

Navigating Care Transitions: A Process Model of How Doctors Overcome Organizational Barriers and Create Awareness

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Brian Hilligoss, PhD¹ and Timothy J. Vogus, PhD²

Abstract

As reforms push for improved integration across the care continuum, managers and policy makers are increasingly concerned about care transitions, such as during shift changes or when moving patients between units or institutions. The authors examined transitions from an emergency department to inpatient units through a 2-year ethnographic study of an academic medical center. Data include 48 semistructured interviews with doctors and administrators and 349 hr of observations of doctors. The authors show that organizational design poses challenges to doctors attempting between-unit care transitions, including heavy reliance on technology, separation of responsibility and control, and misalignment of routines and temporal rhythms. Each challenge threatened doctors' awareness of the current state of other units and processes. To recover awareness, doctors engaged in time-consuming workarounds. Improved awareness will likely require a mix of interventions, including standardized protocols, work redesign, advanced information technologies specifically designed to enhance awareness, and high-reliability practices, such as safety organizing.

Keywords

high reliability, care transitions, operational failures, coordination, quality

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¹The Ohio State University, Columbus, OH, USA

²Vanderbilt University, Nashville, TN, USA

Corresponding Author:

Brian Hilligoss, PhD, Division of Health Services Management and Policy, College of Public Health, The Ohio State University, Columbus, OH 43210-1351, USA.

Email: hilligoss.4@osu.edu

Introduction

The highly fragmented nature of health care delivery consistently undermines organizational reliability (Institute of Medicine, 1999; Institute of Medicine, 2001; Nembhard, Alexander, Hoff, & Ramanujam, 2009; Ramanujam & Rousseau, 2006) and has been implicated in the soaring costs of care (Kuttner, 2008). In part, this is because fragmentation and specialization necessitate a greater number of between-unit care transitions (Katz, Carrier, Umscheid, & Pines, 2012), and care delivery often breaks down at these transitions (Roberts Yu, & Van Stralen, 2004). In other words, the increasing complexity and fragmentation of health care delivery heightens the difficulty and importance of seamless transitions of care (Cheung et al., 2010; Robertson, Morgan, Bird, Catchpole, & McCulloch, 2014). Consequently, finding ways to improve care transitions is crucial if systems are to achieve the goal of simultaneously providing high-quality, safe, and efficient care (Berwick, Nolan, & Whittington, 2008). Prior research suggests that cross-boundary care transitions are consistently problematic (Bodenheimer, 2008; McDonald et al., 2007), and there is limited evidence suggesting they are responsive to interventions (Cohen & Hilligoss, 2010; Robertson et al., 2014). The persistent difficulty of care transitions suggests we need a better understanding of the challenges to care transitions that cross organizational boundaries as well as the ways in which clinicians cope with these difficulties.

While recent innovations such as electronic medical records (Dean et al., 2009), the patient-centered medical home (Hoff, Weller, & DePuccio, 2012), and accountable care organizations (ACOs; Fisher & Shortell, 2010) are intended to reduce fragmentation, without a grounded understanding of the challenges of transitioning care across intraorganizational boundaries in the inpatient setting, we are ill-equipped to address the more complex endeavors of transitioning care across inter-organizational boundaries and delivering highly reliable care (Chassin & Loeb, 2013). At least two factors contribute to this deficiency. First, most efforts have focused on developing and implementing standard operating procedures, such as care pathways (Gittell, 2002), checklists (Haynes et al., 2009; Pronovost, Needham, et al., 2006), and other structured protocols (Catchpole et al., 2007; Haig, Sutton, & Whittington, 2006). Yet checklists and protocols are often inadequate (Gordon, Mendenhall, & O'Connor, 2012), and supplemental interpersonal approaches (Weick & Roberts, 1993; Weick & Sutcliffe, 2007) to care transitions that patch and work around operational failures remain necessary (Hilligoss & Moffatt-Bruce, 2014; Tucker, 2004; Tucker & Edmondson, 2003; Tucker & Spear, 2006). Thus, failing to understand the interpersonal and organizational dynamics shaping care transitions leaves researchers and practitioners with an incomplete understanding of how to intervene to improve them.

Second, although prior research suggests highly reliable health care is elusive (Chassin & Loeb, 2013), the focus on specific teams (Faraj & Xiao, 2006) and hospital units (e.g., Madsen, Desai, Roberts, & Wong, 2006; Vogus & Sutcliffe, 2007) may underrepresent the challenges to reliability posed by between-unit care transitions. Thus, we know relatively little about *how* doctors transition care across organizational

boundaries—specifically, the challenges they face in doing so and how they attempt to resolve those challenges in real time.

This article begins to address these gaps by reporting on an ethnographic study of doctors' admissions work at one tertiary teaching and research hospital. The questions guiding our study are: (a) what kinds of challenges do doctors encounter when transitioning patients from the emergency department (ED) to various inpatient services? (b) what are the underlying sources of these challenges? and (c) how do doctors attempt to resolve these challenges? In answering these questions, we identify implications for theory and practice regarding awareness, care transitions, and the reliability of health care organizations.

New Contribution

We make three distinct contributions in this paper. First, we describe and document three challenges to between-unit transitions of care and trace their origin to features of the organizational structure of the hospital. In so doing, we provide insight into the multifaceted ways in which between-unit transitions may fail. Operational failures at critical junctures in the care continuum are especially important for the cost and quality of care (Institute of Medicine, 2001; Kuttner, 2008). Having a consistent and repeatable care transition process provides a foundation for detecting and responding to early signs of threats to either patient well-being (Ong & Coiera, 2011; Robertson et al., 2014) or system reliability (Madsen et al., 2006; Weick & Roberts, 1993) or both. Second, we identify the adaptive workarounds that doctors employ to resolve these challenges. Through documenting how doctors navigate this difficult terrain, we surface possible mechanisms by which system awareness can be improved and operations potentially become more reliable. Third, we contribute to the emerging literature on high-reliability organizations (HROs) in healthcare by addressing a significant gap. While most research on HROs has focused on these organizations' abilities to sustain reliable performance within tightly coupled teams (Edmondson, Bohmer, & Pisano, 2001) and individual units (e.g., pediatric intensive care units; Madsen et al., 2006), our study examines the inherent fragility of reliability when work crosses organizational boundaries. That is, we illustrate how between-unit care transitions rely upon extensive adaptations and workarounds by doctors to restore compromised awareness and ensure that the most basic elements of transitions are accomplished. In other words, research calling for emulating HROs (e.g., Chassin & Loeb, 2013) has underestimated the difficulty of doing so. Specifically, prior work, having focused on teams and individual units, has produced a detailed understanding of what enables highly reliable suborganizations (e.g., a hospital unit), but we lack evidence regarding how to enable reliability across organizational units (i.e., a HRO).

