Patient safety continues to be a major concern for healthcare providers and organizations. Handovers, also called handoffs, serve as the transfer of postoperative care from the anesthesia provider to the postanesthesia care unit (PACU) provider. Ineffective handovers result in gaps in care and potential harm to the patient. We conducted a scoping review to identify key factors affecting patient safety during the process of postoperative handovers. We searched empirical literature examining factors associated with patient safety and postoperative handovers in the context of anesthesia, in the Cumulative Index to Nursing & Allied Health Literature, Ovid, Google Scholar, and The Joint Commission websites between January 2004 and March 2014. We excluded obstetric and cardiac anesthesia-related studies. A total of 31 articles met criteria for inclusion in the review. Factors at multiple levels of the Social Ecological Model affecting patient safety and handovers were identified. Intrapersonal factors included individual communication styles; interpersonal factors were related to anesthesia and to PACU provider team dynamics; organizational environmental factors described the dynamic PACU environment; and organizational policy-level factors included emphasizing a culture of patient safety. This scoping review demonstrates a multilevel analysis of factors affecting handovers and patient safety.

Keywords: Anesthesia, communication, handovers, patient safety, postanesthesia care unit.

The transfer of information from one provider to another, known as a handoff or handover, is critically important to patient safety. Handovers are complex events that contribute to a broad knowledge transfer that helps individual team members better understand the priorities for patient treatment and anticipate future plans of care. Postoperative handovers are a critical phase of the surgical patient’s perioperative care. Ideally, postoperative handovers between anesthesia providers and postanesthesia care unit (PACU) nurses provide critical information about the patient, create an environment for mutual information exchange between the anesthesia provider (sender) and PACU nurse (receiver), and efficiently and effectively transfer patient care and responsibilities while adhering to organizational standards that promote patient safety. Postoperative patients are in an “at-risk” state and require constant vigilance and assessment that can only be achieved with effective communication between the anesthesia provider and the PACU nurse. Even with vigilance, however, surgical patients are more vulnerable to handover errors than are patients in other clinical areas because of the combined acuity and transition.

Furthermore, the fact that postoperative handovers occur in dynamic environments where providers are multitasking heightens the potential for medical errors and loss of information. Observational studies of postoperative handovers have found evidence of ineffective communication between the anesthesia provider and the PACU nurse. A root cause analysis reported by The Joint Commission suggests that poor communication is a major cause of anesthesia-related sentinel events. This failure of communication can have dire consequences. In an observational study, potentially important items, such as estimated blood loss and changes in blood pressure, were not reported during handovers. When information is inadvertently omitted, gaps in patient care and breaches in patient safety can occur. Delays in treatment caused by omission of information have potentially deleterious effects on patient outcomes. Of major concern are poor-quality transfers of patient information that lead to increased morbidity and mortality, increased length of hospital stay, increased healthcare costs, and poor patient satisfaction.

Social Ecological Model
Research on surgical outcomes has primarily focused on the patient’s physiologic factors, length of hospital stay, and complications directly related to the surgery. Recently, a growing body of literature addresses the influence of factors such as communication, team performance, and the working environment on patient outcomes. Consistent with this evolving area of research, recognition has grown of the crisis related to ineffective postoperative handovers. Postoperative handovers are multifaceted events that occur simultaneously with other patient care activities. Factors other than individual preferences and individual communication styles affect post-
operative handovers. Therefore, addressing a complex phenomenon such as postoperative handovers requires a multilevel model.

One way to conceptualize external factors related to patient outcomes is to examine handovers in the context of the Social Ecological Model (SEM). Designed to investigate complex public health issues, the SEM is grounded in core principles concerning “the dynamic relations between people and their environments.” The SEM implies a reciprocal, causative relationship between factors of the individual and the environment that ultimately influence behavior. Intrapersonal level factors of the SEM include characteristics, such as knowledge and attitudes, of the involved individuals, whereas the interpersonal level of the SEM describes relationships, processes, and interactions, whether formal or informal, between and among individuals and groups. The institutional level of the SEM describes factors associated with institutions and organizational characteristics, systems, and policies. The community level consists of relationships among institutions, and the public policy level refers to state and national laws and policies.

