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### Assessing and Improving Communication and Patient Handovers in the ICU

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#### Introduction

The process of transferring responsibility for care of a patient from one healthcare provider or healthcare team to another is referred to as the "handoff," or "handover," while the term "signout" refers to the act of transmitting information about the patient (Berwick 1996). Such handoffs occur several times a day between nurses, between attending physicians / nurse practitioners, and between trainees, when the patient is admitted to, managed in, and transferred from the intensive care unit. Clinicians and researchers agree that patient handoffs serve as the basis for transferring responsibility and accountability for the care of patients from outgoing to incoming health care teams across shifts, across disciplines and across care settings. During a handoff necessary and critical information about a patient is transmitted from one caregiver to the next, or from one team of caregivers to another. Such information allows the health professionals or healthcare team who takes over the patient's care to gain relevant knowledge about the patient, understand the management plan, and ultimately ensure that the patient's care continues in an uninterrupted, error-free manner. The patient handoff between healthcare providers is a vulnerable period in the patient's care journey during which vital information may be lost, distorted or misinterpreted (Baker et al. 2005). Unfortunately, the practice of patient handoff to, within and from the ICU is often suboptimal due to communication barriers and is a major contributor to medical errors and adverse events.

#### How Frequent and Important is the Problem?

Studies find significant variation in practice and a lack of appreciation of the systems of care around the patient. Patient transfers from intensive care units (ICU) to other inpatient wards may be particularly vulnerable in this regard, given the unstable patient status and complexity of the medical conditions that characterise these transfers. A novel contribution to the literature on transitions of patient care is a deeper understanding of how variations in communication, culture, and technology used by healthcare professionals in medicine and nursing leads to ineffective or suboptimal handoffs. Studies of hospital discharge suggest a particularly risky care transition, especially for older adults. Multiple studies document that adverse events occur in approximately one in five adult medical patients within three weeks of discharge (Clark 1996). Nearly 20 percent of older Medicare patients discharged from a hospital will be readmitted within 30 days (Cohen et al. 2012). A broad spectrum of adverse events can occur after discharge, including both diagnostic and therapeutic errors, but adverse drug events (ADEs) are particularly common and harmful. Recent studies indicate that nearly 100,000 elderly patients are hospitalized every year due to ADEs (Cullen et al. 1997). Additionally, 1 in 67 emergency hospitalizations are the result of an ADE. Particularly in the face of an aging population, ensuring safe care transitions for patients with complex, chronic illnesses remains an important patient safety issue (DeRienzo et al. 2014).

Patients are transferred from the ICU, where medical care is intensive and resources are rich, to environments where patients receive much less intensive monitoring and patient care. Often some key pieces of information are omitted, transmitted with errors, or not understood as intended (Eccles and Mittman 2006). When a patient's transition from the intensive care unit (ICU) to and from a hospital ward is less than optimal, the repercussions can be far-reaching — unit readmission, an adverse medical event, avoidable morbidity and even mortality (Flink et al. 2012). Similar evidence of implications of ineffective handoffs in the ICU setting can be seen in work by Li et al, who found that of 112 patient transfers poor communication during patient transfer resulted in 13 medical errors and 2 two patients being transiently “lost” to medical care (Forster et al. 2003).<sup>11</sup> A total of 101 NICU patient handoffs (31 unique patients) were analysed. DeRienzo et al. demonstrated that, per patient, residents made more written errors for infants in critical-care beds than for infants in step-down beds (2.33 vs 1.67, P=0.04). Replacing residents' written handoffs with the gold-standard, auto-populated data would have prevented 92% of written errors. Furthermore, in a survey about how providers perceived their handoffs strategies and practices, 60% of provider felt that handoffs were incomplete or missing key information.

### **What Are Some Causes of Poor Handoffs?**

Discontinuity of care and lack of seamless transitions between the ICU and other hospital settings were present with poor handoffs in most studies, although the specific causes and contributing factors varied. In some cases local differences in the organization and management of patient care played an important role. A fundamental reason, however, is the lack of a common ground to enable interpretation of the complete handoff content (Greenhalgh and Russell 2010). Common ground refers to the pertinent mutual knowledge, beliefs and assumptions that support interdependent action, and an ongoing process of tailoring, updating and repairing mutual understanding. It is constructed by three skills: the ability to share, inform and request; the ability to jointly share attention and intentions with each other; and the ability to construct common cultural knowledge. According to Cohen and colleagues, true handoffs involve a co-construction by both parties of the oncoming caregiver's understanding of the patient, and not a one-way transmission of information (Hesselink et al. 2012a).

Poor information storage and retrieval systems that are not user-friendly also contribute to compromised handoffs (Hesselink et al. 2012b). For example, even with sophisticated electronic medical records, many ICUs continue to use paper forms or parallel electronic databases as repositories of patient information to transmit to incoming colleagues (Horwitz et al. 2009).