Methods

Given the goal of understanding the challenges experienced by doctors when transitioning care across organizational boundaries and the means by which such challenges

are resolved in real time, research methods that provide insight into work as it unfolds in situ are needed (Hoff & Witt, 2000; Weiner, Amick, Lund, Lee, & Hoff, 2011). Furthermore, the understudied nature of the phenomenon coupled with failed interventions to improve care transitions (Robertson et al., 2014) suggests that a focus on the perceptions and “lived experiences” of actors in the specific context embedding that phenomenon should yield new and valuable insights (Weiner et al., 2011). Consequently, a qualitative approach that uses both observations of, as well as interviews with, providers who engage in cross-boundary care transitions work is needed.

Our data come from a 2-year (January 2009–March 2011) ethnographic grounded theory study of hospital admissions work that the first author conducted at “Memorial Hospital” (pseudonym), an adult acute care, tertiary teaching facility located in the Midwestern United States. Memorial is consistently listed as a “top hospital” by outlets such as *U.S. News and World Report* and has an “A” Hospital Safety Score rating from the Leapfrog Group. The three main departments providing direct patient care are the Emergency Department (ED), Internal Medicine, and Surgery. The latter two are further subdivided into a variety of subspecialty services (e.g., Cardiovascular Medicine, Gastroenterology, Thoracic Surgery, Vascular Surgery, etc.). Much of our data on inpatient activities comes from General Internal Medicine (“General Medicine”), which is subdivided into a Hospitalist service and four Resident services.

Our approach to data collection followed recommended practice for qualitative research as we used multiple methods (e.g., interviews and nonparticipant observation; Weiner et al., 2011; Yin, 2003). Data analyzed for this paper include 48 semistructured interviews with doctors and administrators in all three main departments and 349 hr of observation, split between the ED and General Medicine. Roughly half of the interviews were conducted at the start of the study to provide orientation to the setting and relevant phenomena and to gather participants’ perceptions of the challenges entailed in admissions work and transitions from the ED to inpatient services. The remainder of the interviews occurred toward the end of the study, providing a member-check on the emerging analysis. The latter interviews also confirmed theoretical saturation, because the answers to interview questions were largely consistent and provided limited additional insight even though details and individuals varied (Corbin & Strauss, 2008). The first author interviewed 45 unique individuals including 20 attending doctors (“attendings”), 16 resident doctors, and nine administrators. Of the 36 doctors interviewed, 14 were in emergency medicine, 17 were in internal medicine, and five were surgeons. Each interview lasted approximately 1 hr.

Observations entailed the first author shadowing either a resident or an attending doctor for anywhere from 3 to 8 hr. These observations afforded the opportunity to watch admissions work as it unfolded and reduced the need to rely on what doctors reported. The first author conducted many informal interviews during these observations, not only with the doctors he was shadowing, but also with other doctors, nurses, clerks, and technicians working nearby. He kept a small notebook and took brief notes. Each evening he typed up these notes, adding to them additional details recalled from memory, resulting in 220 single-spaced pages. In order to maximize the amount of admissions work observed, observations were primarily conducted between 9:00 a.m.

and 8:00 p.m. Monday through Friday when the largest number of ED admissions typically occur at Memorial. However, one weekend observation and two night observations extending beyond midnight were conducted to ensure inclusion of data from these less active admission periods.

Consistent with Grounded Theory methodology (Charmaz, 2006; Glaser & Strauss, 1967), data collection and analysis proceeded iteratively, with each effort informing the other. As data were gathered, they were coded to identify themes, which in turn were used to guide subsequent sampling and data collection efforts. Analysis involved developing first-order in vivo and process codes (Saldaña, 2009) that entail terms, concepts, and categories originating from the language of the informants, combining and abstracting these into second-order codes that represent themes and dimensions originating from the researcher's theoretically based interpretations of the informants' words and actions at a higher level of abstraction, and aggregating second-order codes into overlapping categories (Gioia, Corley, & Hamilton, 2013). Second-order categories were then used to frame the overarching themes regarding challenges, their effects on doctor awareness, and how doctors address them. Table 1 provides an overview of the analytical coding framework.

Findings

The overarching theme to emerge from our analysis is that of the dynamics of awareness. By "awareness" we mean the condition of being conscious or cognizant of the state of a situation or system, and by "dynamics of awareness," we mean the processes by which awareness is threatened and restored. We found that coordinating between-unit transitions of care at Memorial Hospital involved considerable work on the part of doctors to recognize and respond to specific and changing challenges. While clinicians must certainly attain an awareness of the patient's current or emerging conditions, of interest here is the work entailed in achieving and maintaining an awareness of the current state of other organizational units or processes in order to organize one's own efforts accordingly. We make a distinction here between knowledge and awareness. The former pertains to an enduring understanding of how the hospital works, whereas the latter is situational, referring to an understanding of the current state of a unit, process, or other aspect of the organization.

We organize the findings into three broad sections. First, we discuss two features of the hospital's organizational structure that underlie much of what we found. We then trace these structural features to three complications or organizational workarounds that threaten the awareness needed for between-unit care transitions. Finally, with these structural features and threats to awareness in view, we discuss how individual doctors use a specific set of workarounds to cope with these conditions and to restore awareness.

In the sections that follow, we support and illustrate our findings by presenting representative quotes and examples from our data. In order to demonstrate that the phenomena reported are not isolated events, we have taken care to provide examples from a variety of participants, such as both attending and resident doctors, and

Table 1. Analytical Coding Framework.

First-order codes (e.g., in vivo and process)	Second-order themes (i.e., consequences of underlying structural features)	Aggregated, overlapping second- order categories (i.e., underlying structural features)	Overarching theme
<ul style="list-style-type: none"> • Deciphering ambiguous pages • Using IT to predict work • Finding parties for handoff • Playing “telephone” • Communicating via telephone versus face-to-face • Updating the system • Checking capacities of other units • Control of the patient • “Predicting boarding is hard” • Managing orders during boarding • Admitting patients with pending work • Managing responsibility after handoff • Updating after handoff • Traveling to the ED • Keeping lists of patients • Cleaning up before signing out • “Clearing out the ED” • “Witching hour” • Admission and shift sign-out interaction • Order-writing routines differ from unit to unit 	<p>Heavy reliance on technology</p> <p>Separation of the transfer of responsibility from the transfer of control</p> <p>Misalignment of routines and temporal rhythms</p>	<p>Physical division of labor</p> <p>Administrative division of labor</p>	<p>Challenge of awareness (i.e., achieving and maintaining an awareness of the current state of another unit or process)</p>

to demonstrate the occurrence of the reported phenomenon in both the ED and an inpatient unit. We have also triangulated our data collection and analysis to report data examples from both interviews and observations in order to focus on findings that are substantiated by both participant reports and researcher observations.

