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“The human and financial costs of wound development and care are substantial and will escalate for the foreseeable future unless evidence-based approaches are enacted at the bedside using systems-oriented strategies.”

—Beitz (p. 244)



Preventing Pressure Ulcers

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Continuity of Care

A Systematic Review of Failures in Handoff Communication During Intrahospital Transfers

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In recent years, considerable effort has been invested in improving handoff communication. Studies to date have predominantly focused on intershift handoffs, with relatively little attention given to intrahospital transfers. Intershift handoffs occur between care providers of the same departments during shift changes. Handoffs at intrahospital transfers occur when patients are transferred from one department to another during hospitalization. The reasons for transfer include the need for specialist investigation or intervention, ongoing support not provided in the referring ward (unit), and repatriation.

Cohen and Hilligoss have recently conducted a review on handoffs in hospitals,¹ in which they discussed several general issues affecting the effort to improve handoffs, including the ambiguities in how “handoff” and “standardization” are defined and the lack of evidence on the effectiveness of handoff standardization. Although handoff during transfers was highlighted as an area of concern, the epidemiology of handoff failures in intrahospital transfers was not explored. There is currently a gap in our knowledge on the nature and effects of communication failures during intrahospital transfers.

In this review, we systematically examined the nature of handoff failures during intrahospital transfers. Also under examination were factors affecting handoff communication and the effectiveness of the interventions to date. For the purpose of our review, we define *handoff* (also known as *handover*) as follows:

The transfer of responsibility and accountability for some or all aspects of care for a patient, or group of patients, to another person or professional group on a temporary or permanent basis.^{2(p. 7)}

Handoff communication, then, is the verbal and written exchange of pertinent information occurring during this transition of care.

Article-at-a-Glance

Background: Handoffs serve a critical function in ensuring patient care continuity during transitions of care. Studies to date have predominantly focused on intershift handoffs, with relatively little attention given to intrahospital transfers. A systematic literature review was conducted to characterize the nature of handoff failures during intrahospital transfers and to examine factors affecting handoff communication and the effectiveness of current interventions.

Methods: Primary studies investigating handoff communication between care providers during intrahospital transfers were sought in the English-language literature between 1980 and February 2011. Data for study design, population characteristics, sample size, setting, intervention specifics, and relevant outcome measures were extracted.

Data Synthesis: Study results were summarized by the impact of communication breakdown during intrahospital transfer of patients, and the current deficiencies in the process. Results of interventions were summarized by their effect on the quality of handoff communication and patient safety.

Findings: The initial search identified 516 individual articles, 24 of which satisfied the inclusion criteria. Some 19 were primary studies on handoff practices and deficiencies, and the remaining 5 were interventional studies. The studies were categorized according to the clinical settings involved in the intrahospital patient transfers.

Conclusions: There is consistent evidence on the perceived impact of communication breakdown on patient safety during intrahospital transfers. Exposure of handoffs at patient transfers presents challenges that are not experienced in intershift handoffs. The distinct needs of the specific clinical settings involved in the intrahospital patient transfer must be considered when deciding on suitable interventions.

Study Flow for Literature Search and Selection

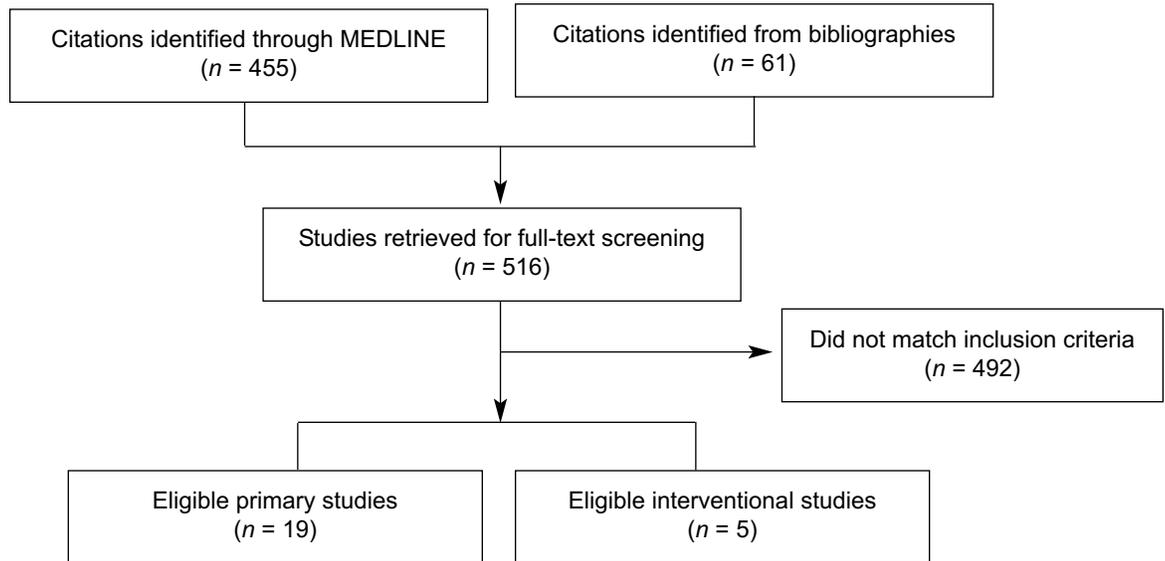


Figure 1. The literature search identified 516 individual articles, 24 of which satisfied the inclusion criteria.

Methods

DATA SOURCES

A search of the English-language literature between 1980 and September 2010 with MEDLINE was conducted, using the following search terms: “intra-hospital transfer,” “intra-hospital transport,” “intra-hospital transfer,” “intra-hospital transport,” “handover,” and “handoff.” A follow-up search was carried out on February 16, 2011. A manual search of article bibliographies was also performed.

STUDY SELECTION

Electronic citations, including available abstracts, were screened to select reports for full-text review. Selection criteria for inclusion were published primary studies that investigated hand-off communication during intrahospital patient transfers. Studies relating to shift handoffs, outpatient handoffs, discharge of patients, interhospital transfers, transfers to long-term care or home settings, and communication with patients and their relatives were excluded. Only English-language articles that appeared in peer-reviewed journals were eligible. Studies that did not generate primary data on handoff or did not specify a method for data collection and sample size were also excluded.

DATA EXTRACTION

Data for study design, population characteristics, sample size,

setting, intervention specifics (if appropriate), and relevant outcome measures were extracted.

