Syncing Up: A Process Model of Emergent Interdependence in Dynamic Teams

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Abstract
Increasingly, organizational teams form quickly and change shape during their short lifespans, meaning they break from traditional definitions of ''real'' teams and experience instability in team membership and boundaries. While scholars have examined conditions that support effective teamwork in more-stable teams, we know little about how these dynamic teams can come to look like real teams that work interdependently rather than independently. My observations of and interviews with medical inpatient teams in a U.S. children's hospital revealed a small subset of teams that succeeded at working interdependently within a core group (internally) and with a shifting set of peripheral contributors (externally). Brief periods of synchronous internal and external teamwork distinguished these emergently interdependent teams. To achieve these synchronous periods, core team members distributed their focus on internal team members and on peripheral members such as nurses, specialists, patients, and patients' family members. Furthermore, core teams intertwined synchronous periods with cycles of external and internal coordination as team boundaries expanded and contracted. Such interdependence was associated with more-efficient work: faster morning rounds and, for patients, shorter hospital stays. Additionally, initial meetings among core team members set the stage for more-interdependent work. My findings contribute to dynamic teams research by illuminating the process of how teams can work interdependently as team boundaries expand and contract, to external activities research by suggesting that synchronous periods hold together previously documented cycles of separate internal and external activities, and to team launches research by extending work with more-stable teams to dynamic teams.

Keywords: dynamic teams, group processes, interdependence, boundaries

Organizational teams frequently fail to conform to the conceptions of a ''real'' team (Hackman, 2011: 51) reflected in many traditional organizations (Edmondson, 2012; Wageman, Gardner, and Mortensen, 2012; Mortensen

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and Haas, 2018). Rather, dynamic teams—at times referred to as ''sand dune teams'' (Hackman and Wageman, 2005: 56) or ''fluid teams'' (Bushe and Chu, 2011: 181)—lack stability both in membership and boundaries. That is, while some teams are temporary (e.g., Klein et al., 2006; Valentine and Edmondson, 2015) or have unstable boundaries regarding who contributes to the work (e.g., Kerrissey, Mayo, and Edmondson, 2021), dynamic teams face both conditions at once (e.g., Arrow, McGrath, and Berdahl, 2000; Hackman and Wageman, 2005; Majchrzak, Jarvenpaa, and Hollingshead, 2007; Edmondson and Harvey, 2018; Mortensen and Haas, 2018).

A challenge to accomplishing work in dynamic teams is that team members' structural interdependence is often not obvious (Wageman, Gardner, and Mortensen, 2012). Even in more-stable, bounded groups, ambiguous structural interdependence can lead teams to differ in their emergent, or behavioral, interdependence—the extent to which their individuals come to actually work together (Wageman and Gordon, 2005). In teams whose membership is in flux, ambiguity in structural interdependence is likely heightened such that we might expect dynamic teams, too, to differ in their emergent interdependence; to that end, research has documented varying degrees of coordination and other team-work processes in dynamic contexts (van Beuzekom, Akerboom, and Boer, 2007; Valentine and Edmondson, 2015). Adding complexity to the issue, research has suggested that dynamic teams often comprise a core group of relatively stable, central team members working with a shifting set of more-temporary, peripheral members who are external to the core (e.g., see Tannenbaum et al., 2012; Mortensen and Haas, 2018). In such cases, ambiguous structural interdependence can exist not only among the temporary group of core team members but also between the core and the shifting set of periphery members. That is, teams can have discretion in whether and how to integrate peripheral members into the team's work and thus vary in the extent to which they do so (Cummings and Pletcher, 2011; Kim, 2020). Given the well-documented relationship between interdependence and team outcomes (Wageman, 1995; Wageman and Gordon, 2005) and the growing prevalence of teams with dynamic membership (Wageman, Gardner, and Mortensen, 2012; Mortensen and Haas, 2018), better understanding of how teams with dynamic membership can exhibit emergent interdependence should have important theoretical and practical implications.

Extant research on how emergent interdependence might develop in dynamic teams is unclear. Research on dynamic team membership tends to avoid assumptions of team boundedness (e.g., see Edmondson, 2012; Mortensen and Haas, 2018) and, instead, suggests that a team can expand its ''shell'' (i.e., boundary) to integrate current members with new, temporary members (Hackman and Wageman, 2005; Ginnett, 2019: 95; Tannenbaum et al., 2012). This suggestion implies that teamwork among initial core members would be concurrent with teamwork among more-peripheral members as the team boundary expands. Still, clear understanding of how this might unfold is lacking. Moreover, research on external activities has also acknowledged that team membership may fluctuate over time (e.g., see Ancona and Bresman, 2007). This work typically assumes a clearer distinction between the team and what is external to the team. Here, internal coordination is thought to compete with external coordination for the team's limited attention and other resources, such that teams do well to balance the two by

sequencing external and then internal coordination or vice versa (Ancona and Caldwell, 1988, 1992; Ancona, 1990; Choi, 2002; Ancona and Bresman, 2007; Ziegert et al., 2022). This research suggests that in dynamic teams, the evolution of internally interdependent work (within the core group) and externally interdependent work (with the peripheral contributors) best occurs via cycles, such that a team focuses on one or the other at a time. Considering these two research streams together reveals that one perspective focuses on integrating core and periphery members, but this view seems to conflict with another perspective suggesting that teams must trade off sequentially between work within the core and with the periphery.

