

# Improving Handoffs in the Emergency Department

Dickson S. Cheung, MD, MBA, MPH      \*Author affiliations can be found in Appendix 1.

John J. Kelly, DO

Christopher Beach, MD

Ross P. Berkeley, MD

Robert A. Bitterman, MD, JD

Robert I. Broida, MD

William C. Dalsey, MD, MBA

Heather L. Farley, MD

Drew C. Fuller, MD, MPH

David J. Garvey, PhD, MD

Kevin M. Klauer, DO

Lynne B. McCullough, MD

Emily S. Patterson, PhD

Julius C. Pham, MD, PhD

Michael P. Phelan, MD, JD

Jesse M. Pines, MD, MBA, MSCE

Stephen M. Schenkel, MD, MPP

Anne Tomolo, MD, MPH

Thomas W. Turbiak, MD

John A. Vozenilek, MD

Robert L. Wears, MD, MS

Marjorie L. White, MD\*

American College of Emergency

Physicians Section of Quality

Improvement and Patient

Safety

Patient handoffs at shift change are a ubiquitous and potentially hazardous process in emergency care. As crowding and lengthy evaluations become the standard for an increasing proportion of emergency departments (EDs), the number of patients handed off will likely increase. It is critical now more than ever before to ensure that handoffs supply valid and useful shared understandings between providers at transitions of care. The purpose of this article is to provide the most up-to-date evidence and collective thinking about the process and safety of handoffs between physicians in the ED. It offers perspectives from other disciplines, provides a conceptual framework for handoffs, and categorizes models of existing practices. Legal and risk management issues are also addressed. A proposal for the development of handoff quality measures is outlined. Practical strategies are suggested to improve ED handoffs. Finally, a research agenda is proposed to provide a roadmap to future work that may increase knowledge in this area. [Ann Emerg Med. 2009;xx:xxx.]

0196-0644/\$-see front matter

Copyright © 2009 by the American College of Emergency Physicians.

doi:10.1016/j.annemergmed.2009.07.016

To be safe, care must be seamless—supporting the ability of interdependent people and technologies to perform as a unified whole, especially at points of transition between

and among caregivers, across sites of care, and through time. It is in inadequate handoffs that safety often fails first.<sup>1</sup>

**Table 1.** Stages of care transition.

Stage	Tasks	Examples of Transition Errors
Pret turnover	Organization and updating of information	Poor situational awareness of current state of the ED and hospital
Arrival	Stopping patient care tasks and preparing to hand off care	Delaying handoff while intermittently continuing care or abruptly stopping care when help arrives without reaching closure point
Meeting	Specific face-to-face exchange	Departing physician could <ol style="list-style-type: none"> <li>1. Pass incomplete or incorrect information</li> <li>2. Provide information in a disorganized or confusing manner</li> <li>3. Fail to provide a clear clinical impression (what is wrong) and plan (what needs to be done)</li> </ol> Receiving physician could <ol style="list-style-type: none"> <li>1. Misunderstand passed information</li> <li>2. Not listen (distractions/fatigue)</li> <li>3. Prematurely close: jump to a conclusion because of patient or provider characteristics (eg, when an intern reports to a senior resident)</li> </ol> Failure to include important parties (medical student, nurses)
Post-turnover	New provider must integrate new information and begin patient care of both patients handed off and newly arriving patients	Incoming physician could <ol style="list-style-type: none"> <li>1. Forget key tasks or information</li> <li>2. Act on a plan without careful thought (not thinking critically)</li> </ol>

## INTRODUCTION AND BACKGROUND

According to the Institute of Medicine's landmark patient safety publication *To Err Is Human: Building a Safer Health System*, emergency departments (EDs) are susceptible to "high error rates with serious consequences."<sup>2</sup> When sentinel events occur, communication errors are deemed to be the root cause in about 70% of cases.<sup>3,4</sup> In addition, 84% of treatment delays are later judged to be due to miscommunication. Of these, 62% are continuum-of-care issues associated with shift changes.<sup>5</sup> This realization led The Joint Commission to exhort in its 2006 National Patient Safety Goal 2E, "implement a standardized approach to 'handoff' communications, including an opportunity to ask and respond to questions."<sup>6</sup>

A transition occurs when 2 or more workers exchange mission-specific information, responsibility, and authority for an operation.<sup>7</sup> This exchange in clinical practice is commonly referred to as a "sign-out" or "handoff." A growing body of literature refers to these as "transitions of care." In this article, these terms are used interchangeably.

Effective communication in emergency physician-physician handoffs is poorly studied.<sup>8,9</sup> Much of the peer-reviewed literature is limited to case reports and commentaries.<sup>10-15</sup> This lack of empirical evidence recently prompted the Agency for Healthcare Research and Quality to make research on transitions of care a priority.<sup>16</sup>

Because there are few established standards and a lack of supporting research, we are unable to offer one simple solution to optimize handoffs. Care transitions will always involve balancing competing goals and depend on the changing state of patients, care providers, and the ED. It is with this understanding that the Quality Improvement and Patient Safety Section of the American College of Emergency Physicians offers this article to help emergency physicians engage in the best possible handoffs.