DATA SYNTHESIS

Results of the studies were summarized by the impact of communication breakdown during intrahospital transfer of patients and the current deficiencies in the process. Results of interventions were summarized by their effect on the quality of handoff communication and patient safety. Studies were categorized according to the clinical settings involved in the intrahospital patient transfers. Quantitative synthesis was deemed not appropriate for this body of literature because of wide variability in research design, populations, types of interventions and outcomes.

FINDINGS

Our search identified 516 individual articles (Figure 1, above), 24 of which satisfied the inclusion criteria. Some 19 were primary studies on handoff practices and deficiencies (Appendix 1, available in online article) and the remaining 5 were interventional studies (Appendix 2, available in online article). One study performed a retrospective review of incident reports related to handoffs within a hospital.³ The study found that 42% (n = 140) of all reports were related to transfers between inpatient wards. The remaining 24 studies focused on a handful of

clinical settings, including transportation of critically ill patients ($n = 2$), discharge of patients from critical care to specialty ward ($n = 5$), transfers of surgical patients ($n = 7$), transfers from the emergency department (ED; $n = 7$), transfers of oncology patients ($n = 1$), and transfers between wards and radiology ($n = 1$).

Transportation of Critically Ill Patients. The literature search yielded two articles exploring the role of communication in ensuring safety during transportation of critically ill patients.^{4,5} In one paper, 176 critical incidents submitted to the Australian Incident Monitoring Study in intensive care were reviewed.⁴ Communication and liaison issues between ICU and destination were cited as the most common management issues, contributing to adverse outcomes in 47 reports. Some 31% of the incidents had significant adverse outcomes. Effective planning and communication were found to be vital in reducing unnecessary waiting periods, ensuring that the time required for transportation was kept to a minimum and that equipment required for the patient was readily available. Detailed analysis of how communication led to errors was not documented.

In the second study, 97 intrahospital transports from the ICU were observed.⁵ Five patients had unnecessary delays away from the ICU because of problems with ancillary staff availability. Poor communication between the ICU and destination was identified as a contributing factor to these unnecessary delays. The extent to which poor communication contributed to delay was, however, not reported.

Discharge of Patients from Critical Care to Specialty Ward. Discharge of the ICU patient to a specialty ward occurs when a patient no longer requires intensive care. Our literature search yielded five papers relating to communication during ICU discharge,⁶⁻¹⁰ two of which were interventional studies.⁹⁻¹⁰

In one study, the discharge planning process was assessed from the perspective of critical care nurses.⁷ Some 43% ($n = 218$) of the participants identified communication as the most important factor in enhancing the discharge planning process. The nurses reported feeling detached from the process, as they perceived that decision to discharge was typically made by physicians, who communicated to senior staff members to the exclusion of nurses responsible for patient care. In addition, there was no consistent handoff policy, and communication between critical care and ward staff was variable.

In another study, ward nurses reported the need for improving handoff communication ($n = 13$).⁸ The study revealed that ward nurses, in particular junior staff, who lacked the requisite skills in managing patients requiring critical care, were often anxious about receiving patients from the ICU.

Ward staff further expressed being overwhelmed by the information provided and the technical terms used by ICU nurses. The need for pretransfer communication to allow for sufficient preparation time was highlighted.

The role of an ICU liaison nurse in facilitating patient transfer was explored in the remaining studies. Several benefits were reported, including improved communication and coordination between the ICU and the specialty ward.⁶ The liaison nurse was perceived as a conduit between the ICU and the ward, communicating with the ward staff regarding imminent patient transfers and conveying information back to the ICU about ward constraints to negotiate the best time for transfer. Patient care after transfer was also enhanced, as continued clinical support was provided by the liaison nurse. In two studies, readmission rates to the ICU were evaluated before and after an ICU liaison nurse role was introduced.⁹⁻¹⁰ Both studies hypothesized improvement in communication between wards and a drop in readmission rates. This reduction was, however, nonsignificant ($p = .05$).¹⁰

Transfer of Surgical Patients. Surgical patients undergo multiple transfers through the continuum of care, including preoperative transfer from the ward to the operating room (OR), postoperative transfer from the OR to the recovery room, and finally from the recovery room back to the ward. Our literature search yielded six studies that assessed preoperative and/or postoperative handoffs,¹¹⁻¹⁶ and one interventional study.¹⁷ Three of these studies were, however, published by the same group of researchers within three months of each other,¹³⁻¹⁵ thereby limiting generalization across organizations and time periods.

In one study, 444 malpractice claims were reviewed, and 60 were found to involve communication breakdowns.¹² Communication failures were distributed equally in all phases of surgical care—preoperative (38%), intraoperative (30%), and postoperative (32%). The study further revealed that handoffs and transfers in care were especially vulnerable to communication breakdown, with 43% of communication failures occurring during handoffs, and 39% during intrahospital transfers. In another study, 20 patients were observed through the surgical journey.¹⁴ Both preoperative and postoperative handoffs were found to be poor, incurring an information loss of 61.7% and 52.4%, respectively. Preoperative verbal handoff from the ward to the OR was completed for only 45% of the patients. Postoperative handoff was equally poor. Only 66% of the patient-specific information, 67% of the anaesthetic information, and 30% of the essential surgical information was transferred. The study further highlights the increased degradation of handoff information from the OR to the recovery, and subsequently from the recovery

ery to the ward.

The remaining studies focused on postoperative handoff between anesthetists and recovery nurses.^{11,13,15-16} In all these studies, handoff was brief, unstructured and informal. Information omission was the primary concern. One study found that in 67% ($n = 185$) of the postoperative handoffs essential information was not verbally transferred.¹¹ Surgical handoff was again highlighted to be particularly poor.^{11,13,15} The surgical team was often not involved in the handoff, and information on intraoperative events was handed over by the anaesthetic team, which might not be aware of surgery related issues.¹³ Although surgery notes commonly accompanied the patient, they were typically incomplete.¹⁵

The unpredictable work pattern at the recovery room was cited as a barrier to handoff communication.¹⁶ Handoffs took place in the midst of other activities, which competed for the receiving nurse's attention. Further, many different members of staff were transiently involved in the care of patients in the recovery area. Thus, the potential for information loss was high.

In an interventional study, a standardized handoff protocol for the transition between the OR and the ICU was developed on the basis of safety procedures from aviation and the Formula 1 pit-stop process.¹⁷ The results were encouraging. The number of technical errors was reduced from 5.42 to 3.15 ($p < .001$), and the mean number of information omissions was reduced from 2.09 to 1.07 ($p = .003$). Teamwork was reported to have improved. The effects of the protocol on patient outcome were, however, not evaluated.