Other studies demonstrate that distractions during complex patient management tasks and lack of adequate time to complete documentation without interruptions contribute to key information being overlooked or not transferred (Hoskote et al. 2014). Asynchronous communication practices in which the patient's status and management plan are written down or audio-recorded by the outgoing professional and the information is ready or played back by the incoming team later to gain information about the patient can also contribute to errors and omission of key data (Jencks et al. 2009).

### **How Can Patient Handoffs Be Studied And Improved?**

Qualitative, quantitative and mixed improvement methods are needed to assess the impact of handoff interventions in the ICU. Such data are needed to explain results of rigorous evaluations, and to understand the relationships between contextual and contributory factors, as well as the sustainability, maintenance, scale-up and spread of interventions to improve handoffs. Implementation science and improvement science are maturing fields that encourage application of rigorous methods to study ICU quality problems, their root causes, the settings and contexts in which they occur, and the effects of strategies attempting to improve the quality of ICU care and ultimately improve patient outcomes (Johnson et al. 2012). Such improvement strategies require multi-level, multi-component, context-sensitive approaches, with continuous monitoring, evaluation and serial refinement of ICU practices.

In particular, qualitative research generates large amounts of data, and it is important that the purpose of the study drives the analysis (Johnson and Barach 2009; Kaplan et al. 2012). Ensuring reliability of the data is essential. “Scientifically rigorous” research has favored multi-center studies, particularly those with rigorous experimental designs that control for context, quantitative data, and adherence to methodologies that reduce bias and confounding (Klein et al. 2005). This kind of research thus focuses on relationships among variables, to the exclusion of contextual features such as the attributes of the unique clinical settings and participants in the ICU in which interventions are studied, and the attributes of those where these interventions may be subsequently adopted or adapted. In contrast to this approach, some have proposed a “realist review” for the study of complex social and clinical interventions, noting that that traditional experimental designs may not be useful for, or adaptable to, evaluating interventions in complex, naturalistic settings, where resistance to uptake, and different expectations for the success of the project by multiple clinical groups can greatly undermine success and sustainability of interventions (Kripalani et al. 2007).

### **Some Solutions To Improving ICU Handoff Management (see Box 2)**

Fundamental to improving handoffs in the ICU is a good system to measure the quality of handoffs. After initially developing local (ICU - specific) operational criteria for what constitutes an optimal handoff, the percentage of handoff sessions and individual patient handoffs that satisfy these criteria is a good place to start assessing effective signouts (see below). The unit of analysis will be (a) Each patient on whom patient hand-off is performed; and (b) Each handoff session during which information about one or more patients is transferred. The data can be gathered by one of the following methods:

- Self-report by the person providing the handoff;
- Self-report immediately after handoff by the person receiving the handoff;
- Self-report by the person receiving the handoff at the end of the shift;
- Assessment by a third party of direct observation of the handoff
- Review of videorecording or audio recording of the handoff.

Once a pragmatic measurement system is developed, developing a single improvement approach for all handoffs is not possible because of the diversity and complexity of ICU settings, practices, management and resources. Ensuring quality and safety during times of transition will therefore require an approach that draws on all available wisdom about what is needed to improve handovers, coupled with a social technical-systems approach to understanding and improving care at the point where patients and providers meet (Kushner 2002). Improving the management and effectiveness of ICU handoffs requires a clear plan, clinical championship, and a series of carefully laid out interventions at several levels.

These interventions meet the definition of a “complex intervention,” one in which it is difficult to isolate one or a small number of “active ingredients,” and to standardize the setting in which the intervention is applied (Li et al. 2012).<sup>26</sup> In an article about the complexity of evaluation of electronic health programmes, Greenhalgh and Russell comment on the limits of scientific evaluation, when it is applied to complex projects that have multiple components and multiple official and unofficial aims (Yao et al. 2012).<sup>27</sup> This is in contrast to the scientific method with an “interpretivist” approach that explicitly considers the importance of the perceptions and mind-sets of participant clinicians relative to other aspects of the programme. Complex interventions to improve ICU care also call for new methods of evaluation of the economic and social benefits associated with their implementation and sustainability (McCormack et al. 2009).<sup>28</sup>

Recognising the barriers to changing clinical practices around improving patient handoffs requires appreciating the heterogeneity and complexity of interventions implicit in improvement science, including rapid-cycle improvement methods, such as Plan-Do-Study-Act (PDSA) cycles that involve iterative cycles of planning, design, evaluation and refinement of improvement strategies (Medical Research Council 2008). These approaches generate evidence regarding barriers to improvement and help identify solutions and assess their effectiveness using quick turnaround in time and resources. An *improvement-science* approach recognizes the need for customized, site-specific and context-sensitive solutions based on careful study of current practices and local mental models, and careful surfacing and recognition of barriers to improvement (Mohr et al. 2004). Context is recognised as important for the success and uptake of clinical interventions and helps to address difficulty of reaching all staff for handoff training, staff resistance to use of structured signout, and concerns that structured handoff may initially increase the time taken to complete signout (Patterson and Wears 2010; Pawson and Tilley 1997).

