EDITORIAL AND COMMENT

Optimizing Handoff Training and Outcomes in Medical Education

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The transfer of a patient's care from one physician or team to another, referred to as a "handoff," is believed to pose significant risks to patient safety.[1,2] Implementation of shorter work shifts in the era of duty hour reform[3] has increased the frequency of handoffs in teaching hospitals[2] and has led to a national imperative to improve handoff training and practice. Empiric research on handoffs is, at present, a relatively new area in medical education in which there remains a significant need for discovery, translation and dissemination of best practices.

In this issue of *JGIM*, the handoff process is examined in multiple settings including inpatient handoffs in residency programs,[4,5] third-year medical students' participation in handoffs,[6] and patients' perspectives of outpatient clinic handoffs.[7] The four articles explore novel aspects of handoffs including perception of errors, the role of standardized templates and technology, validity of assessment methods and the patient experience.

Graham et al. implemented structured handoffs within an internal medicine residency program that included designated time for face-to-face verbal communication and a structured template for written handoff information.[4] This intervention resulted in improved quality of verbal and written handoffs, better handoff documentation and greater resident satisfaction with handoffs. The study included relatively rigorous assessment of patient safety events in which the authors verified residents' classification of events (e.g. near misses, adverse events) rather than relying on resident self-report alone. Although the intervention did not reduce patient safety events, it decreased data omissions, which is an important step towards the goal of demonstrating a cause and effect relationship between handoffs and patients outcomes. This study also demonstrated that interventions aimed at improving handoff quality and outcomes must consider systems factors. Technology plays a key role in creating the organizational learning environment in which improvements in the quality of handoffs take place.

Many medical education research studies fail to report validity evidence for assessment instruments, yet this is an essential step in ensuring the trustworthiness of results.[8] A noteworthy strength of the study by Dine and colleagues[5] is the rigorous evaluation of the reliability of a mobile technology-based support system developed for peer assessment of internal medicine residents' handoffs. Their findings suggest that peer evaluation, implemented in real time, can be a valid and reliable strategy to assess handoffs that is also well received by residents. Peer assessment at the point of care provides actionable information to enhance handoff quality. Combining mobile technology with handoff education allows educators to review and provide immediate feedback to learners in real time, within a relevant context. These data can also inform assessment of Entrustable Professional Activities (EPAs) and milestones related to handoff competency.

Medical students' experiences with handoffs has not been formally captured in prior studies. Arora et al. surveyed over 200 third-year medical students about their participation in handoffs.[6] The authors found that the majority of students participated in handoffs, but formal training was variable. Arora and colleagues noted that residency program directors expect students to be competent in handoffs upon entering residency, yet there is no consensus regarding optimal methods for handoff training and assessment at the medical school level. Therefore, this study highlights several needs: first, to determine the appropriate role for medical students in handoffs; second, to develop instructional programs for third-year medical students tailored to the desired level of competence; third, to create handoff assessment tools to determine students' preparedness for entering residency training.

Pincavage et al. examined patients' perspectives on outpatient continuity clinic handoffs,[7] another important dimension of handoffs that has received little attention in previous literature. Most research on handoffs has focused on inpatient transfers of care; however, continuity of care is especially important in the outpatient primary care setting where longitudinal relationships between patients and providers are of outmost importance. This study identified several barriers from the patient prospective, particularly for high-risk patients, whose care is frequently fragmented by the repeated transitions of care from one trainee to another throughout residency training. Notifying patients of transitions via telephone call, letter, or clinic visit improved patients' satisfaction with outpatient handoffs.

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Together, these four articles in this issue of *JGIM* provide the foundation for the following recommendations. First, handoffs should be taught and assessed throughout the education continuum from student to practicing physician. Appropriate training for medical students, in particular, deserves further investigation. Because meaningful learning occurs when new information is incorporated into pre-existing cognitive structures,[9] and builds upon prior experiences,[10,11] it is necessary to expose students to handoffs throughout medical school. In the early years, students should understand the importance and the value of handoffs while developing skills within relevant clinical contexts. A longitudinal, experiential handoff curriculum in the third and fourth year will allow students to attain the competence necessary to begin residency. Strategies for practicing physicians to demonstrate ongoing proficiency in handoffs is also worthy of exploration.

Second, assessment standards for handoff performance (in the form of milestones, EPAs and competencies) need to be further defined for all learner levels. Milestones and EPAs pertaining to handoffs have been articulated for internal medicine residents. Similar standards should be defined for other learners based on the expected level of competency. Rigorous validity studies of new assessment tools measuring handoff milestones and EPAs should be a priority for future research.

Third, the use of point of care technology in handoffs is worthy of further study. Portable devices connected to centralized electronic medical records may be very helpful to monitor implementation of handoff processes, evaluate handoffs by peers and faculty, deliver timely feedback and track patient outcomes.

Fourth, studies examining satisfaction with handoffs should include perspectives from all stakeholders, including students, residents, fellows, practicing physicians, non-physician professionals (nurse practitioners/ physician assistants, nurses, therapists, technicians, clinical assistants, administrators) and patients. The concept of shared mental models among healthcare teams is one framework that can inform handoff research seeking to incorporate multiple perspectives.[12] In shared mental models, team members share knowledge and expectations about tasks and behaviors, coordinating actions and developing common expectations. Handoff research building upon this framework may increase our understanding of individual and team performance in handoffs, as well as the patient experience. Additionally, qualitative studies of patients' perceptions will help guide the development of patient-centered handoff tools that address patients' needs during critical transitions of care. This approach will also create a foundation for early and meaningful rapport with patients at times of transition. Such strategies are likely to strengthen patient-physician relationships and possibly impact patient's compliance with visits and other safety outcomes.

Finally, interventions examining handoff strategies should evaluate effects on patient safety. Objective measures, such as direct observation, are obviously most robust but logistically challenging and expensive. Verification of learner-reported events, as was done in the study by Graham and colleagues,[4] may be a more feasible approach.

In conclusion, this issue of the journal examines the handoff process across multiple domains, learners and contexts and creates a foundation for further inquiry. Future research should focus on determining best practices for handoff education for all learner levels, demonstrating validity of assessment methods, understanding the patient perspective and objectively measuring patient safety outcomes.

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