Can handoffs bridge the interprofessional divide to build a team?

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Handoffs have become integral to almost all aspects of hospital-based care. Realities such as duty hour limitations and shift work mean that patients are cared for by numerous individuals each day in an inpatient unit. Furthermore, the specialisation of modern medicine now means that patients transfer between units and care teams as their healthcare needs evolve. This changing of personnel and patient location necessitates handoffs, where clinicians communicate information about the patient, transferring responsibility for care from one person to another. For example, a patient in the hospital might receive care from two separate physician teams (night and day coverage) and three nursing teams (each working an 8-hour shift). This means their care is passed through at least five handoffs in a 24-hour period, not counting potential handoffs to procedural teams, escalations of care or handoffs for break coverage. The number of handoffs in a day for each patient can quickly escalate, with each being an opportunity for information to be lost or misunderstood, threatening clinician teamwork and leading to errors and preventable patient harm.

Given the ubiquity, necessity and risk associated with handoffs, the systematic review by McCarthy and colleagues[1] in this issue of *BMJ Quality and Safety* is an important contribution. Using rigorous methods for systematic reviews, they searched several comprehensive data sources for the past 10 years for publications that assessed the association of within-unit structured handoff protocols with patient safety outcomes.

The authors found 16 articles (2 systematic reviews and 13 primary studies published in 14 publications) that met eligibility criteria. Although 12 handoff tools were identified in the literature, only two—Illness Severity, Patient Summary, Action List, Situation Awareness and Contingency Planning and Synthesis by Receiver (I-PASS) and Situation, Background, Assessment and Recommendation (SBAR)—had enough evidence to draw conclusions. The use of SBAR or I-PASS for within-unit handoffs likely improves patient safety, with the evidence being stronger for I-PASS. A notable finding is the sorting of handoff tools by professional role; the studies evaluating SBAR as a handoff tool all evaluated either nurse-to-nurse handoff or nurse-to-physician communication, while the I-PASS studies exclusively involved physicians.

THE IMPORTANCE OF SHARED MENTAL MODELS

Healthcare is delivered in interprofessional teams, so this sorting of handoff tools among physicians and nurses may impede the creation of shared mental models that are required to accomplish the team objectives. This includes healthcare teams, where, for example, stronger shared mental models were associated with patients feeling more prepared for hospital discharge.[2] Shared mental models are defined as 'common or overlapping cognitive representations of task requirements, procedures and role responsibilities'.[3] Shared mental models can help a team develop a shared situational awareness or a clear communication structure, for example.

However, the most robust research, as shown in the systematic review by McCarthy and colleagues, suggests that physicians and nurses choose different tools to conduct handoffs. Not only are the tools different but the workflows are often different for each group, so that there is not a structured opportunity to have an

in-person handoff discussion. These different tools and workflows may be needed in some cases to address the differences in clinical information and tasks among physicians and nurses. However, we believe this can also create a barrier to developing a shared mental model for the team following the handoff.

In this editorial, we discuss this important limitation of the current practice of handoffs—namely, that handoffs are typically conceived and executed as a transfer of patient information from one individual to another, stratified by profession. But in reality, patients are cared for by multidisciplinary teams comprised of individuals who need to transfer information to each other and integrate new team members as they assume care of the patient. This information transfer from team to team and with new team members must result in them having a shared mental model of a patient's care plan and needs.

Healthcare teams are diverse, with compositions dependent on the specific setting. On the inpatient floors, a team may be comprised of nursing and medical staff, as well as pharmacists, therapists and more. In the operating room (OR), the team may include the surgeon, an anaesthesiologist, a nurse and a surgical technologist. Regardless of the location, teams are comprised of individuals completing interdependent tasks in pursuit of a shared outcome.[3] Their ability to achieve this outcome is dependent on their use of key non-technical teamwork skills, such as information sharing and assigning roles and responsibilities, which can lead to a shared mental model.