Transfers from the Emergency Department. The ED is typically a hospital's initial reception department. Patients requiring hospital admission are first examined at the ED and are subsequently transferred to an inpatient unit. Our literature search yielded six primary studies¹⁸⁻²³ and one interventional study.²⁴⁻²⁵

Inadequate handoff was implicated by both emergency physicians and hospitalists as a major contributor to adverse events.^{18,20} In one study, 29% ($n = 246$) of surveyed physicians reported experiencing an adverse event or near miss after ED transfers, and 36 errors were identified, including diagnosis errors ($n = 13$), treatment errors ($n = 14$), and disposition errors ($n = 13$).²⁰ Failure to communicate the most recent set of vital signs, which was cited in 10 of the 36 incidents, was the most prevalent cause of incidents. Information technology was implicated in several errors, where vital signs recorded in the ED were not visible electronically. In another study, inadequate or delayed handoff was reported to result in treatment delays.¹⁸ In particular, failure to communicate pending tests and diagnostic results was a major cause of delayed care after transfer.

Another communication barrier between the ED and inpatient wards is the divergent approaches to patient care.^{18,20,23} ED work is characterized by a high level of uncertainty, and difficult decisions have to be made under significant time constraints before critical data become available. Thus, ED providers typically view their role as stabilization and disposition, not definitive diagnosis and management. Consequently, referrals are often made with incomplete handoff and treatment. Hospitalists, on the other hand, expect ED providers to produce definitive diagnoses. Admissions are commonly denied until confirmatory test results and laboratory studies are provided.^{18,20,23} This diversity in approaches leads to tension in the handoff. Hospitalists might believe they are being "dumped" with admissions that are difficult to justify,^{18,22} whereas emergency physicians might believe that their professional opinions are being questioned.¹⁸ Inpatient teams would sometimes attempt to steer patients to another team.²²⁻²³

High workload at either the ED or the admitting ward compounds the communication challenges.²⁰ Handoff becomes less interactive and rushed, and is sometimes omitted. Furthermore, ED physicians may not have time to review the patient again before transfer and are unaware of new developments or current vital signs. Crowding in the ED also causes some patients to be physically removed from standard care locations, increasing the possibility of being overlooked.

Communication failures during referral exacerbate the overcrowding situation in ED because patients cannot be moved from the ED to inpatient hospital beds. Long boarding time at the ED further increases the likelihood of handoff failure, as the patient is transferred between multiple caregivers because of shift changes within the department. Omissions and misinformation during intershift handoffs propagate to the final receiving ward.²⁰

A nursing handoff during ED transfers faces a different set of challenges. A study on nursing handoff between the ED and the ICU reported a lack of structure and consistency in how handoffs were performed.²¹ On a patient's arrival at the ICU, nurses had a tendency to focus on medical handoff between physicians and on providing immediate care to the patient. Consequently, ED nurses felt detached from the handoff process and were uncertain about the roles they played. Some chose to withhold information for fear of being repetitive.

In an interventional study, a voice-mail handoff was implemented to replace verbal handoff, so that emergency physicians could provide handoff at a time convenient to them.²⁴ Most of the physicians indicated that the dictated system was easier. However, lack of interaction was flagged as a communication barrier. Statistical analysis of outcome was not provided in the study.

Transfers of Oncology Patients. Intrahospital transfers of oncology patients require transfer of information regarding the patient's treatment protocol, so that continuity of therapy can be maintained.

Our literature search yielded one interventional study on the transfer of oncology patients.²⁵ A pharmacist-initiated handoff was designed to ensure accurate and timely handoff of the chemotherapy protocol when a patient was transferred from oncology to the critical care unit. The intervention consisted of a form containing information relating to the specific therapies, which was completed during patient admission and updated throughout patient's hospitalization. On patient transfer, the form was handed over to the receiving ward. In addition, a verbal handoff was given by the pharmacist, reiterating information in the form. The intervention showed significant reduction in errors and omissions in prescribing or administration of drug therapy after transfer. The mean number of errors or omissions per transfer was reduced from 3.97 to 0.45 ($p < .0001$). Patients requiring intervention because of errors or omissions were reduced from 100% to 68% ($p = .001$).

Transfers Between Wards and Radiology. The need for medical imaging procedures is one of the most common causes for inpatient transfers. Most patients undergo at least one routine diagnostic procedure during hospitalization. Our literature search yielded one paper that assessed handoff communication during inpatient transfers to radiology.²⁶ In the paper, we reported an observational study in which radiology porters were shadowed through the inpatient transfer journey. An average of 4 transfer errors per transfer were observed in 101 transfers. The most common errors were inadequate handoff ($n = 181$) and failure to verify that the correct patient was transported ($n = 176$). We also found that a number of redundancies were built into the transfer process to safeguard against these errors—informational redundancy, in which critical information was communicated multiple times, at different locations, and procedural redundancy, in which critical processes were performed by different care providers at multiple points in the transfer process. However, they were relatively ineffective in preventing errors because of the poor compliance rate.

Discussion

The literature to date shows that deficits in handoff communication during intrahospital transfers are substantial, in agreement with Cohen and Hilligoss.¹ There is a lack of robust evidence on best handoff practices, and current knowledge on the nature of handoff failures during intrahospital transfers is scanty. Although the articles contained in our review overlap somewhat with those

cited by Cohen and Hilligoss (4 of the 24 studies included in this review were also cited in the other study), the two studies differ both methodologically and in the focus of analysis. Cohen and Hilligoss provided a narrative review on several issues common to handoffs during shift change and inpatient transfers, while we have performed a systematic analysis of the nature and effects of handoff failures during intrahospital transfers. In the current review, we have presented our results in terms of the clinical settings involved in the intrahospital patient transfers but explored only a few types of transitions. Despite the small dataset, it is evident from this review that the specific clinical settings involved in the intrahospital patient transfer (Table 1, page 279) present their distinct needs, which must be considered when deciding on suitable interventions, as we now discuss.

Transportation of Critically Ill Patients. The risk of transporting critically ill patients is well documented. Critically ill patients have limited physiologic reserves, so that any changes in their condition have the potential to be life-threatening. Much data has been accumulated with respect to patient harm events caused by physiologic deterioration during intrahospital transfers. Several studies have reported high adverse event rates of between 20% and 70%.^{4-5,27-30} However, few studies explored system-based factors that may have contributed to these events. The two papers reviewed reported an association between communication failures and transport mishaps. How these failures occurred was, however, not documented. There is currently a paucity of knowledge regarding how communication failures occur and how we can prevent them.