In this article, I seek to combine these two truths to better understand how dynamic teams come to exhibit interdependent work both internally within a core group and externally with a shifting set of more-temporary, peripheral contributors. To do so, I use a qualitative study of medical inpatient teams characterized by extreme membership dynamics: core teams working together for only a week at a time and with a constantly shifting set of peripheral contributors throughout each week. I find that while core members in many teams worked relatively independently from one another or from the periphery, a handful of teams came to exhibit much more-interdependent work both within the core and with the periphery. These emergently interdependent teams were distinguished by periods in which the team boundary expanded, when teamwork within the core and with periphery members occurred simultaneously. These brief periods of synchronized internal and external teamwork were possible because they were embedded between cycles of separate external and internal coordination behaviors (such that the team boundary could expand and contract, much like the shifting boundary of an amoeba) and because of the distribution of some core members' focus on the periphery and others' focus on the core. During these synchronous periods, internal and external teamwork reinforced each other. Teams that exhibited these synchronous periods achieved more-interdependent work (both internally and externally) and, moreover, worked more efficiently, as indicated by each team's average daily time spent on patient rounds and its patients' lengths of hospital stay. Finally, my findings suggest that the content of initial meetings, solely among core members at the start of the week, could allow these members to set the stage for subsequent internal and external teamwork.

This article's findings offer at least three key contributions. First, by documenting how dynamic teams can come to look like real teams through interdependent work both internally and externally as team boundaries expand and contract, this work contributes to teams research that has acknowledged the existence of ''sand dune teams'' (Hackman and Wageman, 2005), or dynamic teams. Second, this study contributes to research on external activities; while my process model of emergent interdependence includes previously documented cycles of separate external and internal work periods, the model diverges to suggest that in dynamic teams these cycles are critically intertwined with simultaneous periods, without which teams might devolve into overemphasis of either internal or external teamwork and thus work less efficiently. Lastly, this study extends research on team launches to dynamic teams.

TEAMWORK ACROSS TIME AND PEOPLE

This study seeks to unpack how teams with dynamic membership can come to look like real teams, working more interdependently than independently both within a core group and with a shifting set of peripheral contributors. To address this process, I turn to research on patterns of teamwork, or team processes—i.e., ''members' interdependent acts'' (Marks, Mathieu, and Zaccaro, 2001: 357)—that could emerge over time; greater levels of teamwork both internally and externally would indicate greater emergent interdependence in dynamic teams. Here, existing research on how teamwork is distributed across time and across team members offers important insights on which to build.

Teamwork across Time

Early research applying a temporal lens to teamwork suggested that teams shift between types of behavior over time, e.g., as the team reaches its mid-point (Gersick, 1988, 1989) or as the team progresses through episodic stages (Marks, Mathieu, and Zaccaro, 2001) or through developmental stages (Tuckman, 1965). While past studies have focused largely on the temporal pattern of work internal to a team, the notion that teams shift among types of work is evident, too, in research on both a team's internal and external activities. This research posits that teams need to shift between internal work and work with external entities because attention and other resource limitations inhibit teams from engaging in both simultaneously (e.g., see Choi, 2002). That is, a focus on internal processes can absorb attention and thereby lead teams to be ''oblivious'' to the external environment (Ancona and Caldwell, 1988, 1992: 662). Similarly, engaging in external activities is taxing and may limit a team's ability to attend to internal processes or develop cohesion (Ancona and Caldwell, 1988, 1992; Ancona, 1990; Marrone, 2010). Research has indicated that, to manage this tradeoff, teams can first gather information from sources external to the team and then integrate it internally (Gersick, 1988; Ancona and Bresman, 2007). Alternatively, teams might initially be overtasked with managing internal work and thus lack resources for external work, such that starting with an internal focus and then engaging with external sources should be better (Choi, 2002). Both patterns are ones of entrainment, whereby the cycle of team activity is thought to match the task environment, and such entrainment to the context is thought to benefit team performance (Ancona and Chong, 1999). When we apply these ideas to dynamic teams, it is notable that such teams lack the clear, stable boundary of traditional teams that allows us to examine activities as strictly internal or external; yet dynamic teams often take the form of a core–periphery network wherein a relatively stable core interacts with a more temporary set of peripheral contributors (Tannenbaum et al., 2012; Mortensen and Haas, 2018). Thus it seems that understanding how dynamic teams' internal (within the core) and external (between the core and periphery) work occur over time would likely provide insight.