## PERSPECTIVES FROM OTHER DISCIPLINES

Handoffs in other high-risk industries such as aerospace, nuclear power, and aviation can offer worthwhile lessons to health care practitioners.<sup>17,18</sup> Observations of shift changes at the National Aeronautics and Space Administration's Johnson Space Center highlight the importance of a "question and answer period" to detect errors in assessments and plans.<sup>19</sup> *Los Angeles*-class nuclear submariners are trained to use "precise, unambiguous, impersonal and efficient" language to navigate safely.<sup>20</sup> In the aviation industry, pilots are required to perform scripted preflight emergency briefings. Highly effective flight crews use one third of their communication time to discuss threats and errors in their environment, regardless of workload, whereas poor-performing flight teams spend about 5% of their time on those issues.<sup>21</sup>

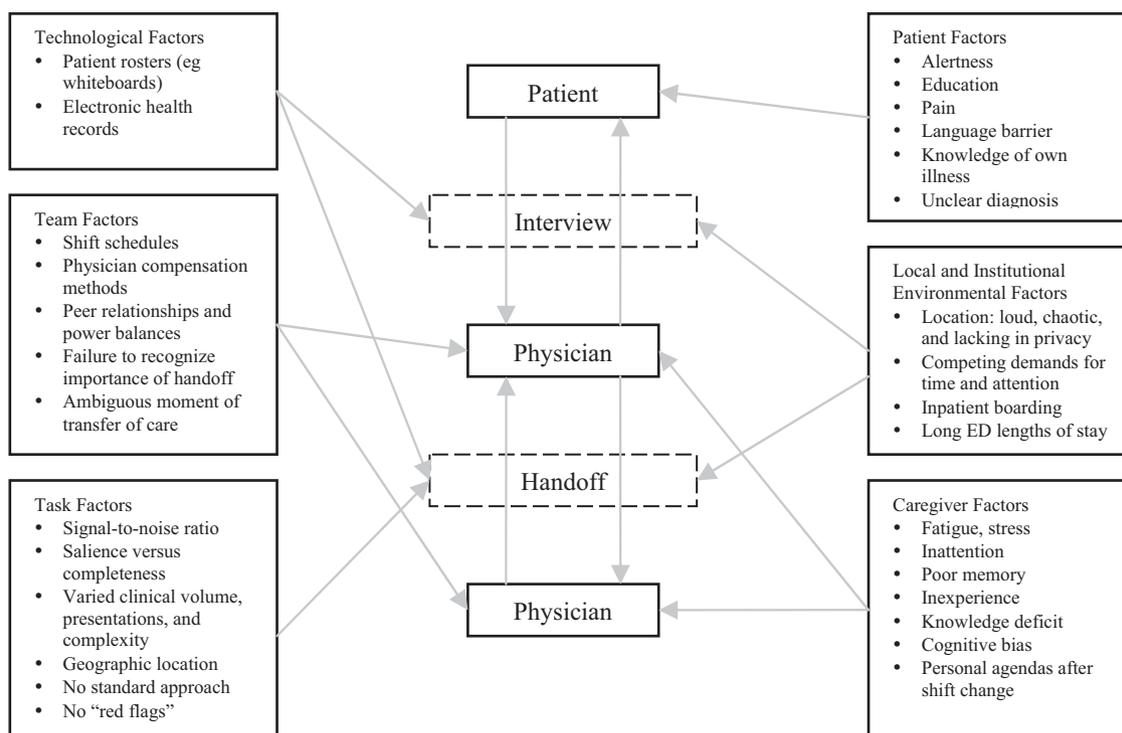
## PURPOSE AND CONCEPTUAL FRAMEWORK

EDs provide clinical care 24 hours a day and physicians work in shifts. There is a period around the time of shift change when providers transfer information, primary authority, and responsibility for patient care.<sup>22,23</sup> Other aspects of the care environment, such as diversion status, boarding patients, pending transfers, equipment, and personnel issues, are also sometimes discussed. Handoffs can be a source of liability and error but also an opportunity for rescue when the re-evaluation of a case from a fresh perspective may result in preventing or recovering from an adverse event.<sup>11,24-29</sup>

Although current handoff practices vary considerably, there are commonalities in structure and purpose.<sup>23</sup> Four phases of handoffs have been identified (Table 1): (1) *pret turnover time*, in which the departing emergency physician prepares for the upcoming handoff; (2) *arrival*, in which the appearance of the oncoming emergency physician heralds the beginning of a new shift; (3) *meeting*, in which there is an exchange of information

**Table 2.** Conceptual framings for handoffs.

Conceptual Frame	Primary Function	Risk	Intervention
Information processing	Transfer data through a noisy communication channel	Missing or inaccurate data	Ensure minimum data set content is transferred and accurate
Stereotypical narratives	Categorize by stereotypical narrative and highlight deviations	Inappropriately applying default assumptions	Explicitly label stereotypical narratives and highlight deviations
Social interaction	Coconstruction of shared mental model	Failing to support shared sense-making and anticipation	Encourage flexible, adaptive, tailored sharing of perspectives on data
Resilience	Cross-check assumptions with a fresh perspective	Incorrect framing of problems/risks and solutions/strategies	Create a supportive environment that encourages cross-checking through a question and answer period

**Figure 1.** Conceptual model for barriers in handoffs.

and understandings among the physicians; and (4) *post-turnover time*, in which the receiving physician assumes care and the departing physician focuses on unfinished tasks and clarifies critical information.<sup>30,31</sup>

Health care professionals tend to view handoffs as simply a process to transfer information. Table 2 offers several alternative conceptual frameworks with associated functions and risks and indicates how they may enlighten specific interventions.<sup>32,33</sup>