The SEM provides a comprehensive guide for studying, describing, and analyzing causal relationships and factors that affect postoperative handovers. This model explicates how behaviors, in the activity of postoperative handovers between anesthesia providers and PACU nurses, are influenced by the involved individuals and the environment. By extracting and elucidating factors at each level of the SEM, postoperative handovers can be better understood and studied, with key factors identified that affect the quality and processes involved in conducting postoperative handover. As an example, human factors such as communication and teamwork affect postoperative handovers. Moreover, the PACU environment can be analyzed to investigate environmental factors influencing exchanges in information and patient care. For clinicians and administrators trying to improve quality and safety, exploring the attributes of postoperative handovers within the SEM allows for assessment of current practices and prospective planning for practice changes. Researchers interested in designing effective interventions to improve handovers need to account for factors on each level of the SEM. Figure 1 illustrates the SEM, as defined by McLeroy et al., and Figure 2 shows the SEM as adapted from its original applications in public health. Applying the SEM to analyzing postoperative handovers may identify a wider array of intervention points for restructuring and standardizing postoperative handovers. Once target points are identified, they can be addressed and improved on. Accordingly, the purpose of this article is to present a scoping review of the literature to identify multilevel factors, guided by the SEM, that influence postoperative handovers.

**Methods**

The scoping review methodologic framework developed by Arskey and O’Malley guided the conduct of this review. We conducted a scoping review to obtain a broad view and perspective of the literature pertaining to postoperative handovers. A scoping review is optimal for investigating complex research areas, as this type of review aims to rapidly “map” the current state of knowledge and identify gaps in existing research. In addition, scoping reviews provide an opportunity to “identify sources of evidence to inform practice, policymaking, and research.” The 5 stages of the framework for scoping are as follows: (1) identify the research question, (2) iden-
tify relevant studies, (3) select studies, (4) chart the data, and (5) collate, synthesize, and report the results.13(22)

The electronic databases of PubMed, Cumulative Index to Nursing & Allied Health Literature, Scopus, and Ovid MEDLINE were searched in March 2015, with results limited to January 2004 through March 2015. Additional searches were conducted through Google Scholar, as well as The Joint Commission and the Agency for Healthcare Research and Quality home pages. Initially using keywords from important articles, we conducted broad literature searches. The outcome of this iterative process resulted in refining the keywords used in the initial search and combining those search terms with Medical Subject Headings (MeSH terms). With use of the Boolean term AND, the following groups of key search terms were combined with MeSH search terms: anesthesia, postanesthesia care unit, PACU, recovery, surgical patients, recovery room, anesthesia nursing, perioperative nursing, handovers, handoffs, and communication.

Eligible for screening were all articles pertaining to postoperative handovers that met the following inclusion criteria: handovers delivered by the anesthesia provider, defined as the anesthesiologist, anesthesia resident, or Certified Registered Nurse Anesthetist (CRNA), to either the PACU nurse (recovery room nurse) or the intensive care unit (ICU) nurse. Study selection involved applying post hoc inclusion and exclusion criteria.13,15 Articles were eligible for inclusion if they described 1 or more factors at each level of the SEM. Studies assessing handovers in obstetric, pediatric ICU, and cardiac ICU settings were excluded because these settings and their providers are highly specialized. In addition, the reference lists of systematic review articles were searched.

After application of inclusion and exclusion criteria, 199 articles were identified. These 199 articles were “scoped” to identify articles that addressed any or all of levels of the SEM. Data were compiled, collated, and synthesized using the 4 levels of our adapted SEM as coding categories. Charting the data included extracting from each study the purpose of the study, study design, setting, and sample size. The original 5-level SEM was adapted to 4 levels for this study based on the results of the literature review. Furthermore, the SEM, which is a public health model, was adapted in the following ways to study a clinical event occurring in a healthcare organization setting: the institutional level is referred to as the organizational environmental level, and the community level and public policy levels were revised to form the organizational policy level.