A key element of the above-described research is the notion that through a team's collective work cycles that entrain to a task environment, the team members' activities become synchronized (Ancona and Chong, 1999). Notably, this entrainment of members to each other, wherein team members' activities

are more synchronized, can occur even when it is not driven by the external environment, and this entrainment also predicts team performance (Riedl and Woolley, 2017). To this end, a growing body of research has focused on team member entrainment, suggesting that it indicates mutual, or coordinated, attention (Chikersal et al., 2017; Riedl and Woolley, 2017; Mayo and Woolley, 2021; Tomprou et al., 2021). For example, a study with sales teams and one with distributed software innovation teams both found that the temporal clustering of work into bursts in which members contribute and respond to one another rapidly indicates that members are coordinating their attention and that this clustering facilitates team effectiveness (Riedl and Woolley, 2017; Mayo and Woolley, 2021). This research has typically focused on fairly clearly bounded teams. However, research on ''sand dune teams'' has posited that a team with dynamic membership can expand and retract its team boundary (Hackman and Wageman, 2005; Ginnett, 2019), hinting at the possibility of internal teamwork (within the core) entraining to, or occurring synchronously with, external teamwork (with periphery members integrated into the team for a brief period). As noted, while this may conflict with the notion that internal and external work best unfolds in separate periods over time, it suggests that attention to the synchronization of members' activities is germane to dynamic teams whose challenge is partly that the set of individuals who could contribute is in flux, such that managing input is likely a key part of dynamic teams' effectiveness.

Combining these insights on the temporal ordering of teamwork behaviors and the benefit of synchronizing team activities, I believe that examining the patterns of team member interactions over time—the ordering and synchrony of teamwork—will likely provide insight into how dynamic teams can work interdependently both within a core group and with more-peripheral contributors.

Teamwork across People

In addition to considering how a team's work is distributed across time, I examine the distribution across people. Writings on the value of the division of labor trace back at least to Adam Smith's work (1776) on the potential efficiencies of specialization. Much work since then has highlighted that clearly specified roles (Katz and Kahn, 1966) are key to organizational and team effectiveness because they facilitate coordination (Hackman, 2002, 2011). While roles could be assigned in a top-down manner, specialization can also emerge and, in such cases, also predicts team coordination and performance (e.g., see Liang, Moreland, and Argote, 1995; Ren and Argote, 2011).

Despite the recognition that clear roles are useful and the noted increase in role-based work (Bechky, 2006; Valentine and Edmondson, 2015), roles often are not clearly and rigidly defined (e.g., Ginnett, 2019). Particularly in contexts with more-dynamic team membership, there is evidence that roles can be fuzzy, with overlap that requires sorting out who will do what in new scenarios. Indeed, some fluidity to who does what may be effective in such settings (e.g., see research on backup behaviors, Marks, Mathieu, and Zaccaro, 2001; leaders' dynamic delegation of tasks, Klein et al., 2006; role shifting, Bechky and Okhuysen, 2011; and extra-role behaviors, Valentine, 2018). Accordingly,

research has recently called for studying who is doing what over time (Humphrey and Aime, 2014) as a way to better understand emergent teamwork processes, including coordination (Okhuysen and Bechky, 2009).

Investigations of team division of labor have also extended from internal teamwork to considering who engages in external activities that span the team's boundary—activities that one or many team members could do (Ancona and Caldwell, 1988). Some research suggests that work external to a clearly defined team should be the formal responsibility of team leaders (Hirst and Mann, 2004; Hogg, van Knippenberg, and Rast, 2012). Other research has highlighted that in many teams, the evolving nature of the work makes it difficult to assign boundary-spanning behaviors to just one person (Mathieu et al., 2017). Indeed, boundary-spanning activity can emerge in a bottom-up fashion (Guo et al., 2021), and in more-dynamic environments teams may benefit when more than one person, or even the full team, shares in the completion of these tasks (Carson, Tesluk, and Marrone, 2007; Zhao and Anand, 2013). While this research tends to assume a clear boundary around the team, thus allowing for cleanly examining work that is internal and external to a team, we can apply this emphasis on the division of labor to teams with fuzzier boundaries; that is, I believe the findings reviewed above suggest that focusing on how work is distributed across members (and perhaps fluidly distributed) may shed light on the process of dynamic teams' interdependent work.

RESEARCH SETTING

I conducted this research in the general pediatric inpatient service of a large metropolitan children's hospital in the U.S. between October 2016 and September 2017. Teams in this setting provide care to patients admitted from the hospital's emergency department. The teams make diagnoses for their patients, develop care plans, work to execute those plans, and determine when to discharge patients from the hospital. They do this largely during what they refer to as ''morning rounds,'' which I explain further below, and these rounds create a constrained time period in which teams must make decisions about care plans.

When team membership is highly dynamic, defining the team is a challenge (Wageman, Gardner, and Mortensen, 2012); because the team boundaries are not fixed, who is in the team and who is external to the team are less clear. To this end, an emerging team–network perspective is useful (Edmondson, 2012; Humphrey and Aime, 2014; Stuart, 2017; Mortensen and Haas, 2018; Park et al., 2020). In adopting this ''teams as networks'' perspective sometimes implicitly and sometimes explicitly, research has distinguished the more-core, central team members and the more-noncore, peripheral contributors (Arrow and McGrath, 1993; Ancona and Bresman, 2007; Humphrey, Morgeson, and Mannor, 2009; Cummings and Pletcher, 2011; Summers, Humphrey, and Ferris, 2012; Stuart, 2017). Here, core team members are defined as those who are more central to a team's workflow, who have more decision-making authority, and who may be more stable during a team's lifespan, whereas periphery team members are more temporary, fluctuating in and out of the team during its lifespan to contribute their expertise as needed (Ancona and

Bresman, 2007; Humphrey, Morgeson, and Mannor, 2009; Cummings and Pletcher, 2011).[1] I use the delineation of core roles to examine internal teamwork in dynamic teams with respect to the interdependent work that emerges within those core roles. I consider external teamwork with respect to the boundary work (Langley et al., 2019) that emerges between core roles and the more-fleeting periphery contributors.