With all 4 conceptual framings, providers use handoffs to develop a shared understanding among caregivers, which includes the patient's clinical picture, his or her recent course, therapies administered, rationale for pending diagnostic tests and therapies, and likely disposition. Providers make the transition from one case to the next when there is an adequate understanding of a patient's case. The degree to which patient information is summarized or compressed is a reflection of

several factors: the volume and complexity of patients to be handed off, the degree to which a patient "matches" well-understood patterns in the field of emergency medicine, the amount of "work" remaining for the receiving emergency physician, the time allotted for the transition to take place, and the demand for attention required by other concurrent events.<sup>23</sup> However, there are times when the receiving provider is unable to achieve an adequate understanding of the patient's clinical status, so further evaluation of the patient is performed in the posthandoff period.<sup>22</sup>

### ANALYSIS OF POTENTIAL ERRORS AND BARRIERS TO EFFECTIVE HANDOFFS

Transitions in care lead to adverse patient outcomes for many reasons. Contributing factors to a poor handoff may be attributed to the patient, provider, team, task, technology, or

the local or institutional environment.<sup>34</sup> The process and associated possible problems of transferring information from patient to provider and then through the handoff process to a second provider are illustrated in Figure 1. The following discussion highlights some barriers within this framework.

### Signal-to-Noise Ratio

The concept of a signal-to-noise ratio, borrowed from the field of electrical engineering, illustrates the difficulty of communicating a clear message against a loud and disruptive background.<sup>35</sup> This notion has particular meaning in the ED, where staff interruptions, ongoing patient concerns, emergency medical services radio calls, temporal pressures, and the routine chaos of the work environment can all overwhelm the few moments of directed attention required for safe and effective handoffs.<sup>36-38</sup> Disorganized handoffs themselves can add to the distractions because extraneous data may drown out essential messages and details.

### Conciseness Versus Completeness

Every moment in a busy ED represents valuable time that must be used efficiently. The quality of the handoff thus depends on an appropriate balance of completeness and conciseness. Sometimes an adequate handoff can be limited to a short phrase with a working diagnosis and a disposition, as with the stable patient whose ED visit is nearing its conclusion and whose likelihood of requiring further intervention is low. This abbreviated handoff may not suffice for a patient whose course is more complicated.

### No Standard Approach

The peer-reviewed literature offers few clues to guide best practices. Physicians often default to individualized practices based on local norms, their own experiences, and situational preferences.<sup>39-41</sup> The content, location, style, and length of handoffs can be inconsistent and unpredictable. This lack of standardization can make it difficult for both the departing and receiving physician to communicate effectively.

### Ambiguous Moment of Transition of Care

After the handoff communication has occurred, the departing physician will sometimes remain in the ED to complete charts or unfinished tasks. ED staff may be confused about which physician is in charge of the patients who were handed off. Management decisions are often directed to the departing physician, possibly leaving the receiving physician uninformed on important clinical events unless the departing physician updates the receiving physician.

### No Clear High-Risk Triggers for the Dangerous Handoffs

Emergency medicine training conditions physicians to search for “red flags” and high-risk situations that may require more vigilance. Unfortunately, little information exists to help identify a potentially dangerous handoff situation. “Red flags” may include an uncertain diagnosis, an unstable patient, an

unclear disposition, a consultant-driven evaluation, a pending imaging study, deviations from a typical diagnosis or treatment plan, a patient with a psychiatric illness, and a prolonged stay in the ED. Further study is needed to characterize reliable high-risk triggers.

### Cognitive Bias

Patient information relayed from one physician to another is often subjective and prone to cognitive bias. In the transfer of care, the receiving physician usually relies on the clinical acumen and recall of the departing colleague. When the receiving physician assumes the interpretation of the initial physician, based on erroneous information or a faulty clinical impression, adverse outcomes may result. Nearly every handoff carries this risk of “diagnosis momentum.”<sup>42</sup> The receiving physician is subject to his or her own cognitive bias and may interpret what is communicated during the handoff through a faulty lens (eg, being adversely influenced by distraction, being inexperienced). A particularly common form of cognitive bias is “anchoring,” which is the tendency to rely too heavily on one piece of information or trait of the presentation according to one’s beliefs or experiences with the same or similar patients.

### Economic Construct of the ED Group

Physician compensation methods can also exert considerable influence on the patient handoff. Productivity-based systems tend to discourage handoffs in patient care and may financially motivate the initiating physician to continue patient care to disposition. In an hourly pay system, there are fewer disincentives to turn over patients to the next physician. The receiving physician in such a system may inherit multiple patients in various stages of evaluation and must assume responsibility for making the appropriate disposition of patients in whose treatment they were not initially involved. Either system can influence handoffs for better or worse. Thoughtfully blended systems may enhance the advantages of each while minimizing the barriers to effective handoffs.

### Additional Factors

Unavoidable task factors, such as an uncertain diagnosis, and patient factors, such as a language barrier, may predict a more problematic handoff. In addition, several institutional factors, including inpatient boarding and a chaotic work environment, may contribute to an adverse handoff. In summary, a number of formidable forces work against a safe, effective, and efficient handoff, and these factors must first be recognized to be mitigated.

### MODELS OF HANDOFFS

The most common handoff practice in EDs today is a one-to-one provider exchange between like professionals (eg, physicians, nurses, midlevel providers). This is typically a

narrative-based discussion or interactive verbal exchange focused on the most salient points in each patient's care, sometimes with the receiving provider taking notes. This approach has the advantage of being well accepted, well practiced, and conformable to the situation, timing, and persons involved.

However, this popular model of handoffs has its limitations. Major pitfalls include incompleteness and inconsistency. Several alternative models and methods have been proposed and used to improve handoffs. The components of these models include participants (single versus multidisciplinary), location (central versus bedside), method of exchange (written versus verbal), and the use of adjuncts (eg, templates, mnemonics, computers).