Results
After applying inclusion and exclusion criteria and scoping the articles, we identified 23 for inclusion.

• Intrapersonal Level. Intrapersonal-level factors concern temporal attributes of the individual, individual activities, human factors related to communication styles and skills, and performance of activities related to handovers.

• Communication Style. Individual communication style during postoperative handovers was described as verbal and nonverbal.16,17 Nonverbal communication included eye contact or lack of eye contact, posture, hand gestures, and how the providers were physically oriented in relation to others during the handover.16,17 Verbal communication included clarity of speech and delivery of key patient-specific information.16 Individual handover communication styles influenced the quality of information transfer.1 For example, Smith et al17 observed that some anesthesiology providers’ handovers contained language such as “my usual”, implying the provider’s assumption that the PACU nurse was familiar with the type of anesthetics delivered by a particular provider. Furthermore, individual communication styles were found to be largely informal during information transfers.17

• Professional Background. Handovers were described as involving providers from various professional backgrounds and skill sets, each with unique priorities during the handover process.4,18 One study indicated that providers’ tone of voice suggested familiarity between providers.17 Familiarity often exists among providers who have long work histories and may imply a sense of unspoken trust among providers. Attributes of individual providers, such as attitudes about handovers, legibility of handwriting, level of experience, and professional aptitude, influenced the quality of handovers.18,19 One study found that trainees engaged in more information-seeking behaviors than did experienced providers participating in handovers.1

• Cognitive Processes. Mental activities such as prioritizing and information recall were identified as significant intrapersonal factors as well. For example, various providers participating in postoperative handovers prioritized information differently,18,20 and had different expectations of information content.17 Furthermore, providers were described as having different mental models, including how the patient’s condition was conceptualized.1 Members of the surgical team, such as surgeons and anesthesia providers, were described as having different perceptions of the surgical course compared with the ICU team.20 One qualitative study used semistructured interviews to identify information transfer and communication gaps across the perioperative period.19 Respondents reported that memory lapses occurred in which providers forgot to transfer critical pieces of information during the handover.19 One study emphasized that the receiving providers’ memory of information transferred during handovers was critical to providing seamless high-quality patient care.21 In this study, the structure and duration of the handover significantly influenced the amount of information the receiving provider retained afterward.21 Furthermore, multitasking,
in which providers were observed as being engaged in myriad other activities during postoperative handovers, was described in 5 studies.17,20,21,22

- **Interpersonal Level.** Interpersonal factors are the interactions, including interpersonal communication, team behaviors, and interpersonal dynamics of information transfers, that occur during handovers.

- **Dynamics Among Providers.** Interpersonal factors were described as interactions and information transfers between the 2 highly specialized teams: anesthesia providers on the one hand and PACU or ICU nurses on the other.20 Interpersonal dynamics among providers were described as being different in postoperative settings compared with other patient transition points. For example, an article described a key distinctive quality of postoperative handovers: the delivering team is composed of the surgeon and the anesthesia provider.20 In other settings, the delivering team is typically composed of 1 member such as a nurse or single physician. Furthermore, handovers conducted between the PACU and ICU nurses involve cross-discipline collaboration and a temporary merger of the surgical team with the ICU team of providers.20 This difference in specialization is important because members of the delivering team are likely to prioritize and therefore communicate information based on their professional perspective of the handover event.20 Another observational study described the dominant communication behaviors of transferring clinicians as “giving,” assessment, planning and decision making, and handover management.1 In contrast, the receiving clinicians’ handover communication was characterized by acknowledging receipt of the handover and by information-seeking behaviors.1 Differences in dominant communication behaviors reflect providers’ organization and prioritization of information delivered and received during information transfers.