Nevertheless, a few key issues were highlighted in the studies reviewed, in particular, the importance of pretransport coordination. Failure to organize ancillary services for transport and failure to coordinate with the destination site the timing of transfer can lead to unnecessary delays. As a result, transport time is prolonged, potentially increasing the likelihood of a transport mishap.³¹ Several professional societies have developed guidelines for the transfer of critically ill patients.³²⁻³⁴ A common recommendation is the implementation of a formalized transport protocol, including a checklist for pretransport coordination.³⁵⁻³⁶ The general consensus of the literature is that most, if not all, transport-related adverse events can be prevented by proper pretransport planning and communication.

Discharge of Patients from Critical Care to Specialty Ward. Discharge of the ICU patient is a complex process. The decision to discharge a patient is often a difficult balancing act. On the one hand, premature discharge is associated with increased mortality.³⁷ On the other hand, delay in discharge reduces ICU bed availability, and prolonged stay in the ICU exposes patients to in-

Table 1. Key Issues Identified for each Clinical Setting and Recommended Improvement Strategies

Setting	Key Themes and Challenges	Improvement Strategies
Transportation of critically ill patients	Failure to communicate arrival time and resources required result in delayed or inadequate care	Formalize pretransport coordination process. ⁴
Discharge of patients from critical care to specialty ward	Ward nurses may lack expertise or confidence in handling critical care patients from the ICU.	Introduce an ICU liaison nurse role to facilitate transfer, providing both coordination and clinical support. ⁶
	Time constraints impede handoff communication during the discharge planning process.	Formalize handoff to allow for uninterrupted time to conduct handoff. ⁷
	Pretransfer communication is critical to ensure resource availability at the receiving ward.	Early discharge planning ⁸
Transfer of surgical patients	Handoffs are informal and unstructured, leading to inadequate information transfer.	Standardize handoff content and structure. ^{12, 13, 15, 16}
	Surgical handoff is particularly poor.	Involve all members of multidisciplinary team in handoff. ¹³
	Work pattern at recovery room is unpredictable, thus, timing of handoff is variable, and handoff takes place amidst other activities.	Formalized handoff to allow for uninterrupted time to conduct handoff. ¹⁶
Transfers from ED	Content omission was common, in particular communication of the most recent set of vital signs.	Standardize handoff content and structure. ¹⁸
	Differing approaches to patient care between emergency department (ED) physicians and inpatient teams result in incomplete handoff and interprofessional misunderstanding.	Align physicians' view for referrals handoff communication across medical specialties through education and hospitalwide guidelines. ^{18, 20, 22, 23}
	High workload, time constraint and overcrowding at ED impede handoff communication.	Increase staffing level. ²³
	Difficulty in assessing information and communicating with providers across units on different shifts.	Implement centralized information repository to ease access to patient information. ^{19, 20}

creased risk of ICU-acquired infections.³⁸⁻³⁹ Premature discharge may result from poor knowledge or pressure for beds. Discharge delay can result if ward beds are unavailable or if ancillary staff and resources required for transport have not been organized. Given the complexity of the process and the amount of coordination required, it follows that effective communication is essential to ensure a smooth transition.

Our literature search revealed that research on handoff during patient discharge from the ICU is still sparse. Most studies to date focused on the physiologic criteria for discharge. The Society of Critical Care Medicine has provided detailed discharge criteria to assist physicians in the discharge decision.⁴⁰ However, the role of handoff communication is still poorly understood.

Studies published to date revealed several interprofessional communication barriers. ICU nurses feel excluded from the discharge planning process; decisions are typically made by physicians and communicated to senior staff members only.⁷ Tension between the ICU and ward nurses is also evident. Lack of knowledge in the critical care domain impedes communication, as ward nurses can find themselves overwhelmed by the informa-

tion given to them during handoff. Ward nurses may feel inadequate when interacting with ICU nurses, which may prevent them from seeking assistance and information from ICU nurses.

Implementation of the ICU liaison nursing role is believed to have assisted in bridging the professional boundary between ICU and ward nurses. However, evidence that the role contributes to patient safety is still anecdotal. Further studies are required to confirm its effectiveness.

Transfer of Surgical Patients. The literature on handoff of surgical patients focused predominantly on intraoperative communication in the OR. The small set of studies to date underscores the prevalence of communication breakdowns in preoperative and postoperative handoffs. Communication failures in these phases of the surgical process are as common as failures in intraoperative communication. There is an urgent need for improvement in preoperative and postoperative handoffs.

Current handoff practices are mostly informal and unstructured. Omissions of critical information, in particular surgical information, are common, as the surgical team is typically absent at postoperative handoffs. The rapidly changing environment at

the recovery room is a significant communication barrier. Recovery nurses are often under considerable time pressure, and handoff is therefore typically brief and takes place amidst a range of other activities.

Potential improvement strategies include standardizing handoff procedures and content to minimize information omissions, developing a central information repository to improve information access across departments, and ensuring that all members of the multidisciplinary team are present at handoff. Furthermore, the organization should consider how resource distribution or work-flow design might enable recovery nurses to have uninterrupted time to complete handoffs.

Given the environment of the recovery room, implementing these strategies may be difficult. During the immediate postoperative recovery period, potentially life-threatening complications requiring prompt attention by the recovery room staff may arise. The workload in the recovery room is unpredictable, with periods when all the bays are occupied, interspersed with periods with few patients. It is almost impossible to ensure that sufficient staff are available.⁴¹ In addition, unlike a ward, a recovery room has very little ability to choose when to fulfill its workload, as arrival time of patients cannot be scheduled. Any interventions to improve handoff at the recovery room must necessarily be adaptable to the dynamic work pattern of this environment. An automated patient tracking system can potentially provide a promising tool for managing patient flow and anticipating demand peaks.⁴²

Transfers from the Emergency Department. Studies on ED transfers to the inpatient ward to date have qualitatively investigated the connection between communication failures at transfers and adverse patient outcomes. There is a general consensus that poor handoff can lead to delayed treatment, potentially compromising patient safety.

Also evident is the circular relationship between ED overcrowding and communication failures at transfers. Because of overcrowding, EDs are often chaotic and rife with distractions, and clinicians are forced to “multitask” to attend to multiple patients simultaneously. Thus, the opportunity for communication errors abound. Communication breakdown between EDs and inpatient wards further exacerbates the overcrowding problem, as ED patients cannot be moved to inpatient beds, creating a bottleneck within the hospital system.

