

## Transition of Care in the Cardiothoracic Intensive Care Unit: A Review of Handoffs in Perioperative Cardiothoracic and Vascular Practice

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**T**HE FAILURE TO EFFECTIVELY COMMUNICATE critical patient information among healthcare providers is a potential source of patient morbidity and mortality.<sup>1-4</sup> Breakdowns in communication commonly contribute to sentinel events in perioperative care.<sup>5</sup> Problems with communication are very likely during handoffs, a particular type of communication that occurs upon patient transition between locations or when patient care responsibility is transferred among members of the healthcare team.<sup>1-5</sup>

The handoffs involving critically ill patients are particularly susceptible to fault as they involve complex patients on varying degrees of life support. As such, efforts to improve transitions in care in the intensive care unit have focused on increasing the reliability of information exchange about these complicated patients, largely through the creation of a standardized handoff process.<sup>6,7</sup> Standardized handoff processes have been credited with improving communication among team members, reducing medical errors, and improving patient outcomes.<sup>8-10</sup> In this expert review, the challenges to achieving safe and effective communication when cardiac surgical patients transition among healthcare providers are considered, as well as why a structured handoff is ideal, the impact of this practice, current trials that are underway in the field, and future areas of research.

### IDENTIFYING THE PROBLEM: UNDERSTANDING THE MANDATE FOR CHANGE

Patient handoffs are a multifaceted process involving the transfer of patient information, responsibility, and authority between healthcare providers, and typically have been characterized by systematic errors.<sup>11,12</sup> The implementation of shift work and stringent work hour regulations for trainees in graduate medical education at all levels have contributed further to the complex medical environment, with constant flux among practitioners caring for any given patient, resulting in disruptions of the continuity of care.<sup>13,14</sup> As such, the transfer of critical patient information among providers has significantly increased in volume and highlights the importance of high-quality handoffs for the maintenance in the continuity of patient care.<sup>10,15</sup> High-quality and effective handoffs are the product of multiple steps in a dynamic process that typically

involve the interactions of a variety of healthcare providers from different services (Fig 1).

The barriers to effective handoffs are numerous.<sup>15,16</sup> They may originate from factors such as ineffective communication among providers (due to environmental, language, or cultural factors),<sup>16</sup> a lack of standardization of the handoff process,<sup>6-10</sup> a paucity of educational materials and methods for teaching best practices for transfer of patient care,<sup>17-20</sup> or deficiencies in real-time knowledge about the patient's clinical status.<sup>5,6</sup>

Taking a step back, ineffective handoffs may begin even earlier, in that there is little consensus on what material should even be conveyed among providers, let alone on how effectively it is conveyed. Collins et al analyzed the content of 22 resident physician and nursing handoffs in an urban cardiothoracic intensive care unit and identified variables that were present in physician handoffs, nursing handoffs, and both.<sup>21</sup> Although there was significant overlap, there were also multiple variables that were inconsistently present during sign-out

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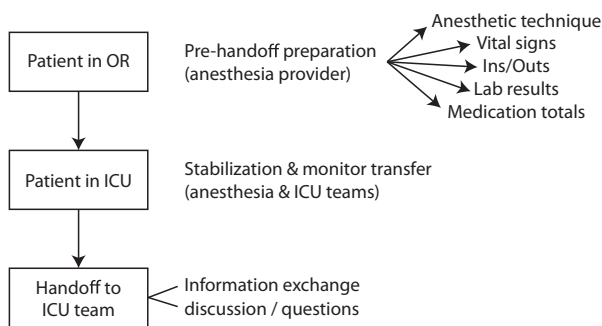
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**Fig 1. The phasic approach to the high-quality handoff. The initial preparation is completed in the operating room by the anesthesia team. The transition and transfer of care during the admission process in the intensive care unit are a joint process among the anesthesia, surgical, and critical care teams. Abbreviations: OR, operating room; ICU, intensive care unit.**

among different types of providers.<sup>21</sup> Fundamental patient information, such as main diagnosis and cardiopulmonary status, were among the critical data that were conveyed inconsistently among providers.<sup>21</sup> There has been a call for content standardization of handoffs in different specialties, including emergency medicine, pediatrics, anesthesiology, and critical care.<sup>11–13,22–25</sup>