## Training For Improved Patient Handoffs

Effective ICU handoffs should be comprehensive, accurate, unambiguous and efficient. Verbal sign-out should be augmented with written materials. Both verbal and written sign-out should follow a standard template containing structured information, with as little transcription of information as possible. Good sign-out should also allow for clarification and challenging of transmitted information, particularly around decision-making. Finally, the setting for the sign-out should be quiet and free of distractions and interruptions.

Patient handoff management is rarely taught systematically. The following principles can help to redress this, and should be considered a ‘starter set’ of principles to be customised based on the specific contexts of ICUs, teams and individuals as described above:

- Teach providers to tell a “better story”. More effective integration of the quantitative outcomes data with the more qualitative contextual data will enhance the wisdom of health professionals, and capture the complexity of patient stories.
- Provide feedback. Sustain the effort by giving feedback about individual performance and by setting performance expectations.
- Couple inexperienced providers with experienced incoming and outgoing providers. The experienced incoming provider can demonstrate proper inquiries about patient status and issues, and the experienced outgoing provider can demonstrate proper “story-telling” and methods. Capturing the wisdom of an 8 or 12-hour shift is more complex than one might assume.
- Consider the use of videotaped simulated handovers and self-directed videotaping for reflective [reflective?] learning. Use of these tools can improve handover. They can demonstrate the nature of false assumptions and omissions; the effects of interruptions; good versus poor patient problem descriptions; and the consequences of relying only on written information.
- Educate all staff using interactive methods on the importance of effective handoffs and about the characteristics of good handoff – include communication training using a program such as TeamSTEPS (Payne et al. 2012) or other team training programmes.
- Provide staff with laminated reminder cards listing desirable features of handoffs
- Use a mnemonic such as IPASS or SIGNOUT (Li et al. 2011).
- Integrate handoffs into a team handoff instead of ‘siloes’ handoffs within disciplines.
- Provide a quiet private physical space for handoffs to occur.
- Perform handoffs at the bedside rather than in a conference room.
- Develop standardized written handoff tools and try to import patient information automatically from the electronic medical record into these tools (to avoid transcription errors) (Riesenburg et al. 2009; Solet et al. 2005).

## The Future

Several key understandings have emerged about the complex nature of patient handoffs in the ICU. First, there is a need for a deeper understanding about how variations in communication, culture, and technology used by healthcare professionals in medicine and nursing leads to ineffective or suboptimal handoffs. Second is the need to develop a “common conceptual ground” among all parties (individuals, teams, ICUs, wards) involved in handoffs. Third is the recognition that interventions to improve handoffs benefit from ICU staff involvement, which increases sensitivity to local and participant context, promotes trust and enhances clinician uptake and buy-in through a shared understanding of the strengths and limits of the proposed interventions. Fourth is the recognition that any comprehensive strategy to improve handoffs should include an evaluation of benefits, risks and cost-effectiveness, that may include the use of surrogate upstream outcomes and Bayesian methods (Taylor et al. 2011).

Further research and funding are needed to identify effective educational and workplace interventions to improve ICU handoffs. Such interventions are likely

to be successful if they are multi-layered, and involve multiple stakeholders, ranging from the individual patient, clinician and clinical level, with a special focus at the microsystems and organisational levels (Toccafondi et al. 2012). Ultimately, achieving the ideal handoff on an ICU patient requires individual clinicians, and health systems to recognise the importance of good communication as a powerful therapeutic tool, one that is as important to the outcomes of ICU patients as the medications, technology, invasive procedures and surgical interventions that they receive.

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Box 1 summary key messages

**Box 1**

**Key Messages**

- Identify the leadership required to improve handovers.
- Seek to understand handover communication as a complex adaptive process.
- Recognise the effect of culture as a key enabler for change and improvement.
- Develop tools to make information readily accessible and transparent.
- Apply principles of human factors to clinical design.
- Focus on training, assessing uptake and success and sustaining gains.

Source: Johnson and Barach 2009

**Box 2**

**Questions to help guide local implementation of new handoff strategies and to measure the impact of the changes**

- What are the clinical handoff situations that carry the most risk for patients?
- What information and critical success factors are needed to better understand the process of handoff in this setting?
- What handoff interventions are the most effective?
- What resources and tools are available to improve handoff communication?
- Which individual clinicians are willing to serve as "champions" for improving the handoff process?
- What mechanisms can be put in place to spread, sustain and transfer improvements across the organisation?
- What improvements can be built into information systems tools to enhance their successful adoption (eg, checklists, reminder systems, information technology solutions)?

Source: Johnson and Barach 2009

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