### Single Versus Multidisciplinary Handoff

Currently, most handoffs occur among providers of the same type (ie, on a single-disciplinary team). The advantage of this model is that it is efficient and focused: physicians hear what physicians need and nurses hear what nurses need. It also makes available a portion of the staff to guard the department while the other group performs their handoff. Handoffs may also occur as part of a multidisciplinary team. In this model, different team members (eg, nurses, physicians, midlevel providers, pharmacists) contribute to and participate in the handoff. These types of handoffs are common in inpatient services. The advantage of this model is that it integrates viewpoints of different providers, builds a team approach, and enables participants to serve as a "check and balance" for one another. There is little evidence available to support the superiority of either model as a best practice in the ED.

### Handoff Location

Handoffs may occur at the patient's bedside or in a central location. Most commonly, the exchange takes place at a central location (eg, in the provider's work area or in front of a computer or a whiteboard). This method provides easy access to written patient information (computers, charts, etc), is less time consuming, and affords greater privacy. Some physicians advocate that handoffs occur at the patient's bedside. The advantages of bedside handoffs include being able to introduce the patient and the receiving physician, the ability to integrate patient input into the transfer and update the patient on his or her status, and an opportunity for the receiving physician to directly assess the patient. The effectiveness of bedside rounding on handoffs, including patient and provider satisfaction, is unknown.

### Use of Written Aids

Written aids have been recommended as a means of improving communication during handoffs.<sup>43</sup> This method goes beyond the typical narrative model of the departing physician giving a verbal handoff while the receiving physician listens and takes notes. It implies that the critical elements of each patient's status and care plan will be documented by the

departing physician. Written aids confer an additional measure of reliability because the essential information is recorded and can be easily referenced.

Templates are a specific written aid designed to help guide handoffs. Few have been formally studied in the ED setting. The goal is to improve salience and avoid information loss. But template formats with a prespecified, rigid structure may actually increase the potential for error in some circumstances by being unnecessarily comprehensive and concealing essential messages.<sup>22</sup>

### Use of Mnemonics

Published handoff mnemonics include SBAR, the 5-*P*s, I PASS the BATON, HANDOFF, and SIGN OUT.<sup>44-48</sup> These and several other hospital-based handoff templates include a number of data elements that may not be relevant to ED practice or have unnatural information flows that could decrease efficiency and be impractical to implement. A recent review of the literature identified 24 unique handoff mnemonics. The authors concluded, however, that the literature studied was "not of sufficient quality and quantity to synthesize into evidence-based recommendations."<sup>49</sup>

### Computer-Assisted Handoff

As electronic health records become more common in EDs, they will likely play a larger role in the handoff process. Some computerized handoff tools have improved communication and reduced adverse events on surgical training services.<sup>50-52</sup> However, studies of these the tools found them to be complex templates with numerous data elements that enforce a level of compliance and detail not desirable in ED settings. In addition, if tools or templates are not an inherent part of the medical record, their use could introduce redundant documentation.

Despite the limitations of electronic health records, there is promise that these systems can offer several advantages over the traditional oral or pen-to-paper methods. These include functionality that can prompt users to communicate essential information and improve compliance, allow focused templates or updates to be added to the medical record, aid with retrieval of information, and monitor handoff practices. Although these systems may serve as adjuncts to the transfer of care, the importance of an interactive exchange between care providers will remain.<sup>41</sup> Perhaps the greatest benefit of electronic health records is that, by providing detailed information on demand, they may allow handoffs to focus more on integrated patient assessments and less on mere information exchange.

## QUALITY MEASURES

Attempts to improve health care in the modern era frequently involve the development, ratification, and enactment of quality measures. Particular importance can be applied to a measure if individual providers or institutions are required to publicly report their performance or if financial incentives or disincentives are attached to them.<sup>53</sup>

- Knowing the historical narrative
- Being aware of significant data or events
- Knowing what data are important for monitoring changes
- Being prepared to deal with effects of previous events
- Anticipating future events
- Understanding the current plan of care strategy
- Performing planned tasks
- Alerting others to the completion of interdependent tasks

**Figure 2.** Measures of handoff outcomes.

Handoff quality measures can be grouped into those that quantify the outcomes, the content, and the processes of handoffs.<sup>32</sup> Metrics to quantify outcome measures can be developed to mirror the handoff objectives listed in Figure 2. Outcome metrics can also be developed to evaluate the overall success of the handoff process from the perspective of the receiving and departing provider (eg, satisfaction with the handoff event or the subjective attainment of a “shared mental model”).

Measures of handoff content are more straightforward. One can estimate the thoroughness of a handoff by evaluating whether certain key items are communicated (eg, name, location, allergies, plan). The main difficulty is in identifying what items should be included in this minimum data set content. Several health care groups have attempted to codify a list of items necessary for a successful handoff, and the components of their suggested mnemonics reveal considerable variability.<sup>46-48</sup> Even within a specific clinical scenario, essential information seems to depend on the situation.

Finally, specific handoff interaction processes can be conceptualized and measured according to their frequency. Assignment of “essential” processes can be seemingly arbitrary. Potentially useful elements include minimizing interruptions, inviting interactive questioning, identifying tasks to be done by the receiving provider, and using closed-loop verification communication techniques for critical information.

Although measurement is desirable and may be useful, it can also instigate new risks. Attempts at measurement that do not consider unintended consequences can lead to the introduction of policies that may actually worsen handoff processes and even increase the incidence of adverse events.