In this setting, I therefore start with the organizationally defined inpatient team consisting of physicians and medical students. The hospital identifies these groups nominally by a color (e.g., the ''Blue Team''). Typically, in hierarchical order, a group includes one attending physician (the supervising physician), one senior resident (in the second or third year of residency), two interns (in the first year of residency), and two to three medical students (in the third or fourth year). Ultimately, this group decides when a patient can be discharged (or, in rare instances, transferred to the intensive care unit or a long-term care facility). Thus I consider this group to reflect the core team members, following research suggesting that core team members ''create the team strategy and make key decisions'' (Ancona, Bresman, and Kaeufer, 2002: 36). These core members work together for one week, after which the group is reconstituted for the next week. I take the perspective of the core team and consider a single week as the team's lifespan.

During a single week, patient care also involves an ever-changing array of other people—nurses, patients and their families, sub-specialties (e.g., neurology, infectious disease, endocrinology), and other multidisciplinary members (e.g., care coordinators, social workers). I treat these individuals as more peripheral; they interact with the core team members more temporarily during the week to provide specialized expertise. Thus the work of patient care involves core physicians and a shifting set of periphery members. Two features make these teams an ideal setting to study dynamic teams. First, core teams in this setting are highly temporary in that the physician groups are reconstituted each week. Second, each team's periphery is in constant flux.

As noted, much of the team's work occurs during morning rounds. Typically, a round involves the core physician group reviewing a patient's history and pertinent information about the patient's condition, making an assessment (including a diagnosis or set of potential diagnoses), and developing a care plan (treatment course, lab or imaging tests needed to collect additional information, discharge plan, etc.). Of note, the core groups in this setting are instructed to conduct ''family-centered rounds,'' which are conducted at the patient's bedside (rather than behind closed doors), with peripheral roles (nurse, patient, patient's family, and potentially other peripheral roles) present and involved in sharing information and making plans. Yet while this is the prescribed rounding model, it is neither mandatory nor monitored. As the example in Figure 1 illustrates, the core team of physicians (i.e., the ''Blue Team'') might manage its boundary such that when they start morning rounds at Time 1, the boundary

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[1] Much of this work has highlighted the outsize impact that features of formal and informal core roles (e.g., their attributes and their turnover) can have on a team's coordination and team outcomes (Humphrey, Morgeson, and Mannor, 2009; Summers, Humphrey, and Ferris, 2012; Stuart 2017). Additionally, these studies have echoed other research that documents the value of external activities by suggesting that integrating more noncore contributors (individuals other than the core set of team members, such as customers or consultants) is associated with better performance in project teams (Cummings and Pletcher, 2011).

Figure 1. Example of Shifting Boundaries Over Time
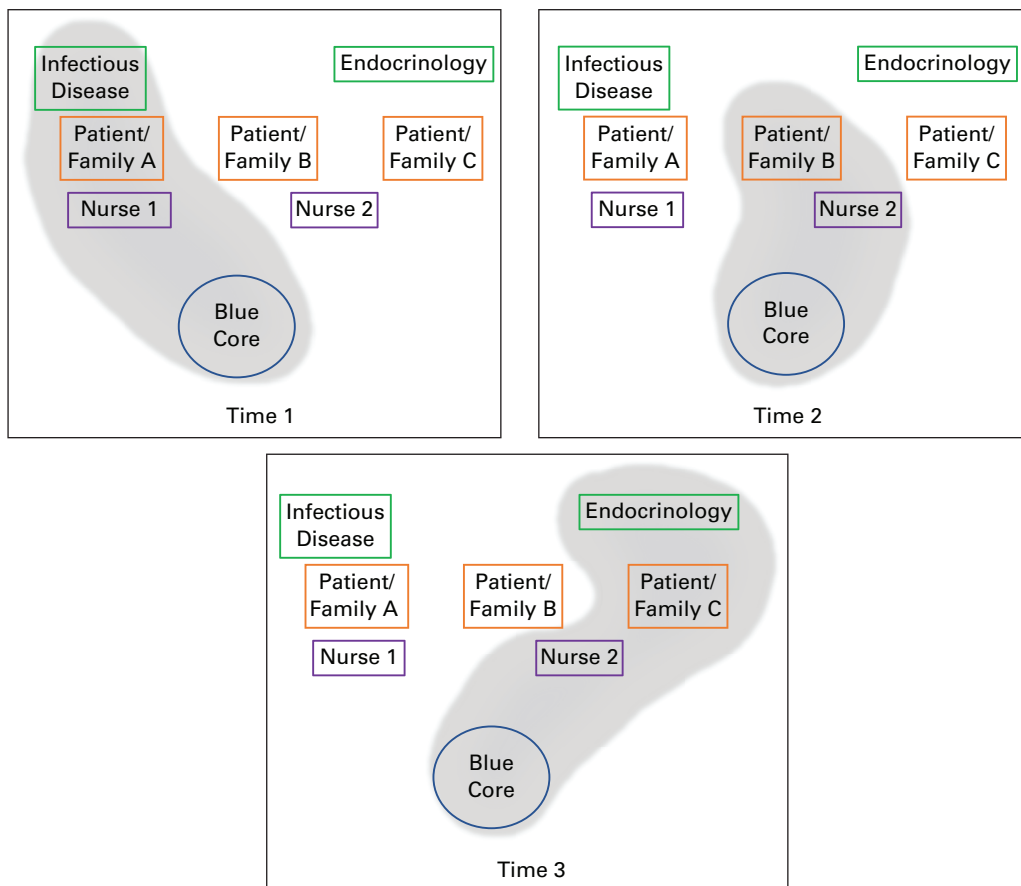
around the work expands to include periphery members as the core engages a nurse, the patient and family members, and an infectious disease subspecialist in discussion. At Time 2, the boundary shifts as the core goes to the next patient and attends to and interacts with that new patient as well as a different nurse, and so on as the core team continues morning rounds. Thus in some cases, the core team works with a constantly shifting set of periphery members, revealing an amoeba-like shifting of the team's boundary, as the gray areas across time in Figure 1 depict; in other cases, periphery members may not be present or involved in rounds, reflecting different external team-work in which the core has not integrated periphery members at all.

