors' shift handovers. *Int J Qual Health Care* 2013;25:58-65.
- Riesenberg LA, Leisch J, Cunningham JM. Nursing handoffs: a systematic review of the literature. *Am J Nurs* 2010;110:24-34.
- Riesenberg LA, Leitzsch J, Massucci JL, et al. Residents' and attending physicians' handoffs: a systematic review of the literature. *Acad Med* 2009;84:1775-87.
- Nagpal K, Arora S, Abboudi M, et al. Postoperative handover: problems, pitfalls, and prevention of error. *Ann Surg* 2010;252:171-6.
- Foster S, Manser T. Receiving care providers' role during patient handover. *Trends Curr Anaest Crit Care* 2012;2:156-60.
- Manser T, Foster S, Flin R, Patey R. Team communication during patient handover from the operating room: more than facts and figures. *Hum Factors* 2013;55:138-56.
- Wohlauer M. Fragmented care in the era of limited work hours: a plea for an explicit handover curriculum. *BMJ Qual Saf* 2012;21:i16-8.
- British Medical Association, National Patient Safety Agency, NHS Modernisation Agency. *Safe handover: safe patients. Guidance on clinical handover for clinicians and managers*. 2005. Available from: <http://www.saferhealthcare.org.uk/IHI/Products/Publications/safehandoversafepatients.htm>.
- Haggerty JL, Reid RJ, Freeman GK, et al. Continuity of care: a multidisciplinary review. *Br Med J* 2003;327:1219-21.
- Australian Commission on Safety and Quality in Health Care. *Safety and Quality Improvement Guide Standard 6: Clinical Handover*. Sydney: ACSQHC; 2012.
- Manser T, Foster S. Effective handover communication: an overview of research and improvement efforts. *Best Pract Res Clin Anaesthesiol* 2011;25:181-91.
- High 5s. High 5s Project Action on Patient Safety. 2006. Available from: https://http://www.high5s.org/pub/Manual/TrainingMaterials/High_5s_Project_Overview_Fact_Sheet.pdf.
- Patterson ES, Roth EM, Woods DD, et al. Handoff strategies in settings with high consequences for failure: lessons for health care operations. *Int J Qual Health Care* 2004;16:125-32.
- Perry S. Transitions in care: studying safety in emergency department signovers. *Focus on Patient Safety* 2004;7:1-3.
- Manser T, Foster S, Gisin S, et al. Assessing the quality of patient handoffs at care transitions. *Qual Saf Health Care* 2010;19:1-5.
- Catchpole KR, De Leval MR, McEwan A, et al. Patient handover from surgery to intensive care: using Formula 1 pit-stop and aviation models to improve safety and quality. *Pediatr Anesth* 2007;17:470-8.
- Evans SM, Murray A, Patrick I, et al. Assessing clinical handover between paramedics and the trauma team. *Injury* 2010;41:460-4.
- Horwitz LI, Meredith T, Schuur JD, et al. Dropping the baton: a qualitative analysis of failures during the transition from emergency department to inpatient care. *Ann Emerg Med* 2009;53:e4.
- Pickering BW, Hurley K, Marsh B. Identification of patient information corruption in the intensive care unit: using a scoring tool to direct quality improvements in handover. *Crit Care Med* 2009; 37:2905-12.
- Dowding D. Examining the effects that manipulating information given in the change of shift report has on nurses' care planning ability. *J Adv Nurs* 2001;33:836-46.
- Nagpal K, Vats A, Ahmed K, Vincent C, Moorthy K. An evaluation of information transfer through the continuum of surgical care: a feasibility study. *Ann Surg* 2010;252:402-7.
- Welch SJ, Jones SS, Allen T. Mapping the 24-hour emergency department cycle to improve patient flow. *Jt Comm J Qual Patient Saf* 2007;33:247-55.
- Foster S, Manser T. The effects of patient handoff characteristics on subsequent care: a systematic review and areas for future research. *Acad Med* 2012;87:1105-24.
- Borowitz SM, Waggoner-Fountain LA, Bass EJ, Sledd RM. Adequacy of information transferred at resident sign-out (in-hospital handover of care): a prospective survey. *Qual Saf Health Care* 2008;17:6-10.