- **Teamwork.** Teamwork characteristics were explicitly identified as a significant interpersonal factor as well. Mazzocco et al7 conducted an observational study to determine whether patients whose surgical teams demonstrated effective teamwork experienced better outcomes than did patients of teams with poor teamwork. Domains of behavioral markers of teamwork identified in this study were patient briefing, information sharing, inquiry, vigilance, and awareness.7 Patients whose surgical teams exhibited poor teamwork during handovers were at higher risk of major and minor complications and death, after adjusting for the ASA physical classification system.7

The working atmosphere referred to the interpersonal relationships within the team of clinicians involved in the handover.23 Tensions and blurred responsibilities among providers23 contributed to communication failures, leading to ineffective handovers.17,24,25 For example, Dee and Robb23 found that providers were often unclear about who was responsible for airway management during handovers, whereas another study described responsibilities being negotiated between providers during handovers.17 The transfer of patient information from the anesthesia provider to the PACU nurse did not automatically and simultaneously imply the transfer of responsibility.17 In fact, the transfer of responsibility appeared to be contingent on mutual provider trust and balancing power between providers.17 Furthermore, longstanding interpersonal relationships between anesthesia providers and PACU nurses were observed to encompass a sense of familiarity; in other words, anesthesia providers expected PACU nurses to recall more commonly used anesthetic techniques.17 In addition, a theme that emerged from research on handovers was the PACU nurse’s sense of being maneuvered into taking responsibility for a patient.17 In 1 study, PACU nurses were unwilling to assume care of patients when they received what they considered to be an incomplete handover.26

Apical interpersonal relationships and timing of information transfers were identified as interpersonal factors. Four articles described hierarchy as an interpersonal factor influencing postoperative handovers.19,20,27,28 One article defined the processes of OR to ICU handovers and found that hierarchy emerged as an inherent factor that exists among perioperative teams during handovers at their institution. Bonifacio et al20 stated that hierarchy confounds interpersonal communication among providers. Another article found there was insufficient time allotted for receiving the patient before commencing information transfers.25 Furthermore, 2 articles indicated the timing of postoperative handovers is a concern because often all parties are not ready to engage in information transfers.19,20,28 Hierarchical relationships among providers can serve as a barrier to open communication among perioperative teams.

- **Quality of Information Transfer.** The quality and quantity of information transferred during postoperative handovers depended on interpersonal communication between anesthesia providers and receiving PACU and ICU nurses. Information omissions and incomplete handovers were characterized by providers failing to verbally communicate pertinent information during handovers.16 Five articles described information omissions as provider-related activities.2,4,6,19,29 For example, 1 observational study found that 66% of patient-specific and 67% of anesthetic-specific information was transferred during handovers.3 After observing postoperative handovers using a 24-item postoperative assessment tool, another study found 9.1 omissions per handover.2 Milby et al30 found that 72% of patients with diabetes were identified as having the disease to the PACU nurse during handovers, whereas 40% of the patients with heart failure were identified, suggesting variations in the content of handovers.

Anwari31 studied the quality of handovers from anes-
The operating room and the PACU are considered two of the most complex environments in healthcare. In fact, the PACU is described as event driven and distraction rich, where PACU nurses respond to spontaneous, emerging patient events. The situation is time pressured because split-second decisions must be made to maintain patient safety. The PACU environment is dynamic because of frequent patient admissions, discharges, and transfer of patients in and out of the unit. Multidisciplinary teams must respond to unpredictable workloads, care for patients in a vulnerable state, and collaborate to provide safe and effective care. Moreover, patient care in this environment encompasses many interventions and practices to promote safety and efficacy that must also be executed in a time-pressured environment. Furthermore, time pressures associated with the operating room and case turnovers may cause providers to curtail patient information during handovers. Petrovic et al mapped the transfer of patients from the OR to the ICU. Several factors, such as limited writing space, poor lighting, interruptions, and background noise were identified as limitations during information transfers.