Underlying Structural Features

Like most tertiary care centers, Memorial Hospital was divided into a variety of medical and surgical services (e.g., General Medicine, Pulmonary and Critical Care Medicine, Orthopedic Surgery, Thoracic Surgery, etc.). This division of labor into sub-specialty units enabled the hospital to organize its expertise for dealing with a wide variety of illness conditions. Concentrating all expertise and technologies related to one particular specialty into a single service enabled the development of practices to serve the unique needs of patients with particular conditions. This division of labor, however, produced two structural features that underlie the challenges of coordinating between-unit transfers at Memorial Hospital: the administrative and the physical separation of services.

First, the division of labor into units produced separate administrations that have organized and managed operations in those various units. Routines, cultures, and norms have developed and evolved to serve the unique mission of each unit. For example, General Medicine was subdivided into Residency services and a Hospitalist service. This enabled the hospital to address its teaching mission while ensuring a sufficient number of generalists were on staff to cover the significant patient population requiring general care. The routines and practices that serve teaching purposes—for example longer shifts, monthly rotations, and team-based approaches—had therefore been instituted in the residency services while alternative practices, such as 8-hr shifts and weekly rotations, were used for the hospitalists. Similar differences between the ED and various inpatient units existed in terms of routines and norms as well, allowing the former to devote its resources to addressing urgent and life-threatening conditions while Internal Medicine units, for example, focused on treating the underlying causes of illness.

Second, the division of labor into separate units was accompanied by a separation of those units into different physical spaces within the hospital buildings. The Memorial Hospital and Medical Center comprised more than 45 clinical and administrative buildings, occupying more than 6 million square feet. Consequently, some units of the hospital were close to one another, whereas others were farther apart. The ED, for example, was located on the ground level, permitting easy access for incoming emergencies, but it was separated at a considerable distance from the various General Medicine wards located on the upper floors of the patient bed tower, or as one ED attending put it, “two blocks away, and up six floors.” For inpatient staff, the physical separation presented a tradeoff: by traveling the considerable distance to the ED to see the patient and administer care, doctors were simultaneously moving themselves farther away from the rest of their patients and were thus less able to respond quickly to any urgent needs of those patients.

Before turning to the consequences that stem from these structural features, a brief discussion of interdependencies provides context. Although administratively distinct, the various units were in fact interdependent. Their capabilities necessarily overlap. Most notably, General Medicine overlapped with all other Internal Medicine services, allowing the former unit to handle less severe cases and the subspecialty units to handle the more acute ones. Considerable negotiations emerged among Internal Medicine services or between medical and surgical services over “borderline” cases. Furthermore, the limited capacities of units necessitated practices that somewhat evenly distributed patient loads. One such practice at Memorial Hospital was “alternating,” whereby after admitting a certain number of cases on a given day, the various subspecialty Internal Medicine units alternated with General Medicine, admitting every other relevant case. Likewise, the General Medicine resident service alternated with the Hospitalist service to distribute the workload of general medicine admissions. There were, of course, many guidelines regarding the placement of patients based on illness condition, but for present purposes, simply knowing that inpatient services negotiate and alternate admissions is sufficient for understanding subsequent findings.

Threats to Awareness

The administrative and physical structural divisions in turn produced complications for between-unit transitions, primarily by compromising awareness of the current state of other units or processes. At least three threats to awareness were particularly notable in our analyses: (a) a heavy reliance on technology-mediated communication, (b) the separation of the transfer of responsibility for the patient from the transfer of control of the patient, and (c) the misalignment of the routines and temporal rhythms of different units.

Heavy Reliance on Technology-Mediated Communication. First, as a result of the separation of units physically, and to a lesser extent administratively, there was considerable reliance on technology-mediated communication. Doctors relied heavily on information technologies to conduct work generally, but particularly during between-unit transitions of care. In fact, at Memorial Hospital, the overwhelming majority of admission handoff conversations between ED and Internal Medicine doctors happen via telephone. Face-to-face ED admission handoff conversations are rare exceptions. Alphanumeric paging systems, telephony, electronic health records (EHRs), and other technologies played crucial roles in making the necessary connections and sharing important information needed to arrange for the transfer of responsibility and control in a safe, effective manner. While such technologies attempt to bridge the discontinuities of time and space for noncolocated parties, they lack many of the rich communication channels provided by face-to-face interactions, including nonverbal cues such as body language, eye contact, and use of the physical environment. Consequently, use of these technologies to work around the separations created by organizational structure sometimes produced challenges that threatened awareness and further complicated care transitions.

For example, alphanumeric pages proved a recurring source of confusion for doctors regarding accountability. Ambiguous pages referring to unknown patients frequently triggered extended searches to figure out who the patient was and who was responsible for care. For example, the page "Pt Brown has hit the floor. Orders needed" immediately triggered uncertainty for the hospitalist who received the page, given that she did not have a patient named "Brown." The communication ambiguity raised numerous questions for this hospitalist. Had someone transferred a patient to her service without first performing a handoff? Did a colleague, previously covering admissions, take the handoff but forget to tell her about the patient? Had the page been routed to her in error? And regardless of whose patient it is, does the patient's condition demand immediate attention such that any delay caused by trying to clear up the ambiguity would potentially cause harm or hurt quality of care? The page provided insufficient detail to sort out the confusion. Sometimes a single phone call helped resolve the ambiguity, but on numerous occasions for this and other doctors, multiple calls and searching through the EHR were required before such questions were answered.

A quote from an ED attending further demonstrates how reliance on telephones and information systems also contributes to accountability ambiguity and inaccurate understandings of who is available to resolve patient issues or to provide relevant information.