To study these teams, I focused on the core team members, particularly during morning rounds. This allowed me to study the interactions among core team members while also capturing how the core team engaged in teamwork with more-peripheral members.

METHODS

Scholars' current incipient understanding of this topic calls for inductive, grounded theory building (Edmondson and McManus, 2007; Mathieu et al.,

2017). This study used multiple methods (observations and interviews) and multiple sources (all levels in the physician hierarchy and nurses). This allowed for triangulation and stronger substantiation of the emergent themes and grounded theory.

Sample and Data Collection

   Phase 1 data collection: Observations and interviews.   Over the course of 24 weeks, I observed 24 general pediatric inpatient teams (one team per week), with a focus on the core team members. I observed each team for its complete lifespan: Monday to Friday. I observed teams for three to five hours per day: each day from 9 a.m. to 12 p.m. (this included morning rounds) and one to two days of the week for roughly two hours in the afternoon. In total, I spent an average of 18 hours with each team during the week in which the team was intact, and a total of over 430 hours observing inpatient teams. During morning rounds, I followed the core team members as they moved throughout the hospital. When a single physician group member broke off from the rest of the group, I stayed with the larger subgroup. When a physician group split up more evenly, I chose to follow one of the subgroups based on the situation. For example, if only a subgroup entered a patient room for a round, I typically did not enter the room because the rationale for the team sending in fewer members could have been to avoid overwhelming the patient and family with a large group. For observations conducted after morning rounds had concluded, I typically stayed in the core group's dedicated work space within the hospital, which is where they executed much of their work after rounds.
   While observing, I took notes in situ, except that I did not take notes in patients' rooms, instead recording what had transpired as soon as I exited those rooms. This was due to the fact that unlike the physicians and nurses, the patients and families were not accustomed to such observation. Physicians and nurses seemed to be unaffected by or adjust quickly to my note taking. My organizational partners explained that this behavior occurred most likely because in this environment, the care providers are often evaluated and observed (e.g., by physicians from other hospitals). After a day's observations, I wrote memos reflecting on and summarizing the observations. Instead of using participants' names in the notes or memos, I used unique identifiers. Individuals are denoted by their role, team number, and, when more than one person was in a role, a random letter (e.g., Intern 1A was on the same team as Intern 1B but was a different person).
   I also conducted a total of 87 semistructured interviews (Kvale, 1996; Patton, 2006). Given my goal of gaining multiple perspectives, interviewees represent all levels of the physician hierarchy: 16 attending physicians, 13 senior residents, 22 interns, and 22 medical students (average per team: 3 core team members; generally 5–15 minutes). I also interviewed 14 nurses (generally 5–15 minutes). Physicians were interviewed based on availability and willingness to participate. Nurses were interviewed based on their assignment to care for patients admitted to the general pediatric inpatient service (i.e., these nurses shared patients with the physicians who were the focus of my observations) and their willingness to participate.

Physician interviews covered topics including roles, learning, teaching, interactions within the physician group, interactions with others (e.g., nurses, sub-specialists, patient families), management of the work, and what is similar and different week to week. Nurse interviews covered topics focused on their roles and tasks as well as interactions with the physicians.

Interviews were audio recorded and transcribed when the interviewee allowed it and when the interview space ensured that HIPAA-protected information would not be captured (i.e., in a private space and not in or near hallways in which conversations with and about patients might be captured). When it was not possible to audio-record the interviews, I took notes during the interview to document interviewees' verbatim comments as closely as possible.

Phase 2 data collection: Observations. After a short break and review of the data and emerging themes, the goal of phase two was to collect additional data that would help me to refine the emerging constructs and theory. I conducted additional observations of 16 teams on Mondays from 9 a.m. to 12 p.m. In total, this amounted to an additional 48 hours of observation. As in phase 1, I recorded observational notes in situ, except not inside patient rooms. After a day's observations, I wrote memos reflecting on and summarizing the observations.