In the literature, anesthetists’ handovers took place amid a variety of other activities that compete for the PACU nurses’ attention. One study found that distractions and interruptions during handovers were numerous and often necessary to address other patient concerns and execute time-sensitive interventions. Smith and Mishra analyzed handovers and noted that many staff members were transiently present during the handover process, including surgeons, nurse practitioners, patient care assistants and patient transporters. Together, these distractions and interruptions formed barriers to safe handovers. Furthermore, 2 studies found that interruptions occurred in about half of the observed handovers. Distractions by support personnel during handovers and increased noise levels related to equipment may be accepted elements of PACU environments, therefore perpetuating a distracting environment. Additional auditory distractions, such as pager alarms, monitor alarms, and phone calls, make the PACU work environment a less-than-ideal environment for handovers.

**Organizational Policy Level.** Organizational policy refers to structured frameworks, such as tools and checklists, designed and implemented by healthcare organizations to streamline and improve the quality of postoperative handovers. In addition, factors at the organizational policy level refer to context or unit protocols designed and institutionally adopted to standardize information transfers. Several studies discussed development and implementation of checklists and tools to standardize postoperative information transfers. However, most interventions were not governed or directed by overarching institutional guidelines; instead, they were provider initiated.

Nagpal et al found that developing and implementing preestablished (existing) standardized tools and checklists improved efficiency of handovers, enhanced current high-quality care practices, and decreased sentinel events surrounding the perioperative period. De Vries et al implemented a comprehensive checklist, the surgical patient safety system (SURPASS), that was divided into preoperative, operative, recovery or intensive care, and postoperative stages of the surgical pathway. After implementation of SURPASS, the number of postoperative complications was reduced from 27.3 per 100 patients to 16.7 per 100 patients. Results of this study suggested that interventions, such as checklists and smart cards, reduced information transfer and communication failures and improved work flow. Other researchers found
that implementation of the Perioperative Handoff Tool for information transfer from the OR to PACU improved information sharing, increased provider satisfaction, and decreased distractions during the handover process. After implementation of a handover protocol, another study found significant reductions in both information omissions and task errors, including oxygen masks and monitor setup. Finally, Mardon et al. studied the relationships among 8 postoperative patient safety indicators and the Hospital Survey on Patient Safety Culture sponsored by the Agency for Healthcare Research and Quality. The study found that hospitals with higher scores on patient safety culture tended to have fewer documented adverse events.

Discussion
The findings from this scoping review add a different perspective to the extant literature through the use of the SEM to investigate the multiple factors that influence postoperative handovers. Application of the SEM provides a structured, overarching framework for systematically identifying interrelated factors influencing the complex information transfers associated with handovers. In fact, the SEM was designed to study complex events with multiple interrelated parts. Through use of scoping methods underpinned by the SEM, this review gained broad perspectives of the complexities of information transfers in the postoperative setting. The SEM provides a unique perspective to identify leverage points related to postoperative handovers within institutions.

• Recommendations. The primary goal of postoperative information transfers is to safely and efficiently transfer care of the postoperative patient from one skilled provider to another. Therefore, researchers and providers interested in improving the quality of handovers and promoting patient safety need to seek input from frontline providers to determine the best courses of action for addressing factors that negatively influence postoperative information transfers. Intrapersonal factors, such as individual communication styles and nonverbal communication, are not easily amenable to change. To better understand the impact of these factors, clinicians interested in improving information transfers should develop multidisciplinary platforms to allow providers to distinguish their concerns and perceptions of their roles during postoperative handovers. Verbalization of providers’ thought processes involved during information transfers can reduce misperceptions and misconceptions related to interpreting certain communication styles. For example, communication, both verbal and nonverbal, and teamwork influence interpersonal interactions during information transfers. In some practice settings, providers have longstanding relationships in which verbal and nonverbal cues are inherently understood. Likewise, among these longstanding relationships, providers may feel like they are valuable parts of a functional and efficient perioperative team where each member and their input are valued. One study found that patients whose surgical teams exhibited strong teamwork behaviors had better outcomes. This finding should be explored in future research by examining and identifying which specific aspects of communication and teamwork among providers results in positive patient outcomes. Because surgical teams are familiar with their patient populations, work environment, and workload, quality improvement administrators should solicit recommendations for quality improvement measures from providers who routinely participate in information transfers.