So if I go to the paging [web]page, and I go to General Internal Medicine. ... I get—so, the admitting residency service is being covered by Matthew [alias]. So, I page Matthew, but it's not necessarily Matthew who calls me back. ... Matthew is going to take my page, "Mrs. Smith, 66, coming in with pneumonia," and he's going to look at his roster, and he's going to look at all of his colleagues, and he's going to say: This goes to Bob; it doesn't go to me. So, maybe Bob is on General Internal Medicine. Maybe Bob is on [the Hospitalist service]. Maybe Bob is on Pulmonary. I don't know. So Bob calls back [saying], "What's going on?" And I don't know that it's not Matthew because I don't know Matthew. So, then what ends up happening is then the patient is boarded. Eighteen hours later, we know that Matthew got called. We don't know that it was Bob who answered. So we get mix-ups like that all the time. (P204, ED attending)

We note that part of the challenge this particular attending identifies relates to a lack of familiarity (e.g., "I don't know it's not Matthew because I don't know Matthew"). In large academic medical centers, it is not uncommon for staff to lack familiarity with other staff given the near constant rotation of many personnel. While this lack of familiarity might be seen as a challenge in its own right, it is exacerbated by divisions of labor coupled with a heavy reliance on technology-mediated communication. Whatever challenges emerge from working with temporary staff rotating through one's own unit, arguably greater challenges emerge from working with temporary staff rotating through another administrative unit, in a separate physical location, with whom one only communicates via a telephone or paging system.

Separation of Transfer of Responsibility From Transfer of Control. Unlike handoffs within a single unit, between-unit transitions necessarily involve some separation of the transfer of responsibility from the transfer of control. Responsibility, that is, the duty and authority to oversee the patient's care, is transferred during the handoff conversation. The physical control of the patient, however, is not transferred until the patient is physically moved from one unit to another, and this process is typically accomplished by parties other than doctors. Thus, doctors would engage in the admission handoff via telephone, and then some period of time would elapse before the patient was physically moved to the new unit. Given the periodic occurrence of boarding in the ED, that period of time could stretch from ten minutes to several hours or even days. At such times, the patient was physically under the control of the ED, but responsibility had been formally transferred to the inpatient unit. In practice, boarding seems to constitute a period of diffused responsibility, where oversight of and decisions about the care of the patient are shared, albeit somewhat ambiguously, by both units. Three different ED attendings said that when they know that a given patient is likely to be boarded for a considerable period of time, they would usually develop a plan for oversight during handoff. The frequent difficulty of predicting when boarding would occur or how long a patient might be boarded, however, made such planning rare.

Between the transfer of responsibility (i.e., the handoff conversation) and the transfer of control (i.e., physically moving the patient out of the ED), parties often took actions that altered processes and made them unpredictable for others. For example, during periods of boarding, there would sometimes be a change in the condition (e.g.,

increased pain, drop in blood pressure, etc.) of a patient who had already been handed off to an inpatient service. Several General Medicine doctors said that in such cases, if ED doctors failed to inform them of this change and any subsequent treatments, the inpatient team was less able to anticipate and appropriately prepare to address the patient's needs.

Misalignment of Routines and Temporal Rhythms. the administrative and physical separations of units can be helpful in allowing units to develop routines tailored to those units, one consequence is that parties on different units have differing ideas about goals or how and when work is to be accomplished. Routines tailored to other units and their temporal rhythms made it difficult for doctors to be aware of and to intervene effectively and efficiently in the processes of other units, even when those processes affected patients for whom they were responsible. For example, it was difficult for inpatient units to get updates on patients from ED staff and to get orders filled during boarding. As one ED resident explained, because ED nurses “don’t know the [inpatient] team, . . . they’re not going to call them. They call us.” Many inpatient doctors expressed frustrations with trying to manage orders for patients during boarding. According to one hospitalist, “sometimes the [ED] nurses follow the orders, and sometimes they don’t.” Differing perceptions about how to execute the boarding process paired with different formal procedures for writing and administering orders exacerbated the challenge of transitioning care effectively.

Each unit’s unique routines, including shift schedules, rounds, and rotations, produced temporal rhythms that were, to some extent, unique to that unit. For example, several ED attendings and residents spoke of the “witching hour”—roughly 6 a.m. to 7 a.m.—when the Internal Medicine services were typically occupied with rounding, and therefore would often not respond to pages for new admissions. Because this time period overlapped the end of the night shift in the ED, many ED doctors said they often faced a complicated tradeoff: push to admit cases earlier in their shifts before convincing evidence was available to support the admission; stay beyond the end of their shifts to hand off those admissions personally once all test results were in and the inpatient units had completed their rounds; or sign out those cases to the incoming ED shift, leaving someone else less familiar with the case to perform the admission hand-off. Doctors in both the ED and inpatient services suggested there is no simple or inherently superior solution to this dilemma. Resolving it entailed considering and weighing a variety of situational factors, such as the relative complexity of patient cases, the total number of patients to be signed out, duty hour limits, and personal needs, among other factors.

Similarly, the temporal rhythms of the ED had important implications for General Medicine doctors. Both Hospitalists and General Medicine residents spoke of a frequent noticeable increase in the number of admissions late in the afternoons, as ED staff, nearing the end of their shifts, would “clear out the ED,” to reduce the number of cases signed out to incoming ED staff. Given that each admission represented considerable time (“hours” according to one hospitalist) and effort on the part of inpatient staff, a sudden influx of patients produced a workload that at least potentially

threatened quality and safety of care, as doctors had to triage admissions, giving some patients little attention for several hours. Thus, the norms of one unit (e.g., signing out to the next ED shift as few cases as possible) created ripple effects through the larger system, affecting work in other units.

Differing routines for order-writing during boarding further complicated between-unit care transitions. In the ED, a largely paper-based order system was used, whereas the inpatient units relied heavily on a computerized provider order entry (CPOE) system. The latter was available in the ED, but inpatient staff stated that they believed ED nurses would not consult the CPOE until a patient had been boarded for some length of time. Consequently, several hospitalists stated that if they wanted to be sure a particular order had been filled, they would not only document it in the CPOE, but they would also either call or physically walk down to the ED to request the nurse fill the order.

Table 2 provides further illustrative examples from our data of each of the three categories of challenges that threaten awareness. Although the qualitative, emergent nature of our methods prevent us from providing representative data on the frequency of various threats to awareness, we note that at least one instance of such threats was identified in every observation of and interview with a doctor.