The differences in approaches to patient care by emergency physicians and inpatient teams further aggravate the problem. There is a need to align physicians’ views for handoff communication across medical specialties. This can potentially be achieved by introducing clear guidelines for referrals that are acknowl-

edged across all departments. Having clear criteria for admissions to each ward should alleviate tension caused by disagreements in the appropriateness of a disposition. Educational programs can be introduced to enhance understanding of the functional diversities of ED and inpatient wards.²³

Another widely cited problem was omissions of critical information, in particular, failure to communicate results of pending tests. One strategy to address this deficiency is to standardize the handoff process. Transfer templates and forms can be developed to provide structure and consistency to handoff content. Electronic availability of critical information, including laboratory and radiology results, in electronic health records for individual patients or overview displays for groups of patients can be improved, so that inpatient teams have access to the most up-to-date information. Guidelines on roles and responsibilities for boarding patients and test results follow-up should be clearly outlined to prevent diffusion of responsibility. Achieving consensus on these guidelines will be difficult and will require collaboration from all parties.

Transfers of Oncology Patients. Incorrect prescriptions and delays in administering medications are common when a patient is moved from one location to another. In one of the studies reviewed, a pharmacist-initiated handoff protocol was designed to facilitate transfer of chemotherapy protocol for oncology patients. Significant improvement in patient outcome was reported. The study exemplified the value in having a multidisciplinary approach to handoff. Traditional approaches rely heavily on physicians and nurses. More research needs to be conducted to explore the role of allied health professionals in ensuring care continuity.

Transfers Between Wards and Radiology. Transportation of patients between ward and radiology is a routine clinical process. In the study reviewed, it was shown that deficits in handoff communication in this seemingly mundane process were frequent. Transport requirements were often not communicated, resulting in patients being transferred without appropriate equipment, clinical personnel, or infection control precautions. Furthermore, verification of patient identification was often not performed, creating opportunities for misidentification errors. The study raised fundamental issues surrounding the introduction of safety practices in hospital. Specifically, many redundant defenses were embedded in the formal transfer process, yet failure to enact the redundant steps meant that they failed to safeguard against errors. The authors advocated first increasing compliance with current processes as a quality and safety improvement strategy before investing resources on new processes.

COMMON CHALLENGES AND RECOMMENDED IMPROVEMENT STRATEGIES

Although each clinical setting presents distinct challenges to effective handoff, several common themes emerged from the review. First, handoffs at intrahospital transfer suffer from the same deficiencies as intershift handoff. Handoffs are typically unstructured and highly variable in content and process. Communication failures are often characterized by content omissions, leading to uncertainty in decisions about patient care, which may in turn result in suboptimal care. Factors contributing to ineffective handoff include time constraints, hierarchy and social barriers, lack of training on handoff practices and communication skills, and lack of handoff protocols. These factors are well explored in the literature on intershift handoff.⁴³⁻⁴⁶

Also evident from the literature is the exposure of handoffs at patient transfers to challenges that are not experienced in intershift handoffs. This is largely due to the functional diversity of care teams in different departments, the difficulty in cross-departmental information sharing, and the coordination effort required in patient transportation; we now explore each of these three factors in turn.

Functional Diversity of Care Teams. Handoff of transferred patients requires effective interdepartmental communication between care teams, often with conflicting expectations, divergent expertise, work processes, and culture. Functional diversity between teams increases communication, prioritization, and coordination problems.²⁰ Such diversity is perhaps most prominent in emergency medicine, where conflicting work practices of ED providers and hospitalists lead to tension and disagreements in the referral of ED patients. Handoff quality is subsequently compromised as ED providers provide partial or inaccurate information in the attempt to persuade a specialty ward to admit a patient. There can also be significant differences in the terminology and language used, thus posing challenges in building a shared mental model during handoffs. Furthermore, the referring team may also be unaware of the information required by the receiving team.

The obstacles arising from these differences between departments can be exacerbated by the ambiguity in roles and handoff practices. Clinicians often report not knowing when handoff takes place and to whom handoff should be given. Several studies reported confusion concerning when the responsibility of care was actually transferred, and as a result, patient care can be compromised.^{16,21}

Thus, there is an urgent need for a standardized approach to handoffs at patient transfers. Message-related problems can be improved by content standardization. Ambiguity in roles and

responsibilities can be minimized by standardizing the handoff process and defining expectations for each specialty that are acknowledged across specialties. Although standardization is not a silver bullet, it can reduce communication costs, and help set normative standards for what is expected.⁴⁷⁻⁴⁸ To ensure successful adoption, the standardized protocol must be tailored to a specific context.⁴⁸ Moreover, sufficient flexibility must be built into the protocol to allow for exception handling for nonroutine cases.⁴⁷ Perhaps most importantly, effort should be invested in fostering understanding between disciplines, which may be achieved through education and training.²²

Difficulty in Cross-Departmental Information Sharing. Information sharing between departments can be challenging. There is limited opportunity for cross-departmental feedback as the patient's history unfolds after a transfer. The receiving ward would have to contact the referring ward to retrieve additional information about the patient, resulting in inefficient and delayed care. This problem is further exacerbated by intraward shift changes. Referring clinicians may no longer be on call when the receiving team contacts the ward for more information about a patient. In addition, there may be a time delay between when the handoff is given and when the transfer actually takes place. By then, the handoff information may have become outdated. A recurrent problem is the failure to follow up on laboratory or test results after a transfer has taken place.²⁰ The receiving team may not be aware of pending studies because orders are not accessible. Consequently, urgent results are sometimes left undetected.

There is a need for a real-time, centralized means of accessing patient information. Information technology has the potential to improve information sharing across an institution.⁴⁹ Improving the electronic availability of critical information can decrease misinformation, facilitate recognition of clinical changes, and increase the transparency of responsibility changes to other specialties.²⁰ While electronic documentation is increasingly being deployed as a tool to improve information transfer, the literature to date reveals that its adoption in handoff communication remains limited. Handoff communication is still predominantly verbal, and each department has its own system of managing patient information, which typically includes electronic health record and paper documentation. Information recorded in unit-specific documentation may not be available to other departments. Lack of confidence in the accuracy of electronic documentation has been cited as a reason for preferring verbal communication.¹⁹ Another barrier is the concern that using electronic documentation will increase data entry time, thereby reducing productivity.⁴⁹⁻⁵⁰ To realize the benefits of information technology in health care, substantial effort needs to be invested

in mitigating these barriers. Furthermore, although the advantages of using such systems are discernible on paper, more research needs to be done to understand their potential impact on patient safety.⁵¹

Coordination Effort for Transporting Patients. Physical transportation of patients requires careful coordination effort between care teams. Pretransport coordination is critical to allow for the required resources to be organized. This effort typically involves multiple disciplines, including ancillary services. Moreover, a single transfer often requires multiple handoffs, representing multiple opportunities for error. The literature shows that communication breakdown in coordinating transport abounds, posing significant risks to the safety of patients.