Because PACU nurses and anesthesia providers prioritize differently, additional research is needed to examine providers’ mental sequences of prioritization during postoperative handovers. Once providers understand how each other approach and prioritize, information transfers can be tailored to align more closely with providers’ expectations for postoperative handovers. Thus, restructuring information transfer processes moves toward achieving shared understanding among providers, especially related to meeting provider expectations during information transfers.

Providers’ styles in communication, level of prioritization, and perceived importance of the event were identified as intrapersonal factors that influenced information transfers. One consequence of providers focusing on their individual priorities was that the receiving PACU nurse experienced information overload during the handover by the surgical team, including the anesthesia provider. When providers are overloaded with information, prioritizing and retaining pertinent pieces of information is difficult. In general, anesthetists communicate information that they believe to be relevant to the handover process, including the type of anesthetics used, patient-specific information such as comorbidities, and pertinent intraoperative events. In fact, some clinicians believe that information is the property of certain providers. Individual communication behaviors, including giving, assessment, acknowledgment, and planning and decision making, have been studied to improve the understanding of team processes supporting effective patient handovers. Issues related to relevance and ownership are problematic when they lead to a lack of shared understanding between providers and place patients at higher risk of perioperative complications and mortality. Familiarization with communication styles and prioritization processes promotes shared understanding among providers. Specifically, providers are equipped to manage and interpret information transferred during handovers because providers are familiar with local staff and practices.

Regarding providers having a sense of ownership of information, this may not be detrimental to postoperative handovers, particularly if the receiving team is not ready
to assume responsibility of the patient. In this regard, the anesthesia provider still “owns” critical patient information and is therefore still responsible for initiating treatments and interventions if the information requires patient care interventions. For example, if the anesthesia provider claims ownership of critical information such as the results of an arterial blood-gas analysis associated with a ventilated patient, and the anesthesia provider has not transferred the patient to the PACU nurse, the anesthesia provider is the logical provider to initiate appropriate interventions. Hierarchy, defined as a gradient in authority, exists among surgical and anesthesia teams. Furthermore, apical relationships can serve as a barrier to effective communication and teamwork. For example, junior providers may feel reluctant to introduce their knowledge and level of understanding of clinical events because they are lower on the totem pole of providers. Consequently, if junior-level providers observe questionable behaviors and practices of senior providers, junior providers may remain silent because they fear negative professional consequences. The negative impact of hierarchy is that junior team members feel inferior and marginalized as a team. Furthermore, junior team members may yield to more dominant roles. To address the negative impact of hierarchy among surgical and anesthesia teams, providers interested in improving information transfers should consider simulation training to offer instances for providers to assess their communication and interpersonal skills.

It is challenging, if not impossible, to change the way that providers conceptualize patients’ conditions because of differences in educational backgrounds, training, and provider roles and responsibilities during handovers. Likewise, providers have different perspectives about anticipatory planning during information transfers. Providers could gain a better understanding and appreciation of each other’s perspectives of postoperative handovers by participating in situation-based clinical scenarios. For example, Nestel et al. rotated surgeons and anesthesiologists through the following 3 roles to improve handover communication skills: provider, observer, and consultant. Instead of evaluating communication, a similar educational session could be designed to allow providers to share their different perspectives of postoperative handovers. By discussing different perspectives of information transfers, providers will move toward shared understanding and gain appreciation of information transfers from a different perspective.