Restoring Awareness

The overarching effect of the challenges on doctors was to threaten their awareness of the status of ongoing care processes and the current state of other units. To deal effectively with these threats, doctors sought to restore awareness of the current state of various processes and of other relevant units. Achieving this awareness was at times challenging, given that doctors regularly encountered a variety of uncertainties that triggered important questions including the current capacities of other units (e.g., is Cardiology almost full?); the progress of routines (e.g., is General Medicine rounding now?); the location of individuals (e.g., is the patient back from the CT scan?); and the party responsible for a patient (e.g., whose patient is Smith?). Resolving these uncertainties was necessary to ensure smooth care transitions

As noted above, awareness is dynamic and situational, while knowledge is (relatively) stable. For example, an ED doctor may have *knowledge* that the Hospitalist service and the General Medicine residency services alternate when taking admissions. That is, the doctor knows this is a regular, ongoing practice. If the ED doctor is also informed that the Hospitalist service is due to take the next admission, then that doctor has an *awareness* of the current state of the alternating process. Knowledge and awareness were somewhat interrelated: Individuals often needed knowledge about general operations in order to guide their attention toward information useful for supporting awareness. In one example of this, a resident received a page from a clerk notifying him that a patient, whose name he did not recognize, had arrived on the floor. Looking through the patient's record in the EHR, the resident noticed a recent entry from a doctor whom he knew to be on staff in the internal medicine critical care unit. From this he guessed that the patient had likely been transferred from the intensive care unit to the floor. A subsequent call to the critical care unit confirmed this suspicion.

Table 2. Observed Threats to Awareness.

Threats to awareness	Example quotes
Reliance on technology-mediated communication	<ul style="list-style-type: none"> • [Field notes] “A lot of what I deal with, with the admitting pager, has nothing to do with admitting patients. It’s purely people don’t know who a patient belongs to, or who to call, or they just kind of come across our number, and so we deal with a lot of non-admission issues. Like this person, you know, I get this page that just says, ‘Brown has arrived on 5B. Thanks.’ You know, I have no idea who this patient Brown is. Is it an admission? . . . This is why it takes so long. I have to spend so much time trying to figure out who this guy was.” (P104, Hospitalist) • [Field notes] “P106 tells me that last night she got a page about a patient who had just arrived on the floor but had not received a handoff about the patient. She said she spent a half hour trying to figure out who the patient was, whether the patient belonged to her, etc. In the meantime, she found out that the patient was hypotensive.” (P106, Hospitalist) • “[The Internal Medicine residency services] don’t always do a great job of communicating with us in that regard of when they’ve capped and what the deal is. . . . It’s just a little irritating when you all of the sudden get a call from the ER, not really knowing what’s going on. Is this legitimate? Did they get my page number, you know, inappropriately? Are they calling the right person here? That’s just kind of a little stupid thing that goes on.” (P102, Hospitalist) • “So half the time when someone calls, I’m like, I don’t know who I’m talking to. Not only do I not know the person personally, they don’t say their name, ‘I’m calling about such and such admission,’ and I talk to them, and I’m done, and I’m like, ‘who did I just talk to? Was it [the Hospitalist service]? Was it a resident? Was it someone I know? [In the case of] the nose bleed [patient], I ended up talking to my old intensive care unit senior, but I was like running around between so many other things that I didn’t even process that that’s who I was talking to. And . . . my attending [asked], ‘Who did you talk to? Who did you talk to?’ And I was like, ‘I don’t know. I’m too busy. I can’t figure it out.’ So, he, like, paged a bunch of people until he figured out who I talked to so he could put it in [the EHR]. Because I was going to put ‘[Hospitalist]’ in [the EHR] and call it a day.” (P212, ED resident)
Separation of transfer of responsibility from transfer of control	<ul style="list-style-type: none"> • “Generally it just takes times. So when it happens, when these signals are crossed, it just, it takes time to sort out who’s actually responsible for the patient. . . . I really need to stop what I’m doing and sort that out.” (P105, Hospitalist) • [Field notes] We walk downstairs to the ED. He goes to the room where he expects to find one of his patients, but the room is empty. He concludes the patient must have already gone to the floor. “That’s the most frustrating thing.” (P101, Hospitalist) • “So when [the hospital is 95% full], and we’re up to the rafters with patients, we know that we’re going to be boarding patients. But I can’t make a prediction of this person’s probably going to be here 16 hr or 18 hr or 10 hr, because of the fact that all of a sudden it will feel like you’re exploding and admitting patients all over the place, and then within 4 hr, half of them will disappear upstairs, and miraculously 10 beds just appeared out of thin air. And so I’m not in the prediction business.” (P204, ED attending) • [Field notes] P208 tells me that admissions that do not come through the ED are invisible to staff in the ED, making it difficult at best to keep up with caps in the Internal Medicine services. She said the subspecialty services can cap, “and we don’t even know it, and we haven’t even triaged anyone [to those services]. . . . If all services are full, there’s nothing we can do about it. It’s not a system flaw. But sometimes GenMed is full and not the subspecialties. And we don’t know that down here [in the ED]. We can’t see.” (P208, ED resident)

(continued)

Table 2. (continued)

Threats to awareness	Example quotes
Misalignment of routines and temporal rhythms	<ul style="list-style-type: none"> • [Field notes] P203 told me about one thing that has been a problem for some time and in his words “will continue to be.” He said that in the mornings there is an hour when no admissions to inpatient services can take place. This is generally between 6 a.m. and 7 a.m., when inpatient staff is signing in and/or on morning rounds. ED physicians have to hold any admissions during this time. Of course the exact window of time fluctuates a bit from one day to next depending on other factors including the general busyness on the floors and patterns of individual doctors. (P203, ED attending) • [Field notes] 2:15 p.m. Page comes about patient #3. P118 laughs—“Here they come.” She makes some comment about “I’m gonna kill them [ED staff]” if they’ve saved up a bunch of admissions to send at once. (P118, General Medicine resident) • “It took probably 15 hr of emergency care before the Surgery team was involved, and the patient ended up going to Surgery as soon as the surgical team saw the patient. The flip side of that is that it took about 3 hr for a surgical staff to see the patient, given, I can’t account for what happened on the Surgery consult side of things, but I eventually was paged. I was scrubbed, because I wasn’t on the consult service, and it took me until my case was over to visit the patient in the [ED].” (P403, Surgery resident) • [Field notes] P212 looks at the [the EHR of an admitted patient who is boarding in the ED]. “Someone somewhere put in an order for a blood transfusion, but didn’t tell us.” P212 is a bit amazed at this. (P212, ED resident) • [Field notes] P110 tells me that it took him a while to return the last ED admission page and then he ended up redirecting it to [the hospitalist service]. He says he feels a bit bad about this as it delays the ED doc who must now go to the trouble of paging another service. P110 says it would be good to have a place that would show all admissions so the ED could easily see if it was time to admit to [the hospitalist service] or General Medicine. (P110, General Medicine resident)

The three sets of threats to awareness resulting from administrative and physical separation of units render achieving awareness of the current state of another unit the central challenge for between-unit care transitions. Doctors spent considerable time and energy proactively and reactively improving awareness—their own and that of others. We organize our analysis of the workarounds undertaken to improve awareness into three categories: clarifying, monitoring, and updating. We offer these categories not as mutually exclusive activities but rather as a means of demonstrating the variety of actions in which doctors engaged as they restored awareness.