At the conclusion of phase 2, observations yielded little to no new information or insights. At this point, I concluded I had reached ''theoretical saturation'' (Corbin and Strauss, 2008), halted data collection, and shifted to focus on data analysis and theory development.

Data Analysis and Theory Development

Following the inductive approach of building grounded theory (Eisenhardt, 1989; Corbin and Strauss, 2008), I overlapped data collection with data analysis. While the data collection was ongoing, in addition to writing memos after each period of observation, I compared data from within and across teams. My goal was to understand how teamwork unfolded, and I focused on how team members interacted. I began with open coding and comparison within and across teams. I created tables to compare teams in terms of the emerging categories (e.g., Monday discussion of physician tasks; Monday discussion of multidisciplinary members; physicians helping each other; physicians asking other roles for input; location of patient care discussion; cohesion; learning; confusion; working through lunch; use of technology). As I iteratively coded the data and compared it within and across teams, I refined the categories, dropped those that did not reveal clear differences within or across teams, and began to group related categories into second-order themes and constructs. By the end of the first phase of data collection, this process yielded a set of tentative constructs and an outline of the relationships among them. During the second phase of data collection, I continued to compare data within and across teams, to refine the emerging constructs and theory. I dropped additional categories and refined existing category definitions.

After the conclusion of phase 2, I went back to the data to pay greater attention to the actions of team members (e.g., coding using gerunds, Charmaz,

Figure 2. Coding Refinement
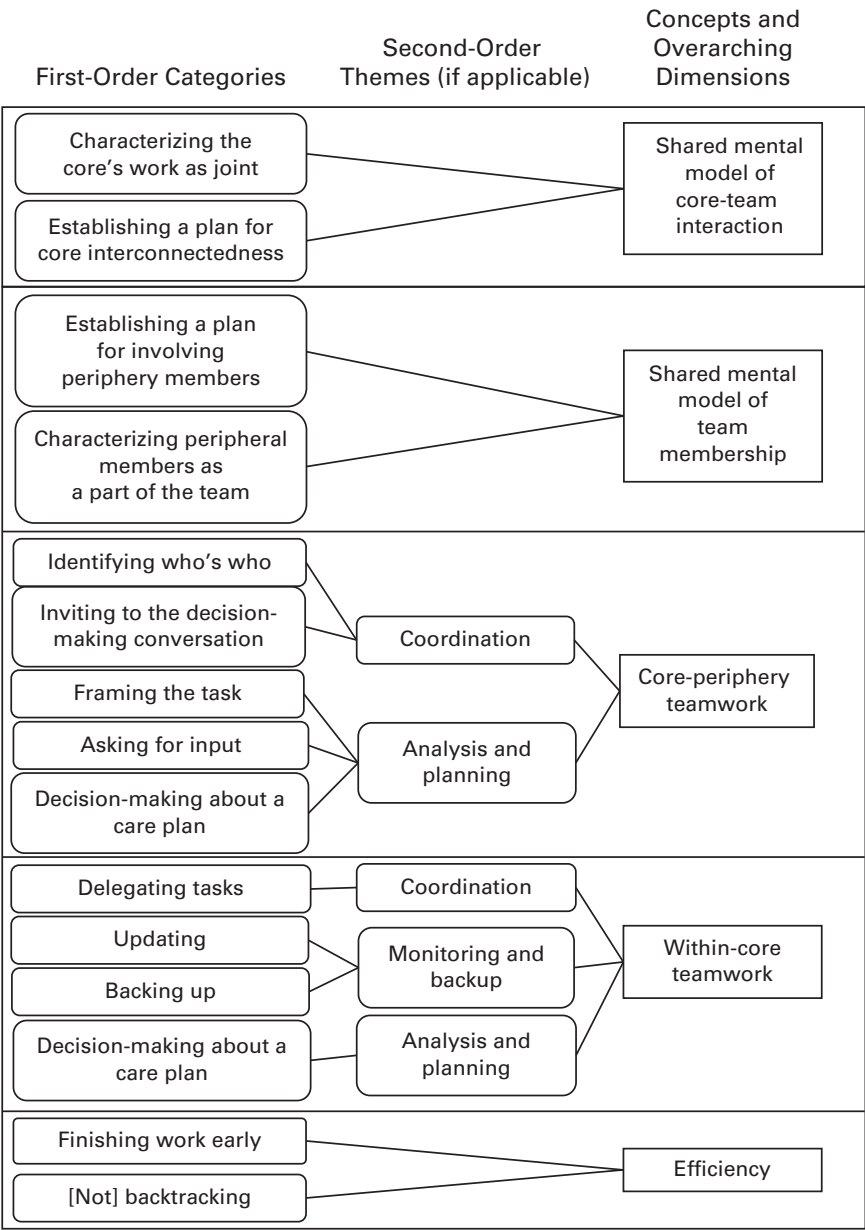
This led to further refinement of codes and categories; see Figure 2 for an overview of the final refinement from categories to constructs and overarching dimensions. I then focused on two narrow teamwork behaviors that emerged to indicate the broader within-core or core–periphery teamwork. First, my analysis of the team's behaviors revealed that core teams exhibiting more-internal teamwork (i.e., more emergent interdependence within the core