**Human Factors Research**. Because this review identified a study examining memory and information retention, it is worthwhile to discuss human factors research. Human factors is a discipline that draws from cognitive psychology and sociology. In addition, human factors research examines the interface between individual behaviors and the work environment. Only sporadic evidence exists of specific implications of human factors, such as provider fatigue, on postoperative handovers. In the ICU handover setting, human factors research has mainly explored the effects of stress, fatigue, and memory load, on quality. For example between the years 2004 and 2014, The Joint Commission conducted a root cause analysis and found that 60% of anesthesia-related sentinel events were related to human factors. In a prospective study of patient safety in the operating room, individual factors that influenced patient safety included the provider’s cognitive and perceptual processes, level of expertise, individual experience, temperament, and situational awareness. Thus, human factors research has produced valuable information aimed to improve the quality of postoperative handovers and patient safety. This line of inquiry needs to be pursued further in the PACU setting. Measurable human factors such as provider fatigue, teamwork, and workload should be studied to determine their influence on the quality of postoperative handovers.

**Barriers to Communication During Handovers**. The interpersonal context of clinical handovers is an important determinant of interprofessional interactions. Effective communication among perioperative team members is an essential component of providing quality and safe healthcare. Effective handovers are largely dependent on the interpersonal communication skills and interactions between the anesthesia provider and the PACU nurse. A lack of teamwork during handovers has been associated with increased postoperative complications. Safety experts stress that individuals’ interactions with each other are critical determinants of errors. In addition, Mazzeo et al. found that patients whose surgical teams exhibited teamwork behaviors were at lower risk of perioperative morbidity and mortality, after adjusting for ASA classification. However, teamwork during handovers is challenged by the involvement of providers across professional groups with different skill sets and different expectations of the handover process. Indeed, hierarchical relationships among surgeons, anesthesiologists, and PACU and ICU nurses exist and could serve as barriers to communication.

A concerning finding was that some PACU nurses believed they were being maneuvered into assuming care of patients during the handover process. Nurses in the PACU should safely assume responsibility of postsurgical patients after the provider voices that he or she is comfortable with the level of information received during the handover and when the patient is hemodynamically stable and has a stable airway. Also, information omissions were identified as a major interpersonal factor influencing information transfers. Deficits in information transfers can lead to delays in treating and assessing for disease-related perioperative complications that may exist alongside anesthesia and surgical complications. Assuming care of patients with incomplete information
sets the stage for medical errors and gaps in patient care.

On admission to the PACU, patient information and technology are transferred from the anesthesia provider to the PACU nurse. Providers must perform multiple clinical tasks while transferring information and responsibility, which requires providers to multitask while participating in information transfers. Multitasking during handovers divides providers’ attention during handovers. Distractions and interruptions during handovers lead to communication errors and information omissions. Consequently, critical pieces of information may be missed and need to be repeated. Incomplete, fragmented handovers may be transferred, which could be detrimental to patient safety and postoperative outcomes. Therefore, the timing of information transfer during handovers is an important factor to consider and should be mutually agreed on between the sender and receiver. For example, when the anesthesia provider arrives to the PACU and observes the PACU nurse engaged in or distracted by other patient care activities, information transfer should be adapted or modified so that a complete handover is achieved. Providers should set aside mutually agreed on, designated times during handovers for information transfer and patient assessment.

Segall et al.29 suggested limiting conversations to patient-related topics during handovers and performing essential tasks before initiating handover communication. Thus, quality improvement initiatives aimed at addressing organizational policy-level factors are needed to reduce the incidence of distractions and interruptions during handovers. Several studies suggested limiting distractions during handovers.2,22,36 For example, the “sterile cockpit” concept borrowed from the airline industry refers to locking the cockpit during takeoff and landing to minimize interruptions. Applying a similar “lockout” concept to handovers, in which conversations and tasks are limited to immediate patient care, is a reasonable approach to simplifying communications during handovers.