Coordination issues are particularly problematic in cases where patient flow cannot be predicted, such as transfers of surgical patients to the recovery ward. In such cases, resources cannot be organized before the transfer. A recurring problem is the unavailability of nurses at the receiving ward during patient handoffs. Another commonly cited barrier to handoff is time constraint, in particular when resources are tight.^{7,15,20}

Coordination issues can potentially be mitigated by introducing a dedicated liaison role for coordinating transfer which provides continuity through the transfer journey, decreasing the complications associated with the lack of essential personnel during patient transfer.⁵² In the transfer of ICU patients, the role of an ICU liaison nurse has been found to improve communication and coordination during transfers. Similarly, evidence shows that using a specialized transport team for both inter- and intrahospital transfers of critical care patients results in a decrease in adverse events.⁵³⁻⁵⁶ Research should be conducted to investigate the cost and benefits of implementing such a team hospitalwide. Another potential strategy for mitigating coordination issues is to provide some means of making patient flow visible hospitalwide, such as an automated patient tracking device. This can facilitate coordination and prioritization of resources.⁴²

EVALUATING HANDOFF PERFORMANCE

Quantitative evaluation of performance is crucial in any patient safety initiative. There is currently a lack of valid, standardized tools to evaluate handoff quality. The literature to date shows a wide diversity of handoff quality measures, and there is currently a lack of consensus about the primary purpose of handoffs and how best to intervene to improve handoff processes.⁵⁷ Common measures include accuracy and completeness of information transferred and information retained, adverse patient outcomes and near misses resulted from inadequate handoff, the quality of interpersonal communication, and compliance rate to

handoff protocol.

Recent attempts have been made to design evaluation tools for assessing clinicians' handoff performance. Manser et al. developed a rating tool covering four factors: information transfer, shared understanding, working atmosphere, and overall handoff quality assessment.⁵⁸ Another tool, known as Mini-CEX, was designed to assess residents' handoff skills, with performance rated in six specific domains (interviewing, physical examination, humanistic qualities and professionalism, clinical judgment counseling, and organization and efficiency) using a nine-point scale.⁵⁹

Although these tools and measures can be useful, they are highly subjective. There is a need for systematic reliable measurement tools to identify factors that would lead to harm reduction and to promote rigor in the design and evaluation of interventions. We have previously presented formal instruments to quantify the reliability of the transfer process, using concepts from high-risk industries.²⁶ Specifically, fault tree analysis was used to capture accident sequences leading to transfer errors, and reliability analysis was used to quantify the relationship between safety components within the process, and their individual contributions to overall system reliability. These analyses, collectively known as quantitative risk analysis (QRA), provide a robust framework for identifying vulnerabilities in the system. In addition, expected improvement can be predicted from the model, so that improvement strategies can be prioritized. The model further facilitates continual monitoring and evaluation.

Process evaluation techniques such as QRA are well-established in many high-risk industries. Compared with other high-risk industries, safety in health care delivery is dismally poor. Increasingly, we are looking to other industries for strategies to manage risks in health care. More research is needed to investigate whether the benefits of such tools can be translated in the evaluation of clinical processes.

LIMITATIONS

This review is limited by the quality of this body of evidence. The literature on handoffs during intrahospital transfer is sparse, and there is a relative lack of high-quality investigations. The majority of studies were descriptive, involving questionnaires and interviews. Thus, there is an overreliance on participants' perceptions. The sample size of most of the studies was small, and few investigations made attempts to measure and control for potential confounding variables. There is also scant evidence to support the effectiveness of the interventions that had been attempted to date. Most of the interventional studies provided descriptive outcomes without presenting measured *p* values against

a control group, thus limiting the quality of evidence and the conclusions that can be drawn. Furthermore, most of the studies involved only a single institution, and findings may not be generalizable to other institutions.

Our review only assesses studies on the handoff communication aspect of intrahospital transfers. Thus, there may be a bias toward an exclusive framing of the objective of a handoff as information transfer. Other handoff objectives, such as ensuring effective transfers of responsibility for patient care following the handoff, are less explored.⁶⁰ Several well-researched aspects of handoff were excluded. In the transportation of critically ill patients, we have extracted data on the role of communication during that transition of care. Another critical step of handoff is the provision of adequate equipment, optimization and stabilization. Several reviews were conducted to address these issues.^{29,35–36} Similarly, in the handoff of ICU patients to specialty wards, we have not explored the medical issues surrounding the transition and the effects of premature discharge. Lin et al. recently published a literature review on factors contributing to the ICU discharge process.⁶¹ In the review of surgical handoffs, we have excluded studies on intraoperative communication in the OR. Again, the reader is referred to an existing review for further information.⁶² Finally, we chose to investigate studies on intrahospital transfer, which is a much less researched area than interhospital transfers. Much can be learned from the body of literature on interhospital transfers.

Despite these limitations, we believe that the conclusion of this report reflect the general state of current handoff practices. Although obstacles may vary across clinical settings, there is consistent evidence on the need for improved communication and information transfer. However, we cannot yet determine from existing literature the types of intervention that would be most effective. A more thorough knowledge of the factors affecting handoff communication is a necessary first step in potentially reducing safety risks within this critical process in the patient care continuum. With the rapid growth in medical specialization and technological advancement in diagnostic test and intervention, patient transfers within a hospital will become increasingly common. Handoffs during this transition of care is a point of vulnerability. The baton of care must be passed with extreme care. ■

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Online-Only Content

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Appendix 1. Primary Studies on Handoff Communication During Intrahospital Transfers

Appendix 2. Interventional Studies on Handoff Communication During Intrahospital Transfers

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Appendix 1. Primary Studies on Handoff Communication During Intrahospital Transfers*