team) also tended to huddle at the conclusion of morning rounds to coordinate their work by ''running the list'' (discussing each patient, sharing updates, and monitoring and delegating remaining tasks). Second, I found that core teams engaging in more-external teamwork (i.e., more emergent interdependence with the periphery) tended to coordinate with nurses to invite them to morning rounds. For all teams, I created counts of the extent to which teams engaged in these two specific behaviors (i.e., the percent of patients for which the core team invited each patient's nurse to the round, and in how many days of the week the core team ran the list), to use as an initial signal of the teams' internal and external teamwork. With this categorization as a start, I then reviewed all teams' data holistically, considering all teamwork behaviors and categorizing teams based on whether they did in fact engage in more-internal and -external teamwork. In doing so, I also mapped teamwork behaviors for each day (in each team) over time, and I noted who engaged in which behaviors. This temporal view of the behavior pattern underlies the process model I developed to understand how some teams had achieved high levels of both internal and external teamwork.

Throughout data analysis, I took multiple steps to ensure the validity of the emerging theory. First, when analysis of a case did not fit the emerging theory, I either accounted for the conflict or revised the theory; this ensured stronger internal validity (Eisenhardt, 1989; Yin, 1994). For example, I initially categorized seven teams from the first phase of data collection (of 24 teams total) as having invited more nurses than average to round with the team and having run the list more days than average. As noted, however, I reviewed all teams' data more holistically to ensure that these crude indicators reflected a broader pattern of teamwork. In one case, a team that was high on both indicators (i.e., invited nurses to more rounds than average and ran the list more often than average) had also frequently added a period of core-only decision-making conversation before each patient round. The decisions in these conversations (lasting as long as 17 minutes) were rehashed in patients' rooms, and the periphery was not included in the analysis of the case and development of the care plan. This led me to recategorize this team as not having achieved emergent interdependence with the periphery. Ultimately, my analysis pointed to six teams (of 24) whose internal and external teamwork patterns suggested that these teams had emergent internal and external interdependence. Examining team behaviors over time also shed light on the importance of teams engaging in synchronous internal and external teamwork as they analyzed and developed a care plan for a patient; thus this view helped to refine and develop the emerging theory. Overall I conducted a cross-comparison of these six emergently interdependent teams and the remaining 18 from the first phase of data collection, to work backward and unpack the process of how some teams achieved emergent interdependence.

Through my analysis of team processes, I also found that core teams exhibited some differences in their initial meetings. Here, following past research suggesting the importance of team launches, I analyzed the conversations in core-team initial meetings (i.e., meetings only among core team members at the start of the week). I also followed a recent acknowledgment of the potential value of using observational data to explore team emergent states such as team cognition (Rapp et al., 2021); specifically, I treated

the communication among individual core members during this initial conversation as indicating the emerging team cognition (Suchman, 1987; Hutchins, 1995; Metiu and Rothbard, 2013). Moreover, following the tradition of viewing groups as information processors (Hinsz, Tinsdale, and Vollrath, 1997; Thompson and Fine, 1999), I found that the data suggested two shared mental models that could emerge. In phase 2 of data collection, there were an additional 16 core teams that I observed on Mondays only. These teams' data, in addition to data from the first phase (total observations of Monday morning meetings are 37, due to missing observations of three teams' original gatherings), particularly helped to refine my understanding of team launches and emergent team cognition. I also triangulated this analysis using interviews in which individuals described their understandings of their work.

Lastly, during and after the second phase of data collection—as my focus shifted predominantly to data analysis—I referred to varied sets of literature, including research on team launches, team cognition, turnover and membership change, fluid teams, healthcare teams, multiple team membership, temporary teams, social network analysis, and team external behaviors and boundary spanning. This allowed me to make sense of how the constructs and theory fit (and did not fit) with existing literature in order to refine the key constructs and sharpen the emerging theory (Eisenhardt, 1989). For example, I found that using the team processes identified by Marks, Mathieu, and Zaccaro (2001) to organize first-order themes was helpful for making sense of the work patterns over time. This engagement with the literature thus allowed me to leverage existing constructs and to grasp boundary conditions. The iterative process of data collection, coding, within- and cross-case analysis, development of constructs, and comparison to extant literature led to the development of a process model of how dynamic teams can achieve emergent interdependence, discussed below.

SYNCHRONOUS INTERNAL AND EXTERNAL TEAMWORK TO ENABLE EMERGENT INTERDEPENDENCE

The findings reported here draw primarily from the 24 teams studied in the more robust first phase of data collection. Six of those core teams exhibited more teamwork behaviors, both within the core (internally) and between the core and periphery (externally)—they were more emergently interdependent. Cross-comparisons of these six core teams with the remaining 18 reveal that the former engaged in brief periods of synchronous internal and external teamwork, allowing the core team's boundary to expand to temporarily include periphery members as internal and external teamwork came to reinforce each other. This was possible because core team members divided their focus on either the periphery or the core during the synchronous periods, and because the synchronous periods were wedged between and intertwined with cycles of separate external and internal coordination periods.