Clarifying Ambiguous Information. Clinical hospital work entails many uncertainties, thus, many efforts to improve awareness represent efforts to clarify ambiguous information. *Clarifying* is a reactive response triggered by the receipt of an unclear signal, such as a page about an unknown patient. Doctors used the EHR, the CPOE, and the hospital’s website in attempts to clarify ambiguities. They also made phone calls, talked to their colleagues, consulted whiteboards, and physically walked to other parts of the hospital to find information to resolve uncertainties. Nearly every observation entailed a doctor engaged in some effort to clarify ambiguous information related to a patient, process, or state of another unit.

Monitoring Ongoing Processes. Many doctors engaged in personalized workarounds to monitor system activity to help restore a “big picture” of the current state of operations. They checked online unit census lists, consulted radiographic imaging schedules, kept running lists of hospital admissions, inquired about the capacities and workloads of other services, and physically visited other units in order to reconstruct awareness and help them predict likely future states. Both residents and attendings in the ED, Surgery, and Internal Medicine services engaged in these practices. For example, during one observation, a General Medicine resident checked the online census of ED patients and their presenting complaints in an attempt to predict how many potential admissions would soon be coming to her service. Similarly, one surgeon spoke of periodically checking the list of ED patients scheduled for CT scans to get a sense of possible impending surgical admissions. These and other similar actions helped doctors predict future states of their own units and to organize accordingly by improving their awareness of the current state of another unit.

Both Hospitalists and General Medicine residents kept running lists of patients being admitted to other services in order to keep track of where those units were in relation to their capacities. Such information was useful for predicting how soon admissions might start coming to a service or for deciding, for example, whether a borderline heart case should be sent to General Medicine or Cardiology. The practice also helped doctors combat ambiguous pages. Many hospitalists, for example, were observed calling the admitting General Medicine resident and requesting a list of that service’s admissions so that if the hospitalists received pages about those patients, they would know to whom the patients belonged.

Updating Information. The hospital is a dynamic, adaptive complex system of moving, interacting parts. It is in a constant state of flux. Consequently, awareness at any given moment is fleeting. Thus, when challenges like misaligned routines compromised doctors’ awareness, they engaged in *updating*. Perhaps at no time is this more crucial than during periods of boarding when responsibility is diffused between two services. During those times, one hospitalist noted the key problem is “Once they [ED doctors] give you the story, you rarely get updates after that.” ED doctors likewise complained about the failure of inpatient staff to update them when alternating or other decision processes on the inpatient side resulted in a change of admitting unit.

Importantly, doctors not only worked to improve their own awareness of system state, they also took actions directed at enabling others to have an accurate, up-to-date awareness. For example, some inpatient doctors, when receiving pages from the ED about admissions during particularly busy times, would send a quick page back to the ED doctors notifying them that they had received the page and would call for the handoff in a certain amount of time (e.g., 20 min). In addition to communicating respect, such actions also conveyed an awareness of the current state of the ED and the admission process.

A frequent update made to restore awareness was changing the EHR to list the correct attending for a given patient. To initiate the admission process, ED staff had to select an admitting service in the EHR. The system then automatically assigned

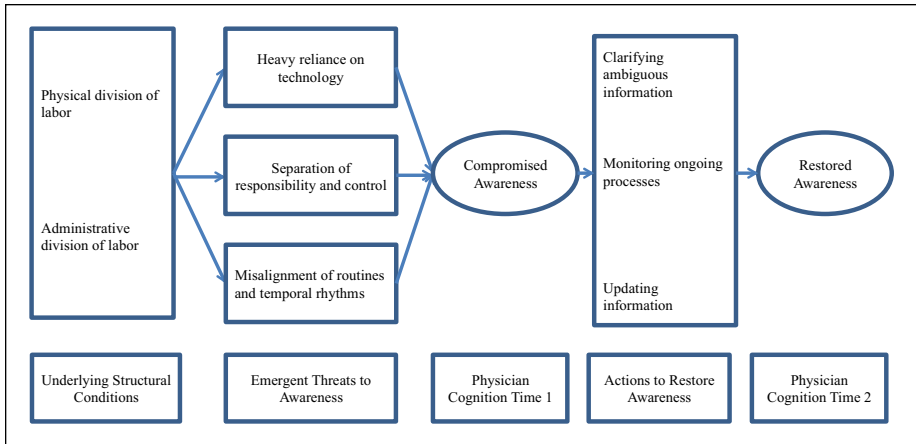


Figure 1. Process Model of Constructing Awareness During Between-Unit Transitions.

the attending based on who was currently admitting on that service. In practice, either because of alternating or negotiations among the Internal Medicine units or between Internal Medicine and Surgery, patients would often end up being admitted to a service other than the one initially selected by the ED. In turn, the EHR had to be manually updated to reflect this change. For quality control purposes, however, only certain individuals with administrative privileges could make such changes. On multiple occasions, both inpatient and ED doctors were observed making phone calls with requests to correct a given patient’s designated admitting service and attending. In so doing, doctors were making attempts to enable the awareness of others and, thus, to improve care transitions. Updating was not a mundane task however, as not all doctors that participated in this study knew how to go about getting the designated attending changed in the EHR. This suggests that the process was not a formal procedure, but rather an informal workaround taken by doctors to cope with an imperfect system.

The ED attending, who in the quote above spoke of the confusions that emerge when the party who calls for the handoff is not the same individual paged by the ED doctor, went on to describe a personal workaround aimed at addressing this problem.

So, now what I started doing is saying, “I’m sorry, I need to know your name and your pager number so that I can make a note of who [I talked to]” so that if anything happens, and I’m not here, we know who I talked to. (P204, ED attending)

This practice of recording in the EHR the name and pager of the parties with whom ED doctors communicate contributed to the awareness of subsequent ED shifts and other providers who consulted the record.

Figure 1 depicts the process model described in the preceding sections.

Discussion

The increasing complexity and fragmentation of health care delivery heightens the difficulty and importance of seamless care transitions (Cheung et al., 2010; Robertson et al., 2014) and renders attempts to simplify care delivery difficult. However, our understanding of foundational aspects of *why* between-unit care transitions are so difficult and *how* doctors cope with this reality is impoverished.