Study	Setting	Method	Sample	Outcome Measures	Major Findings	Main Recommendations
Pezzolesi et al., 2010 ³	All types of hospital handoff	Retrospective review of incident reports	334 handover incidents at a UK general hospital	Characterization of handover incidents, severity and type of incidents	42% ($n = 140$) of all reports were related to transfers between inpatient wards. The specialties reporting the highest number of adverse events were obstetrics and gynecology (42%), and geriatric (12.2%) and general medicine (12%). Inadequate handover was the most common error (45%), followed by no handover at all (29%).	None specified
Beckmann et al., 2004 ⁴	Intrahospital transfer to and from ICU	Analysis of critical incidents	176 critical incident reports	Adverse outcome during transport, contributing factors to adverse outcomes	31% of incidents had significant adverse outcomes. Communication and liaison issues between ICU and destination were the most common management issues, contributing to adverse outcomes in 47 reports.	Implement transport and pretransport checklists; provide a dedicated transport team; monitor compliance with standards.
Lovell et al., 2001 ⁵	Intrahospital transfer to and from ICU	Observations	97 transfers	Adverse outcome during transport, contributing factors to adverse outcomes	Problems were encountered in 60 (62%) of 97 transport episodes. Poor communication between ICU and destination contributed to unnecessary delay.	None specified
Chaboyer et al., 2004 ⁶	ICU discharge to specialty ward	Semistructured interviews	10 ward nurses from a single site	Impact of an ICU liaison nurse	ICU liaison nurse was perceived to have improved communication between ICU and specialty ward, eased the transfer process and enhanced patient care after transfer.	Introduction of ICU liaison nurse

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Appendix 1. Primary Studies on Handoff Communication During Intrahospital Transfers* (continued)

Study	Setting	Method	Sample	Outcome Measures	Major Findings	Main Recommendations
Watts et al., 2005 ⁷	ICU discharge to specialty ward	Questionnaires, semistructured interviews	Questionnaires sent to 502 critical care nurses in an Australian state, response rate 43.4% (<i>n</i> = 218). Interviews with 13 critical care nurses	Factors affecting discharge planning	Two key factors that enhanced or impeded the discharge planning process were communication and time availability.	Improve critical care nurses' knowledge of the discharge planning process and the importance of communicating the plan.
Whittaker et al., 2000 ⁸	ICU discharge to specialty ward	Questionnaires, semistructured interviews	36 questionnaires sent to nurses from 2 wards, response rate of 36.1% (<i>n</i> = 13)	Problems experienced by ward staff when receiving ICU patients	Two major barriers to discharge planning were ineffective communication between ICU nurses and ward nurses and lack of resources, which encompassed staffing, skill mix, workload, and notes.	Early discharge planning; education for nursing staff; introduction of advanced practice nurses or integrated care pathways
Anwari et al., 2002 ¹¹	Postoperative handoff of surgical patients between OR and PACU	Questionnaires	287 PACU nurses; 11 of these questionnaires were rejected because of incorrect completion	PACU nurses' perception of quality of postoperative handoff from anaesthetists	Quality of handoff was perceived to be poor. Critical information was often omitted.	Important information should be communicated verbally; anaesthetist should stay in the PACU to see the first recording of vital signs.
Greenberg et al., 2007 ¹²	Communication across the surgical care pathway	Analysis of malpractice claims	444 surgical malpractice claims from 4 liability insurers	Communication breakdowns resulting in injury to surgical patients	60 of 444 malpractice claims involved communication breakdowns in the preoperative (38%), intraoperative (30%), and postoperative periods (32%). Majority of breakdowns were verbal communications (92%). Attending surgeons were the most common team member involved.	Implement read-back; standardize handoff and transfer protocols; define "trigger" events that mandate communication between nurses and surgeons.

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Appendix 1. Primary Studies on Handoff Communication During Intrahospital Transfers* (continued)

Study	Setting	Method	Sample	Outcome Measures	Major Findings	Main Recommendations
Nagpal et al., 2010 ¹³	Postoperative handoff of surgical patients between operating room and recovery	Interviews	18 clinicians (7 surgeons, 5 consultant anaesthetists, 6 nurses)	Communication problems in the postoperative handoff process	Handoff was characterized by fragmented information being transferred by incomplete team. Surgical team was often absent at handoff. Lack of structured handoff led to information overload, and the absence of a single repository of information made information access difficult.	Implement a standardized handoff protocol and information transfer; implement multidisciplinary team handoff.
Nagpal et al., 2010 ¹⁴	Communication across the surgical care pathway	Observations	20 patients undergoing major gastrointestinal procedures in a surgical unit	Communication problems across the surgical care pathway	Communication failures were distributed across the entire surgical continuum of care. Poor preprocedural communication and inadequate postoperative handoff were the most common problems. Information transfer was mainly verbal, and there was no central repository of information in any phases of surgical care.	Supplement verbal handover with written handover to prevent information degradation.
Nagpal et al., 2010 ¹⁵	Communication across the surgical care pathway	Focus group using HFMEA	4 surgeons, 4 anaesthetists, 6 nurses, 1 human factors psychologist	Communication problems across the surgical care pathway	Inadequate postoperative handoff was an important failure mode. Information transfer was often incomplete or inaccurate.	Postoperative handoff checklists
Smith et al., 2008 ¹⁶	Handoff from anaesthetists to nurses in the OR recovery room	Observations, interviews	45 handoffs between 17 anaesthetists and 15 nurses in a hospital; 19 interviews with anaesthetists, anaesthetic nurses and recovery nurses	Communication problems during postoperative handoffs	Barriers to postoperative handoff included the unpredictable and rapidly changing environment in the recovery room, the differing expectations of the content, and timing of handoff.	Standardization of handoff protocol and information transfer

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Appendix 1. Primary Studies on Handoff Communication During Intra-hospital Transfers* (continued)

Study	Setting	Method	Sample	Outcome Measures	Major Findings	Main Recommendations
Apker et al., 2007 ¹⁸	Handoff between ED and specialty ward	Interviews	2 hospitals, 6 ED physicians, 6 internal medicine physicians	Communication problems during handoff	Poor handoff contributed to treatment delay. Barriers to handoff included inadequate information (requests to admit patients with pending information, poor information flow between clinicians) and conflicting information expectations, stemming from contrasting approaches to patient care.	Standardize handoff protocol; align physicians' views for handoff communication across medical specializations through education and training.
Benham-Hutchins et al., 2010 ¹⁹	Handoff between ED and specialty ward	Observations and questionnaires	5 handoffs; 25 completed surveys (11 physicians, 9 nurses, 1 social worker, 4 pharmacists).	Communication patterns, perceived quality of handoff	Most participants (84%) preferred verbal communication because of a lack of confidence in electronic documentation. Barriers to handoff included difficulty in communicating with providers across units on different shifts, timing of transfers, difficulty in accessing information because of redundant, conflicting sources.	Develop health information technology that complements the nonlinear information gathering behaviors of providers from multiple professions.
Horowitz et al., 2008 ²⁰	Handoff between ED and specialty ward	Questionnaires	246 questionnaires, response rate of 53% (39 ED house staff and physician assistants, 21 hospitalists, 79 internal medicine staff)	Adverse events, near misses, communication barriers	29% (n = 40) of physicians reported experiencing an adverse event or near miss after ED transfers. Communication failure contributed to most of these events, in particular, failure to communicate the most recent set of vital signs. Communication barriers included difficulty in interspecialty communication, misunderstanding and mistrust between groups, differences in expectations, and high workload.	Standardization of information transfer, cross-training between groups, information technology to improve electronic availability of critical information, assign role-based responsibility