Many of the existing problems with handovers, such as poor quality, inconsistency, lack of structure, and information omissions are attributed to a lack of framework and standardization.43 Focusing (drilling down) on organizational-level and policy-level factors, such as standardization of protocols, appears to be an attainable target point of intervention to improve postoperative handovers. Research supports the premise that significant improvements in the quality, efficiency, and efficacy of handovers occur when the handover process is standardized. Existing studies demonstrate improvements in the quality and quantity of postoperative information transfers as well as provider satisfaction after implementation of handover tools. Standardization of information transfer reduces variability among information transfers and provides structured communication goals for handovers. Additionally, development of standardized instruments should reflect current National Patient Safety Goals. By developing and implementing standardized handover protocols, institutions will align their quality improvement efforts with The Joint Commission’s requirement of healthcare organizations to “implement a standardized approach to ‘handoff’ communications.”41(p8) Studies suggest that documenting and formalizing the handover may serve many functions, including improving communication skills and providing evidence of clinical decision making.

Potential limitations related to standardizing information transfers include lack of personalization and the addition of another step in an already involved process. Some providers may be resistant to changing traditional handover practices. Anesthesiologists in 1 study agreed to use a handover checklist during data collection phases of the study, but stated the checklist would not be used in normal everyday clinical practice. Introducing checklists into an already time-pressured environment, such as the PACU, creates another task for providers to complete. Furthermore, standardization of checklists requires development of context-specific and ecologically feasible handover tools. Thus, it is critical to obtain input and direction from providers when standardizing postoperative information transfers. Although checklists were shown to increase the quantity of information transferred, it was not clear if standardizing handovers increased the PACU nurses’ level of understanding of perioperative information.

Conceptual frameworks are used to clarify concepts and propose relationships between those concepts. When describing handovers, conceptual frameworks and the SEM consider the complex interactions between providers and delivery of information. For example, Cheung et al. discussed 4 conceptual handover aspects: information processing, stereotypical narratives, social interaction, and resilience. Botti et al.27 developed a framework to examine the clinical handover. The framework addresses valid, practical tools, and measures of safety and quality in handovers specific to PACUs. The framework also assesses team performance during handovers, analyzes aspects of interprofessional communication, and is framed by safety culture and sustainability. Additionally, the Donabedian framework was designed to evaluate healthcare quality. Combined with other frameworks, the Donabedian framework has been used to identify gaps in the measurement of handovers and to evaluate the structure, processes, and outcomes. Application of 1 or more of these frameworks to real-life situations could unveil other aspects of handovers, such as the role of distractions during handovers on provider memory loss and information retention.

• Study Limitations. This review identified targeted articles that discussed factors reflected in the SEM that influenced postoperative information transfers. It should be noted that other factors, such as patient acuity and
different types of PACUs, influence postoperative information transfers. Also, most of the sample sizes of these studies were small, although theme extraction was consistent throughout the review. Handovers take place in other practice settings, such as the emergency department, as well as intrahospital handovers between physicians and between nurses. Additional information to improve postoperative information transfers can be gained by studying information transfers in other settings. Finally, among the studies reviewed, there were no randomized controlled trials, the gold standard for producing evidence-based research to inform and affect practice changes.

Conclusion

Postoperative information transfers are critical point-of-care transitions. It is essential to optimize communication among providers and to design ecologically valid and feasible information transfer practices. Standardizing information transfers has been shown to increase the amount of information transferred and to improve provider satisfaction with information transfer processes. However, future research needs to systematically evaluate the influence of standardized information transfer practices on patient-specific outcomes. Additional research is needed to determine if there are positive correlations between the quantity of information transferred and integration of information into care. Future research should link the quality of postoperative information transfers to patient-specific outcomes. Moreover, simulation-based research on handovers could address interpersonal communication issues encountered during information transfers. Addressing factors that negatively influence information transfer is critical to patient safety.

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DISCLOSURES

The authors have declared they have no financial relationships with any commercial interest related to the content of this activity. The authors did not discuss off-label use within the article.