We engaged in a two-year ethnographic study of between-unit transitions of care in an academic medical center to better understand these processes. Like many highly regarded hospitals, Memorial Hospital is divided into units that are administratively and physically separated. While these structural divisions permit the concentration of expertise into specialized services, they also produce at least three threats to awareness that make care transitions between units challenging (a) a heavy reliance on technology-mediated communication, (b) the separation of the transfer of responsibility for the patient from the transfer of control of the patient, and (c) the misalignment of the routines and temporal rhythms of different units. In order to produce a successful between-unit care transition, doctors require awareness of the state of other units and processes within the hospital, but such awareness is threatened by the physical and administrative separation of units. Whereas others (e.g., Kahn & McDonough, 1997; Kellogg, 2009; Okhuysen & Eisenhardt, 2002) have demonstrated that shared space is important for fostering improved communication and system awareness, our findings demonstrate the converse: Working in units that are physically and administratively separate gives rise to challenges that threaten awareness and effective communication. To restore awareness, doctors engage in time-consuming workarounds by which they clarify ambiguous information, monitor ongoing processes, and update understandings and information.

Threats to awareness created by structural conditions and the ways doctors work to restore compromised awareness have theoretical implications for work on individual and collective awareness, high-reliability organizations, and organizational learning. We explore each of these before turning to a discussion of implications for improvement.

First, our work extends existing literature on awareness in ways that bear upon efforts to reduce fragmentation in health care. In other words, the transitioning and receiving doctors need a well-developed sense of current system conditions. But by leaving awareness—and more specifically the dynamic processes by which it is threatened and restored—implicit, structured coordination mechanisms such as checklists, care pathways, and structured protocols come to be seen as the primary means by which integration should be achieved. Such mechanisms may be helpful (or even very helpful) in increasing knowledge and facilitating awareness, but they are unlikely to be sufficient. The information that doctors need to adapt their actions is situational and varies as both the context (i.e., a unit or process) and the content (i.e., patients) change in ways that are not fully predictable. Thus, even with improved design and better practices, awareness remains a dynamic, emergent, and crucial mechanism for effective care transitions. The specific awareness needed is of not merely tasks (Crowston, 1997), roles (Gittel et al., 2000), or patient status, but also the current states of organizational units and processes that would seem to be beyond the scope of one's work.

Second, amid innovations to better integrate health care delivery, there is a simultaneous push to make it more highly reliable (i.e., nearly error-free; Chassin & Loeb, 2013). However, we lack systematic evidence regarding how organizations become highly reliable. The evidence of highly reliable health care delivery relies on studies of specific units (e.g., Knox, Simpson, & Garite, 1999; Madsen et al., 2006) or procedures (Pronovost, Berenholtz, et al., 2006) becoming highly reliable, but not broader organizations. Our study helps to fill this gap by illustrating how prior studies of high-reliability units and procedures understate the challenge of organizations and systems becoming highly reliable. For example, early studies of HROs described how they sustained their error-free performance through “having the bubble” or maintaining an integrated big picture of current operations and being able to detect weak signals of threats (Roberts & Rousseau, 1989). These early studies, however, were confined within the boundaries of a single unit. We show that “having the bubble” or maintaining “sensitivity to operations” (Weick & Sutcliffe, 2007) is especially elusive in between-unit care transitions due to persistent threats to awareness, even in a hospital that is otherwise recognized as providing excellent care. That is, between-unit transitions render creating and sustaining the bubble difficult due to the physical and administrative separations that elicit organizational workarounds in the form of heavy reliance on information technology. This reliance, in turn, produces simpler interpretations of the complexity of the task, which undermine the broad awareness needed to transition care effectively (Gittell, 2002; Weick & Sutcliffe, 2007). Consequently, individual doctors engage in their own workarounds to restore awareness. In other words, overcoming challenges to one’s own and other’s awareness requires considerable creativity and discretionary effort by individual doctors.

Lastly, we found that doctors engaged in a set of specific behaviors, including clarifying, monitoring, and updating, in order to restore their and others’ awareness. This finding has implications for organizational learning. Although these practices helped individual doctors resolve specific gaps in their understanding, they largely amounted to first-order problem solving (Tucker & Edmondson, 2003) and ad hoc workarounds (Halbesleben, Wakefield, & Wakefield, 2008) that failed to address the organizational origins of the challenges to effectively transitioning care. The time spent restoring awareness also has implications for quality, safety, and learning. While we did not systematically measure the amount of time doctors spent sorting through such ambiguities, on multiple occasions field notes indicate that a doctor spent ten or fifteen minutes trying to resolve these issues, be it related to a patient or another responsible party. Concerns about safety justify the time spent, but these efforts represent a tradeoff whereby there is less time to devote to the central activities of patient care and making systematic improvements that might foster more learning as well as higher quality, safety, and reliability. Additional research might attempt to quantify the cost of doctors’ (and others’) time spent at such awareness-building tasks to develop a better sense of the scope and impact of the problem.

Equipped with a more fine-grained understanding of the actual barriers to high-reliability (Weick & Roberts, 1993) and the extensive workarounds engaged in by doctors to reestablish awareness and even minimal levels of reliability, we can better see

the scale and scope of the difficulty of organizing for high reliability. These challenges and the effort required to ameliorate them in real time suggest interventions should target the challenges compromising doctor awareness and necessitating workarounds.

Implications for Improvement

Our research has identified several systematic threats to awareness that necessitate physician-level patching. However, in diagnosing compromised awareness, our findings also suggest some potential courses of action to help address the proximate causes (reliance on technology, separation of responsibility and control, and misalignment of routines and temporal rhythms). We emphasize the proximate causes of compromised awareness because the administrative and physical divisions of labor are largely unavoidable and unlikely to change (Kellogg, 2009). In fact, these divisions are likely to become more stark and difficult to manage as pressures for integration in the form of ACOs escalate. Next we outline a set of structural, technological, and practice-based interventions that, based on our findings, could help ameliorate some threats to awareness.

First, hospitals could implement better structures in the form of protocols and work design to help assure awareness is sustained across care transitions. For example, standardized processes for communicating during prolonged ED boarding or for managing care transitions at times of the day when the temporal rhythms of units are not aligned would help reduce some threats to awareness. Likewise, adopting hospital-wide protocols and systems for order management should also help improve awareness.