(continued on page AP5)

Appendix 1. Primary Studies on Handoff Communication During Intrahospital Transfers* (continued)

Study	Setting	Method	Sample	Outcome Measures	Major Findings	Main Recommendations
McFetridge et al., 2007 ²¹	Nursing handoff between ED and ICU	Documentation review and semi-structured focus group interviews.	2 hospitals, 6 ED nurses, 6 ICU nurses	Handoff structure, handoff quality	There was no structured and consistent approach to how handoffs were performed. Nurses from both ED and ICU lacked clarity on each others' roles and when the actual handoff process began. Urgency to treat patient hindered effective communication. Information omission was common.	A structured framework to patient handoff, assignment of specific roles in the handoff process, commencing handoff before transfer
Nugus et al., 2009 ²²	Handoff between ED and speciality ward	Observations and interviews	28 semistructured interviews with nurses and doctors from EDs (4 inpatient departments, 2 hospitals). 110 hours (24 full shifts) structured observation in each hospital	Communication behavior of emergency physicians and hospitalists	Handoff communication given by ED physicians was often skewed and distorted to persuade an inpatient specialty to formally admit a patient. Transfer requests were often met with resistance by receiving team, who would attempt to steer patient to another team.	Education
Reid et al., 2003 ²³	Handoff from ED to speciality ward	Questionnaire	42 ED physicians	Factors influencing ED doctors' referring patterns	Factors influencing referral decisions included perception of the receiving physician, and the referrer's confidence and knowledge of the patient. Communication was negatively affected by lack of clear protocols for referrals and time constraints. Attempt to steer patient to another team was reported, and referrals were often made because of pressure from senior physicians.	Education, clear guidelines for referrals, increased staffing level

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Appendix 1. Primary Studies on Handoff Communication During Intrahospital Transfers* (continued)

Study	Setting	Method	Sample	Outcome Measures	Major Findings	Main Recommendations
Ong et al., 2010 ²⁶	Handoff between inpatient wards and radiology	Observations	101 transfers from inpatient wards to radiology at a teaching hospital	Adverse events, transfer errors, effectiveness of existing safety measures	Transfer errors abound (<i>n</i> = 420), with inadequate handover being the most common (43.1%), followed by failure to perform patient identification checks (41.9%). Poor communication often led to inadequate infection control precautions during transfer. Redundant safeguards were designed into the existing handoff process to prevent transfer errors. However, these safeguards were rendered ineffective by the poor compliance rate.	Improve compliance with existing transfer protocol.

* UK, United Kingdom; OR, operating room; PACU, postanesthesia care unit.

Appendix 2. Interventional Studies on Handoff Communication During Intrahospital Transfers*

Study	Study Description			Results	
	Setting	Sample Size	Intervention	Outcome Measure	Control
Barbett et al., 2003 ⁹	Discharge from ICU to ward	1,270 patients	Introduced a liaison nurse role in an ICU	Readmission rates Ward staff reporting improvement in communication with ICU	6.5–5.5% NR
Caffin et al., 2006 ¹⁰	Discharge from pediatric ICU (PICU) to ward	1,487 patients pre-intervention; 1,197 patients postintervention; 65 of 115 post-intervention staff surveys (response rate: 57%)	Introduced a liaison nurse role in a PICU	Readmission rates Ward staff reporting improvement in handoff between PICU and ward Ward staff reporting improvement in communication with PICU Ward staff reporting improvement in handoff documentation	5.4% (95% CI 4.3–6.7%) 59% 85% 40%
Catchpole et al., 2007 ¹⁷	Postsurgery handoffs	23 handoffs pre-intervention; 27 handoffs postintervention surveys (response rate: 57%)	Implemented handoff protocol using the analogy of Formula 1 pit-stop and expertise from aviation	Mean number of technical errors Mean number of information omissions Handoff duration	5.42 (95% CI ± 1.24) 2.09 (95% CI ± 1.14) 10.8 min (95% CI ± 16)
Horwitz et al., 2009 ²⁴	Handoffs from ED to ward	1 year postintervention at a medical center; 117 of 197 preintervention staff surveys (response rate: 59%); 113 of 206 responses to postintervention survey (response rate: 55%)	Implemented voice-mail-based, semi-structured sign-out for ED admissions to internal medicine at an academic medical center	Perceived overall quality of communication, good or excellent: ED doctors Internal medicine doctors Perceived usefulness of sign-out, agree or strongly agree: ED doctors Internal medicine doctors Perceived ease in contacting other specialty, agree or strongly agree: ED doctors Internal medicine doctors Interaction with other specialty, usually or always: ED doctors Internal medicine doctors	82% (31/38) 77% (58/75) 94% (36/38) 77% (58/75) 53% (20/38) 33% (25/75) 53% (20/38) 77% (57/75)

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Appendix 2. Interventional Studies on Handoff Communication During Intra-hospital Transfers* (continued)

Study	Study Description			Results	
	Setting	Sample Size	Intervention	Outcome Measure	Control
Coutsouvelis et al., 2010 ²⁵	Handoff of patient's cancer chemotherapy protocol during transfer from oncology and hematology unit to critical care unit	30 transfers pre-implementation; 22 transfers postimplementation at a teaching hospital	Implemented a pharmacist-initiated handoff during patient transfer from oncology and hematology unit to critical care unit.	Patients requiring intervention (%)	30 (100)
				Total number of interventions	144
				Mean interventions per transferred	4.80
				Errors or omissions	
				Total (% of interventions)	119 (83)
				Mean per transferred	3.97
				Mouthcare	29
				Chemotherapy	10
				GCSF	16
				Antibiotics	64
Queries:					
Total (% of interventions)	25 (17)				
Mean per transfer	0.83				

* NR, not reported; CI, confidence interval; NS, nonsignificant; GCSF, granulocyte colony-stimulating factor.