In the critical care setting, the high patient acuity and the large, multidisciplinary teams (with multiple providers at varying stages of training) mandate effective communication and information transfer to ensure continuity of care. The sicker patients in the intensive care unit tend to be at greater risk for handoff errors, due in part to their higher acuity and consequent higher complexity.<sup>6–9,26</sup> This high patient complexity introduces another source for error in the handoff process—the tendency to focus on the details of patient care (eg, specific ventilator settings, medication infusions) and to omit a broad overview of the patient’s condition.<sup>27</sup> This “big picture” overview is important to set the stage for the receiving provider to appreciate the subsequent details of the patient’s condition.<sup>27</sup>

In cardiac surgery, patients transition from the care of the perioperative team to that of the critical care team in the intensive care unit. These handoffs involve physical transport between hospital locations as well as transfer of staff, technology, and information.<sup>6,7,28</sup> Furthermore, hemodynamic instability, medication infusions, mechanical ventilation, and bleeding all contribute to a dynamic, rapidly changing patient status that is being managed by the cardiac anesthesiology and cardiac surgical teams during the transport and admission process in the intensive care unit.<sup>6,7,29</sup>

Furthermore, patient handoff often takes place at the bedside in a noisy and crowded environment as the patient is admitted to the intensive care unit, with the transfer of hemodynamic monitoring and mechanical ventilation to the new care paradigm.<sup>28,29</sup> In addition to physical and environmental challenges, the handoffs of care for the cardiac surgical patient arriving in the intensive care unit may be particularly susceptible to errors, because handoff involves providers of different disciplines (eg, anesthesia and surgery) and with different professional backgrounds (eg, physicians, nurses, advanced

practitioners).<sup>30,31</sup> Most medical centers still lack a standardized sign-out process, and when this is combined with a rotating pool of providers caring for a high-acuity cardiac surgical patient population, the potential for miscommunications and errors is understandably high.<sup>29–35</sup>

#### THE VERBAL HANDOFF: PRINCIPLES AND PRACTICE

Given the multiple sources of errors in the handover process already outlined, a variety of templates have been developed and tested to standardize and reduce errors during the exchange of medical information among providers.<sup>32–35</sup> The mnemonic SOAP (Subjective, Objective, Assessment, Plan) was established as a traditional template for daily progress notes and parallels the clinical encounter with patients, but this template has lacked widespread adoption in the verbal handoff process.<sup>36</sup>

The verbal communication template known as SBAR (Situation, Background, Assessment, Recommendations) was originally developed by the United States Navy to facilitate efficient information transfer in an accurate and predictable structure.<sup>37–39</sup> Multiple handoff studies have shown that the SBAR template significantly improves communication quality among healthcare providers, including both within and between physicians and nurses in the care of acutely ill patients both within individual care units and between units in large health systems.<sup>38–41</sup> Further adequately powered clinical trials are indicated to explore the performance of the SBAR communication template in reducing errors and improving clinical outcomes in the critical care setting, especially in the complex environment of pediatric and adult cardiac anesthesiology and critical care. These trials also could compare the perioperative performance of a mature communication template tool, such as SBAR, with the newly derived PACT (Priority, Admissions, Changes, Task) model.<sup>41,42</sup> This area represents a major research opportunity for the clinical investigators around the world in the perioperative cardiothoracic and vascular community to advance the knowledge and practice of this specialty.

#### PRINCIPLES OF HANDOFF COMMUNICATION: DEFINITION OF BEST PRACTICES

High-quality communication reduces medical errors, maintains continuity of care, and fosters a collaborative work environment.<sup>43,44</sup> Handoff communication among providers may be synchronous (involving direct communication in person or via telephone), or asynchronous (involving written or recorded communication).<sup>45</sup> Technology-assisted templates and related tools have been advocated strongly by multiple thought leaders, including the Institute of Medicine, as mechanisms to improve communication and reduce errors in healthcare teams.<sup>46–49</sup> Multiple handoff electronic platforms ranging from an internet-based sign-out to smartphone-assisted techniques have been studied.<sup>50–54</sup> As a rule, a structured electronic handoff template tends to improve the quality, consistency, and reliability of handoffs in perioperative practice, compared with traditional techniques.<sup>50–54</sup>

Physician-to-physician direct communication is easiest to facilitate when patients are transitioning among providers in the same geographic location (eg, within the intensive care unit) or

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