## LEGAL ASPECTS

Handoffs are high-risk events. Although there is limited information in the peer-reviewed literature, communication breakdowns have been documented to occur in nearly 80% of medicolegal cases.<sup>54</sup> Faulty handoffs are specifically implicated in up to 24% of malpractice claims in the ED.<sup>55</sup>

Theoretically, patient care may benefit from the additional evaluation and diagnostic input of a second care provider. In reality, care transitions frequently result in the dilution of accountability. From a risk management perspective, if a patient experiences a preventable adverse event resulting from a faulty handoff, both departing and receiving providers are likely to share liability.

## STRATEGIES TO IMPROVE HANDOFFS

Standardization of handoffs is often proposed as a panacea for reducing shift-change variability and errors.<sup>56,57</sup> Unfortunately, there is little agreement about what essential information and processes should be included in a “standard” handoff. Thus, any attempt to make content and processes uniform can cause difficulties when the details that one provider considers “essential” are omitted. On the other hand, compiling all the data and processes that every provider considers indispensable may be unwieldy; some of the information may not be useful and may obscure more than it reveals.<sup>32</sup>

The best handoffs appear to be discipline specific and patient specific.<sup>58</sup> Several unique features should be considered when any handoff strategy is implemented in the ED. Suggestions to help “standardize” and potentially improve the handoff process are listed below:

### Reduce the Number of Unnecessary Handoffs

The natural conclusion of a patient’s visit in the ED is occasionally within a short period from the change of shift. Allowing a buffer time between shift changes, either by scheduling overlapping shifts or protecting the departing physician from acquiring new patients at the end of the shift, may reduce delays in disposition or incidences of miscommunication. However, a diagnosis or disposition should not be forced. It is more sensible to concede that the evaluation is in progress, the diagnosis is uncertain, or the disposition is unclear than to force a premature end to a patient’s visit for sake of expediency. An appropriate handoff is always a safer option.

### Limit Interruptions and Distractions as much as is Practicable

The effect of an adverse local environment should not be underestimated. The integrity of the handoff process is compromised in loud and chaotic EDs in which the departing provider is anxious to leave and the attention of the receiving provider is diverted. Choosing a quiet and dedicated space will help protect the sanctity of the handoff process.<sup>41,57,59</sup>

### Provide a Succinct Overview

A major goal of the handoff is to encapsulate and provide a clear summary of the patient’s visit. It is difficult to later recall the relevant features if they are hidden in a myriad of unnecessary detail. Begin the presentation of each patient with a chief complaint, followed by an assessment, plan, and disposition, if possible.

### Communicate Outstanding Tasks, Anticipate Changes, and have a Clear Plan

Patients whose diagnosis or disposition is unclear represent a population that is particularly at risk for an adverse event from a handoff. Departing physicians should communicate all outstanding studies, consultations, or other information that is still pending. As best as possible, departing physicians should attempt to anticipate results and have contingency plans if results are not as expected. Similarly, authority issues should be spelled out (for example, “the neurosurgical service is waiting for the results of the computed tomography scan and then they will determine the patient’s disposition”). Special attention should be focused on patients with potential management issues that may occur soon after the handoff. Those patients should be explicitly identified and have clear care plans (for example, “if the repeat [or next set of] cardiac markers are increasing, notify the admitting physician and redirect the patient to the ICU”).

### Make Information Readily Available for Direct Review

Laboratory and imaging studies should be available for independent review by the receiving team. Documentation, if immediately available, such as provided by an electronic medical record, handwritten chart, or rapidly transcribed dictation, may allow a more truncated handoff by providing a backup information source.

### Encourage Questioning and Discussion of Assessments

The receiving physician should be encouraged to clarify issues and, if possible, discuss the rationale behind clinical impressions.<sup>19</sup> This cross-checking practice may identify key issues that need to be clarified to form an adequate shared understanding and detect erroneous assessments and plans. If this opportunity to interact is not readily available (eg, if the handoff is conducted through an interim third party or by recorded notes only), the handoff process is compromised.

### Account for All Patients

Ensure that a handoff is given on every patient for whom the receiving physician will be responsible. If a patient has temporarily left the department (eg, to go to dialysis), the receiving physician should be given the same handoff as if the patient were still physically present in the ED.

### Signal a Clear Moment in Transition of Care

Communicate in an unambiguous, preferably visible manner that a handoff has occurred. It may be helpful to hardwire the process such that only one physician can be assigned to a patient at any time (eg, through transfer of a pager or telephone or by changing names on the whiteboard or computer). The receiving provider should take full responsibility for the patients who were handed off and resist the temptation to avoid getting involved.<sup>60</sup>

- Characterize current practice and quality gaps
- Define knowledge skills, attitudes, and participants required
- Derive the best timing and location of handoffs
- Define the optimal order of presentation within handoffs and among patients
- Characterize the integration and influence of medical records
- Develop valid and feasible quality measures
- Characterize the “high-risk” handoff
- Derive best practices
- Establish evidence-based monitoring, evaluation, and training of best practices

**Figure 3.** Proposed handoff research agenda.

## FUTURE DEVELOPMENT AND RESEARCH AGENDA

The study of ED handoffs is in its infancy. Research in this area goes beyond usual clinical epidemiologic approaches. It can also be studied from the perspective of behavioral scientists. Engaging psychologists, communications specialists, and human factors experts may create a team that is more effective in revealing meaningful characterizations, interventions, and best practices.

A research agenda for this relatively uncharted field is proposed in Figure 3. Better systems are needed to quantify the true incidence of faulty handoffs and their magnitude of potential harm. “High-risk” features that lead to problematic handoffs need to be characterized, possibly through examination of legal claims data and development of surveillance systems. Templates, computers, and other technologic aids to support handoffs are areas rich for study. Best practices need to be derived and validated. Finally, the implementation of these practices needs to include the development of modalities for training including simulation, behavior modification, and monitoring performance.