SHARED MENTAL MODEL DOMAINS

While several frameworks exist for describing shared mental models, we will use a five-factor framework.[3–5] Within this framework, shared mental models are comprised of a team understanding of five domains. First, there is a shared understanding of the equipment and how it will be used to achieve the team's objectives. Next, there is the task domain, where teams share an understanding of what tasks need to be completed and how they will be completed. These two together are sometimes called the task-related content of a shared mental model. The next two are the team-related content and are comprised of an understanding of (1) the knowledge and abilities of the team members and (2) how the team members will interact and cooperate. The fifth factor was added most recently and relates to the temporality of the team's tasks, such as their relative urgency or priority.[4]

A shared mental model does not always need to encompass all five of these domains; something like equipment use may not be relevant to every healthcare team, for example. Additionally, having a shared mental model does not mean that all team members share the entirety of their individual mental model with their teammates. Nurses and physicians have different nuanced understandings of their patients' clinical status and may have non-overlapping responsibilities. However, if the nurse thinks the patient is stable and the physician is worried that they will acutely decompensate, then it will be difficult for them to rapidly coordinate their actions as a team to manage the clinical situation. That level of discrepancy in shared mental model is what a strong handoff can address.

BUILDING SHARED MENTAL MODELS THROUGH HANDOFFS

Teams in healthcare build shared mental models through informal teamwork throughout their shift and through specific activities designed to bring everyone onto the same page, such as interprofessional rounds, preoperative briefings or team huddles prior to complex patients' appointments in the clinic.[6 7]

In an ideal world, handoffs would occur as a team and be one of these activities that create a shared mental model. In the case of a patient transferring to the intensive care unit (ICU) from the OR, the anaesthesia, surgical and nursing team members might accompany the patient from the OR to the ICU, where they are met by the ICU nursing and physician teams. This multidisciplinary team then uses a structured process of information sharing to complete the handoff of the patient from team to team. This allows the rapid development of a shared mental model of that patient's care by the entirety of the interprofessional receiving team, which will facilitate immediate, effective clinical care.[8 9]

But in reality, this is not the system across much of inpatient healthcare. Instead, consider the inpatient team, where the physician team members give handoff at 5 pm using I-PASS and the nursing staff hands off later at 7 pm using SBAR. Pertinent clinical information has likely been transferred successfully in these structured formats. However, do they share the other components of a shared mental model? If there is no explicit handoff about how physicians and nurses will reach each other with urgent questions or who is responsible for following up on an important laboratory result, then it is unlikely that they have developed those other shared mental model domains.

FUTURE RESEARCH DIRECTIONS

The ability for handoffs to improve patient and team outcomes is theorised to be mediated in part by team communication and coordination,[10] which rely on shared mental models. In clinical contexts such as anaesthesia handoffs, a body of literature exists showing that within single-discipline teams, structured handoffs can increase the clinical content that is shared between the incoming and the outgoing team members.[11] However, despite the theoretical linkage of handoffs and team shared mental models, little research exists to understand the impact of handoffs on shared mental models in multidisciplinary teams. One study in paediatric inpatients analysed the content

of their separate handoffs to understand the content of their shared mental model. They found discrepancies in the clinical information that nurses and physicians were handing off, despite access to a standardised electronic handoff aid.[12] This study, as with most of the single-discipline handoff studies, only assessed agreement in task-related domains, such as the clinical tests that are needed to move the patient's care forward. How handoffs build, or fail to build, the team-related domains of shared mental models, such as how team members will interact and communicate, remains an open question.

McCarthy and colleagues[1] point out a need for further handoff research into understanding the use of different mediums for handoff tools, such as mobile devices, and increased research into structured handoff tools in non-academic settings and in multisite research designs. Research on handoffs should also measure shared mental models and non-technical teamwork skills like communication and coordination. Task-related domains of shared mental models are important and should continue to be a part of handoff research, but how do handoffs build team-related domains of shared mental models? Can better integration of nurses and physicians in handoffs lead to handoffs that transfer not only clinical data but also teamwork expectations? Can systems be re-designed to encourage team-to-team handoffs rather than parallel nursing and physician handoffs? How can we build the leadership and organisational support structures to promote these handoffs?[13] What if we incorporate the patient and care partner into the handoff process and therefore into the team's shared mental model?[14] This systematic review suggests a need to integrate our handoff research silos, which are currently dichotomised to some degree into nursing research with SBAR and physician research with I-PASS. The next generation of handoff research questions should break down this wall.

Information transfer in a handoff is a means to safely care for the patient, but healthcare teams can only do this if they have created a shared mental model through the handoff process. The systematic review by McCarthy and colleagues provides an excellent summary of the moderate-quality evidence base for structured handoffs' ability to share information and enable clinical care. Now it is time to ask how handoffs can help us build stronger teams.

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