In addition, some of the challenges to and deleterious effects on awareness may be remedied by better work design, such as in the form of a centralized coordinator with standardized practices used to manage the interconnections among units. For example, Gittell (2002) found that routines (e.g., care pathways), boundary spanners (e.g., care coordinators), and team meetings were valuable for improving relational coordination under conditions of uncertainty. She has also shown that hospitalists can help repair some of the fragmentation that threatens coordination between functional units and specialties (Gittell, Weinberg, Bennett, & Miller, 2008).

Consistent with work on cross-boundary coordination, we found that heavy reliance on information technology (e.g., EHRs) creates difficulties for coordinating (Gittell, 2000). This, in part, is a function of the fact that some of the uses of technology (e.g., pagers) may be the result of prior workarounds rather than careful design. Thus, technologies that are more explicitly designed for the work of between-unit coordination may smooth care transitions and otherwise enhance clinician awareness of the current state of the system. Specifically, paging systems could be redesigned to rely less on unstructured text (where clinicians may enter insufficient information) and instead be linked directly to and populated with information from the electronic health record. In other words, when a patient is assigned (or reassigned) to a unit or individual doctor, a page could be sent automatically via pager or smartphone to the receiving unit or doctor with a link into the patient's chart. Variation in transition quality could also be reduced by more advanced pagers that could read bar or QR codes in patient

records (electronic and paper) or on patient ID bracelets and transmit relevant information to responsible parties.

Additional IT-enabled improvements might be obtained by building on current uses of dashboards for bed management (Rosow, Adam, Coulombe, Race, & Anderson, 2003) and status boards for ED throughput (Wears, Perry, Wilson, Galliers, & Fone, 2007). Refined variants of such displays could automatically capture data on unit capacities, patient flows, and other dynamic aspects of hospital operations and then widely disseminate that information to aid real-time awareness.

However, better-designed protocols, work, and information technologies are likely to be insufficient because care delivery often relies upon rich, narrative information (Hilligoss & Moffatt-Bruce, 2014) to cultivate a broader and up-to-date awareness. Even highly enhanced information technologies and protocols, however, often provide lean information that makes awareness elusive or incomplete (Beach et al., 2012; Daft & Lengel, 1986). Additional solutions beyond these interventions will likely also be required.

To combat the limitations of protocols, work designs, and information technologies, we propose that hospitals can more fully apply the practices of high-reliability organizations (e.g., Weick & Roberts, 1993; Weick & Sutcliffe, 2007) to care transitions. By practices, we mean the shared ways of interacting that govern the content and form of the conversations that clinicians have and which have been shown to be the core of highly reliable performance (Weick, Sutcliffe, & Obstfeld, 1999), even in health care (Vogus & Sutcliffe, 2007). HRO-like practices target the challenges compromising doctor awareness and necessitating workarounds. For example, using the processes of safety organizing (Vogus & Sutcliffe, 2007) to guide interactions during care transitions would refocus clinicians on the things that could go wrong, the assumptions being made (about the patient and the transition), where necessary expertise resides, and how it can be drawn upon when needed. Safety organizing focuses conversations on the threats to and vulnerabilities in the system. Other approaches such as crew resource management (Dunn et al., 2007; Gordon et al., 2012) or TeamSTEPPS (Stead et al., 2009) similarly help create richer and more focused conversations that proactively identify risks and make smooth transitions and higher quality care more likely.

Lastly, specific practices such as interunit rounds (Campbell & Thompson, 2007) enrich a doctor's understanding of the units from which they receive or to which they refer patients, including the functioning of those units in terms of routines, norms, and temporal rhythms. Such practices might inform further changes that, for instance, improve the alignment of the rhythms of different units by adjusting the timing of shift schedules, rounds, or other practices that can hinder between-unit care transitions. Interunit rounds also build relationships that can be drawn upon to smooth transitions in the future.

As we noted above, our data suggest that such interventions may be useful. However, the tradeoffs and comparative effectiveness of these different solutions would need to be tested, and given the complexity of the threats to awareness, a combination of improvements will likely be needed.

Strengths, Limitations, and Conclusion

The unstructured, inductive approach we used allowed us to open up understanding about challenges to between-unit transitions of care and to draw attention to the problem of achieving and maintaining organizational awareness as a partial explanation for why high reliability continues to elude health care organizations. Thus, our methods provide a way of enriching theory and directing subsequent research efforts. The credibility of our findings rest in several practices commonly used in interpretivist qualitative approaches (e.g., Flick, 2007; Patton, 1999), including prolonged engagement in the field, member-checking of findings with participants, and triangulation of methods.

However, although our approach allows for discovery and extrapolation to theory, it prohibits us from demonstrating the frequency or predicting the generalizability of the reported phenomena more broadly. Nevertheless, our findings are consistent with and also extend prior work (Bodenheimer, 2008) in that they illustrate a set of specific challenges to between-unit care transitions and steps taken by doctors to resolve them. Furthermore, our findings highlight an opportunity for future work to examine empirically (and quantitatively) the ratio of effective to ineffective care transitions, the sources of the failures that do occur, and the conditions under which effective transitions are more likely including doctor behaviors and characteristics (e.g., experience, status) as well as organizational factors (e.g., innovative care transition protocols). The physical and administrative separation of units at Memorial Hospital created emergent challenges for between-unit care transitions. As a result, we would expect our findings to be transferable to similarly complex, specialized, and subdivided health care organizations. But our findings should also apply to other entities that are even more complex (e.g., integrated delivery networks, ACOs; Luft, 2010). Future work is needed to replicate (e.g., with quantitative or qualitative investigation in academic medical centers) and extend (e.g., to ACOs) our findings, as well as to identify boundary conditions (e.g., applicability to specialty hospitals).

This study examined only the work of doctors. Although our data do not illustrate the care transition challenges facing nurses or other clinical staff and how they recover awareness amid those challenges, prior research on operational failures and interruptions suggest that nurses experience similar challenges and attempt to recover awareness through individualized workarounds within and across units (Tucker, 2004; Tucker & Edmondson, 2003; Tucker & Spear, 2006). Further research is needed to document these challenges as well as processes of between-unit transitions across professional (i.e., doctors and nurses, nurses and other clinical staff) as well as organizational boundaries.

Awareness is an ongoing, effortful accomplishment, and enabling it is a pivotal activity in coordinating care during between-unit transitions. Awareness requires sustained effort by doctors due to the structural aspects of hospital and organization design combined with the challenges that result. Further study of awareness and efforts to systematically enable it may in fact be crucial to future improvements in the efficiency, quality, and reliability of care.

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Ethics Approval of Research

This study was approved by the University of Michigan Medical School Institutional Review Board and by The Ohio State University Biomedical Sciences Institutional Review Board.

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