## CONCLUSION

Handoffs in the ED will remain a patient safety issue as long as patient stays overlap provider shifts. Simple solutions are elusive, especially because of the number and complexity of issues involved. This article provides a roadmap on how to conceptualize the ED handoff process, understand its vulnerabilities, improve its function, and measure progress. More effort needs to be dedicated to close the gap between the ideal handoff and its current state.

*The authors thank Linda J. Kesselring, MS, ELS for copyediting the manuscript. The authors are also grateful to Enrico Coiera, MBBS, PhD, Alexandra Murphy, PhD, and Ravi Behara, PhD for*

providing independent reviews of this article. Finally, thanks to Angela Franklin, Esq, who diligently oversees the Quality Improvement and Patient Safety section including the logistics of this grant project.

Supervising editor: Donald M. Yealy, MD

**Funding and support:** By *Annals* policy, all authors are required to disclose any and all commercial, financial, and other relationships in any way related to the subject of this article that might create any potential conflict of interest. See the Manuscript Submission Agreement in this issue for examples of specific conflicts covered by this statement. Funding for this project was provided by an American College of Emergency Physicians Section Grant to the Quality Improvement and Patient Safety section. Portions of the manuscript were created as products of grant number 1 U18 HS016640 from the Agency for Healthcare Research and Quality.

**Publication dates:** Received for publication July 13, 2009. Accepted for publication July 15, 2009.

Reprints not available from the authors.

**Address for correspondence:** Dickson S. Cheung, MD, MBA, MPH, Carepoint, P.C., 5600 South Quebec Street, Suite 312A, Greenwood Village, CO 80111; 303-956-7381, fax 303-649-9973; E-mail [dscheung@alum.mit.edu](mailto:dscheung@alum.mit.edu).

## REFERENCES

1. Committee on the Quality of Health Care in America, Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academies Press; 2004:45.
2. Committee on the Quality of Health Care in America, Institute of Medicine. *To Err Is Human: Building a Safer Health System*. Washington, DC: National Academies Press; 2000:36.
3. Pesanka DA, Greenhouse PK, Rack LL, et al. Ticket to ride: reducing handoff risk during hospital patient transport. *J Nurs Care Qual*. 2009;24:109-115.
4. WHO Collaborating Centre for Patient Safety Solutions. Communication during patient hand-overs. *Patient Safety Solutions*. 2007; 1:solution 3.
5. JCAHO sentinel event alert, issue 26—delays in treatment. Sentinel Event Alert Advisory Group. Available at: <http://www.jcipatientsafety.org/show.asp?durki=9880&site=155&return=9362>. Accessed June 24, 2009.
6. Joint Commission. 2006 Critical access hospital and hospital national patient safety goals #2E. Available at: [http://www.jointcommission.org/PatientSafety/NationalPatientSafetyGoals/06\\_npsg\\_cah.htm](http://www.jointcommission.org/PatientSafety/NationalPatientSafetyGoals/06_npsg_cah.htm). Accessed June 24, 2009.
7. Lardner R. *Effective Shift Handover: A Literature Review*. Offshore Technology Report-OTO 96 003. Health and Safety Executive, 1996.
8. Arora V, Johnson J, Lovinger D, et al. Communication failures in patient sign-out and suggestions for improvement: a critical incident analysis. *Qual Saf Health Care*. 2005;14:401-407.
9. Jenkin A, Abelson-Mitchell N, Cooper S. Patient handover: time for a change? *Accid Emerg Nurs*. 2007;15:141-147.
10. Perry S. Transitions in care: studying safety in emergency department signovers. *Focus Patient Safety*. 2004;7:1-3. Available at: <http://www.npsf.org/download/Focus2004Vol7No2.pdf>. Accessed June 24, 2009.
11. Wears RL, Perry SJ, Shapiro M, et al. Shift changes among emergency physicians: best of times, worst of times. Paper presented at: Proceedings of the Human Factors and Ergonomics Society 47th Annual Meeting; October 13-17, 2003; Denver, CO.
12. Beach C, Croskerry P, Shapiro M. Profiles in patient safety: emergency care transitions. *Acad Emerg Med*. 2003;10:364-367.
13. Beach C. Lost in translation. AHRQ Web M & M. Available at: <http://www.webmm.ahrq.gov/case.aspx?caseID=116>. Accessed June 24, 2009.
14. Vidyarthi A. Fumbled handoff. AHRQ Web M&M. March 2004. Available at: <http://www.webmm.ahrq.gov/case.aspx?caseID=55>. Accessed June 24, 2009.
15. Vidyarthi A. Triple handoff in cases and commentaries: hospital medicine. AHRQ Web M&M. September 2006. Available at: <http://www.webmm.ahrq.gov/case.aspx?caseID=134>. Accessed June 24, 2009.
16. Clancy CM. Care transitions: a threat and an opportunity for patient safety. *Am J Med Qual*. 2006;21:415-417.
17. Lyndon A. Communication and teamwork in patient care: how much can we learn from aviation? *J Obstet Gynecol Neonatal Nurs*. 2006;35:538-546.
18. 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;16:125-132.
19. Patterson ES, Woods DD. Shift changes, updates and the on-call model in space shuttle mission control: computer supported cooperative work. *J Collab Comput*. 2001;10:317-346.
20. Bierly P, Spender J. Culture and high reliability organizations: the case of the nuclear submarine. *J Management*. 1995;21:639-656.
21. Sexton J. *Content Analysis of Cockpit Communication*. Presented at Daimler-Benz: Group Interaction in High Risk Environments, Ladenberg, Germany, October 27-29, 1999. Vol Tech. Report 99-8. Austin, TX: University of Texas; 1999.
22. Wears RL, Perry SJ, Eisenberg E, et al. Transitions in care: signovers in the emergency department. Paper presented at: Proceedings of the Human Factors and Ergonomics Society 48th Annual Meeting; September 20-24, 2004; New Orleans, LA.
23. Wears RL, Perry SJ, Eisenberg E, et al. Conceptual framework for studying shift changes and other transitions in care. Paper presented at: Proceedings of the Human Factors and Ergonomics Society 48th Annual Meeting; September 20-24, 2004; New Orleans, LA.
24. Kitch BT, Cooper JB, Zapol WM, et al. Handoffs causing patient harm: a survey of medical and surgical house staff. *Jt Comm J Qual Patient Saf*. 2008;34:563-570.
25. McFetridge B, Gillespie M, Goode D, et al. An exploration of the handover process of critically ill patients between nursing staff from the emergency department and the intensive care unit. *Nurs Crit Care*. 2007;12:261-269.
26. Behara R, Wears RL, Perry SJ, et al. Conceptual framework for the safety of handovers. In: Henriksen K, ed. *Advances in Patient Safety*. Rockville, MD: Agency for Healthcare Research and Quality/Department of Defense; 2005:309-321. Available at: <http://www.ahrq.gov/downloads/pub/advances/vol2/Behara.pdf>. Accessed July 3, 2009.
27. Kerr MP. A qualitative study of shift handover practice and function from a sociotechnical perspective. *J Adv Nurs*. 2002;37:125-134.
28. Pines JM. To transfer or not to transfer [spotlight]. AHRQ WebM&M [serial online]. January 2009. Available at: <http://webmm.ahrq.gov/case.aspx?caseID=191>. Accessed July 3, 2009.

29. Cooper J. Do short breaks increase or decrease anesthetic risk? *J Clin Anesth.* 1989;1:228-231.
30. Matthews AL, Harvey CM, Schuster RJ, et al. Emergency physician to admitting physician handovers: an exploratory study. Paper presented at: Proceedings of the Human Factors and Ergonomics Society 46th Annual Meeting; Baltimore, MD; 2002: 1511-1515.
31. Singer JI, Dean J. Emergency physician intershift handovers: an analysis of our transitional care. *Pediatr Emerg Care.* 2006;22: 751-754.
32. Patterson ES, Wears RL. Beyond "communication failure." *Ann Emerg Med.* 2009;53:711-712.
33. Patterson ES, Wears R. A measurement approach for transitions of care. In: Patterson ES, Miller J, eds. *Macro-cognition Metrics and Scenarios: Design and Evaluation for Real-World Teams.* Hampshire, UK: Ashgate; in press.
34. Pronovost PJ, Holzmueller CG, Martinez E, et al. A practical tool to learn from defects in patient care. *Jt Comm J Qual Patient Saf.* 2006;32:102-108.
35. Vincent CA, Wears RL. Communication in the emergency department: separating the signal from the noise. *Med J Aust.* 2002;176:409-410.
36. Fairbanks RJ, Bisantz AM, Sunm M. Emergency department communication links and patterns. *Ann Emerg Med.* 2007;50: 396-406.
37. Coiera EW, Jayasuriya RA, Hardy J, et al. Communication loads on clinical staff in the emergency department. *Med J Aust.* 2002; 176:415-418.
38. Spencer R, Coiera E, Logan P. Variation in communication loads on clinical staff in the emergency department. *Ann Emerg Med.* 2004;44:268-273.
39. Beach C, Croskerry P, Shapiro M. Profiles in patient safety: emergency care transitions. *Acad Emerg Med.* 2003;10:364-367.
40. Nemeth C, Connor M, Nunnally M, et al. Distributed cognition: how hand-off communication actually works. *Anesthesiology.* 2005;103:A1289.
41. Solet DJ, Norvell JM, Rutan GH, et al. Lost in translation: challenges and opportunities in physician-to-physician communication during patient handoffs. *Acad Med.* 2005;80: 1094-1099.
42. Croskerry P. The importance of cognitive errors in diagnosis and strategies to minimize them. *Acad Med.* 2003;78:775-780.
43. Pillow M. *Improving Hand-Off Communications.* Oak Brook, IL: Joint Commission Resources; 2007:29-34.
44. Haig KM, Sutton S, Whittington J. SBAR: a shared mental model for improving communication between clinicians. *Jt Comm J Qual Patient Saf.* 2006;32:167-175.
45. Yates G. Panel 1—Promising Quality Improvement Initiatives: Reports From the Field. *AHRQ Summit—Improving Health Care Quality for All Americans: Celebrating Success, Measuring Progress, Moving Forward.* 2004.
46. Patient Safety Program, Department of Defense. *Healthcare Communication Toolkit to Improve Transitions in Care.* Falls Church, VA: Healthcare Team Coordination Program, TRICARE Management Activity; 2005. Available at: [http://dodpatientsafety.usuhs.mil/files/Handoff\\_Toolkit.pdf](http://dodpatientsafety.usuhs.mil/files/Handoff_Toolkit.pdf). Accessed July 3, 2009.
47. Brownstein A, Schleyer A. The art of HANDOFFS: a mnemonic for teaching the safe transfer of critical patient information. *Resident Staff Physician.* 2007;53. Available at: [http://www.residentandstaff.com/issues/articles/2007-06\\_02.asp](http://www.residentandstaff.com/issues/articles/2007-06_02.asp). Accessed July 3, 2009.
48. Horwitz LI, Moin T, Green ML. Development and implementation of an oral sign-out skills curriculum. *J Gen Intern Med.* 2007;22: 1470-1474.
49. Risenberg LA, Leitzsch J, Little BW. Systemic review of handoff mnemonics literature. *Am J Med Qual.* 2009;24:196-204.
50. Peterson LA, Orav EJ, Teich JA, et al. Using a computerized sign-out program to improve continuity of inpatient care and prevent adverse events. *Jt Comm J Qual Patient Saf.* 1998;23: 77-87.
51. Van Eaton EG, Horvath KD, Lober WB, et al. Organizing the transfer of patient care information: the development of a computerized resident sign-out system. *Surgery.* 2004;136:5-13.
52. Van Eaton EG, Horvath KD, Lober WB, et al. A randomized, controlled trial evaluating the impact of a computerized rounding and sign-out system on continuity of care and resident work hours. *J Am Coll Surg.* 2005;200:538-545.
53. Cromwell J, Drozd EM, Smith K, et al. Financial gains and risks in pay-for-performance bonus algorithms. *Health Care Financ Rev.* 2007;29:5-14.
54. Levinson W. Physician-patient communication: a key to malpractice prevention. *JAMA.* 1994;272:1619-1620.
55. Kachalia A, Gandhi TK, Puopolo AL, et al. Missed and delayed diagnoses in the emergency department: a study of closed malpractice claims from 4 liability insurers. *Ann Emerg Med.* 2007;49:196-205.
56. Alvarado K, Lee R, Christofferson E, et al. Transfer of accountability: transforming shift handover to enhance patient safety. *Healthcare Q.* 2006;9:75-79.
57. McCann L, McHardy K, Child S. Passing the buck: clinical handovers at a tertiary hospital. *N Z Med J.* 2007;120:U2778.
58. Arora V, Johnson J. A model for building a standardized hand-off protocol. *Jt Comm J Qual Patient Saf.* 2006;32:646-655.
59. Sabir N, Yentis SM, Holdcroft A. A national survey of obstetric anaesthetic handovers. *Anaesthesia.* 2006;61:376-380.
60. Bitterman R. Fumbled handoffs at shift change: a common liability source for emergency physicians. *ED Legal Letter.* AHC Media LLC, 2008.

#### APPENDIX 1. Author Affiliations.

From the Sky Ridge Medical Center, Carepoint P.C., Denver, CO (Cheung); the Department of Emergency Medicine, Jefferson Medical College, and Albert Einstein Medical Center, Philadelphia, PA (Kelly); the Department of Emergency Medicine, Northwestern Memorial Hospital, Chicago, IL, Feinberg School of Medicine, Northwestern School University, Chicago, IL (Beach); the Department of Emergency Medicine, University of Nevada School of Medicine, and the Emergency Department, University Medical Center of Southern Nevada, Las Vegas, NV (Berkeley); the Emergency Physicians Insurance Co, Auburn, CA, and Bitterman Health Law Consulting Group, Inc., Harbor Springs, MI (Bitterman); Physicians Specialty Ltd., RRG, Canton, OH (Broida); Emergency Medicine Physicians, Ltd., Canton, OH (Broida, Klauer); EM Kimball Medical Center, Emergency Medical Associates, Livingston, NJ (Dalsey); Christiana Care Health System, Newark, DE, and Thomas Jefferson University–Jefferson Medical College, Philadelphia, PA (Farley); the Department of Emergency Medicine, Johns Hopkins Bayview Medical Center, Baltimore, MD (Fuller); Paper Documentation Solutions, T-Systems, Inc., Dallas, TX (Garvey); Michigan State University College of Osteopathic Medicine, East Lansing, MI (Klauer); the Emergency Department, Ronald Reagan UCLA Medical Center, Geffen School of Medi-

cine at UCLA, Los Angeles, CA (McCullough); Ohio State University, Columbus, OH (Patterson); the Department of Emergency Medicine, Department of Anesthesia Critical Care Medicine, Johns Hopkins University School of Medicine, Baltimore, MD (Pham); Cleveland Clinic Emergency Services Institute, the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University, and Lerner Research Institute Department of Biomedical Engineering, Cleveland, OH (Phelan); the Hospital of the University of Pennsylvania, Center for Clinical Epidemiology and Biostatistics, Leonard Davis Institute of Health Economics, University of Pennsylvania, Philadelphia, PA (Pines); Department of Emergency Medi-

cine, University of Maryland School of Medicine, Baltimore, MD (Schenkel); the Emergency Department, Louis Stokes Cleveland DVAMC, and Case Western Reserve University School of Medicine, Cleveland, OH (Tomolo); the Department of Emergency Medicine, Saint Francis Hospital and Medical Center, Hartford, CT (Turbiak); Simulation Technology and Immersive Learning, Office of Medical Education, Feinberg School of Medicine, Northwestern University, Chicago, IL (Vozenilek); the University of Florida, Jacksonville, FL, and Imperial College, London, England (Wears); and the Department of Pediatrics, Division of Emergency Medicine, University of Alabama at Birmingham, Children's Hospital of Alabama, Birmingham, AL (White).

**Short abstract for Cheung et al, YMEM** Patient handoffs at shift change are a ubiquitous and potentially hazardous process in emergency care. As crowding and lengthy evaluations become the standard for an increasing proportion of emergency departments (EDs), the number of patients handed off will likely increase. It is critical now more than ever before to ensure that handoffs supply valid and useful shared understandings between providers at transitions of care. We provide the most up-to-date evidence and collective thinking about the process and safety of handoffs between physicians in the ED.