In what follows, I first report on the observed distinction, in all core teams, between core and periphery team members, along with the ambiguity of structural task interdependence in the core teams both internally and externally. I then turn to the emergent process of how six of the 24 teams came to exhibit emergent interdependence; I contrast this with the remaining 18 teams that were better characterized as isolated (independent from the periphery) or

underdeveloped (independent work within the core team). Finally, I examine the implications of developing emergent interdependence (with respect to efficiency) and its enablers.

Core vs. Periphery

Observations and interviews revealed an apparent boundary around the core physician group. First, a known professional boundary, in this case, distinguished the core group from other multidisciplinary members. Additionally, in terms of a networks lens, there was a relative consistency of core members interacting together, contrasted with the set of relevant periphery members that constantly shifted, thus creating a sort of temporal boundary around the core. Given that professional differences aligned with the temporal ones (in terms of time spent working together during the week), the delineation between core and periphery members was perhaps clear (aligned with faultlines theory, Lau and Murnighan, 1998).

Second, and critically, core team members regularly evoked the color used to formally identify the core group as distinct from that of other care providers. As one intern explained in an interview, ''there's the Red Team then there are nurses, etc.'' (Intern 1M). This was true, too, of periphery members when referring to physicians with whom they shared a patient. For example, in interviews, nurses spoke of sharing a patient with specific color teams, and a pharmacist said things to me like, ''the Blue Team is good this week.'' In these instances, the periphery members referred to a specific physician group that had been staffed that week as a distinct entity from themselves. Even in the core teams that, as described below, came to work more interdependently with peripheral members, arguably blurring the boundary from an outsider's point of view, the consistent use of color-team identifiers suggested at least a clear subgroup that members perceived as distinct from other multidisciplinary roles.

Ambiguities in Structural Interdependence

Within-core interdependence. Part of the challenge created by dynamic team membership is that members work together only temporarily; they often lack familiarity and must learn (quickly) how to work together. To that end, while the core team members worked in specific positions (attending physician, senior resident, intern, or medical student) that offered those individuals some sense of their role on the team, these roles were fuzzy. As one intern stated, there were ''grey areas'' (Intern15M) because people in multiple, if not all, positions within the physician group could do many tasks that fall to the physician group. A medical student on Team 1 described who would coordinate with a specialist consulting on a case: ''it depends on who has time. If an intern's really busy, I can consult, or if I'm really busy one of the interns can consult. Or if both of us are really busy, the senior can help out in doing that.'' In short, any of those core positions *could* do the task. The intern acknowledging grey areas also elaborated: ''Every attending and senior [resident] are different. . . . There are things either of us could do, like on another team, the senior did departs'' (Intern 15M). As this comment suggests, individuals worked across various groups over time (i.e., core members worked on different teams

from week to week); as they worked with various individuals over time, they experienced different expectations and were challenged to learn and establish different divisions of the work. To this end, one senior resident acknowledged in an interview, ''Sometimes I'll adapt my role. It's adaptable every week'' (Senior Resident 15). Thus as scholars have demonstrated in other contexts (Ginnett, 2019), there was ambiguity regarding which tasks to do, creating the potential for confusion about who should do what and how to work together in these newly reconstituted teams. The ambiguity in roles underscores the general ambiguity of task interdependence—the extent to which the work required individuals to interact and work collectively to achieve the tasks at hand (Wageman, 1995; Wageman and Gordon, 2005). That is, while many tasks could be divided and executed independently, core team members *could* come to work more collectively.

Core–periphery interdependence. Dynamic teams often reflect a shifting set of peripheral contributors such that core team members must come to understand with whom to work outside of the core team. In this study's context, a shifting set of patients' families and multidisciplinary health care team members floated in and out of the work with physicians, based on the evolution of the task. As one team member (Intern 18A) described, the team's shape is ''changing all the time, like gelatin on a subwoofer, going all over.'' On another team, an intern (Intern 13E) explained that there is an ''endless permutation of people that could be involved.'' This fluctuation can create confusion about with whom to work (Mortensen and Hinds, 2002; Mortensen and Haas, 2018).

As core groups of physicians did their work, there were some structural reasons for interacting with periphery members (e.g., nurses were administratively required for part of the patient discharge process). Core groups were also encouraged to conduct ''family-centered rounds'' wherein periphery members relevant to a patient case (primarily nurses, patients, patients' families, and potentially others including specialists, care coordinators, etc.) were present for the patient round and decision making about the patient's care. Still, this was not enforced, and there was ambiguity regarding whom to involve, when, and how. For example, teams might debate whether a specialist or care coordinator was even needed for a case, and as scholars have shown elsewhere (Kim, 2020), the teams had discretion in the answer. Thus the structural task interdependence between the core and periphery was ambiguous, and I observed variability in the extent to which core teams in fact engaged in teamwork with the periphery, exhibiting what Langley and colleagues (2019: 707) referred to as '''collaborative boundary work' (or work at boundaries).''

Syncing Up for Emergent Interdependence

Although all teams faced ambiguities in structural interdependence, all core teams exhibited some teamwork behaviors both internally and externally; see Table 1 for sample evidence of such teamwork behaviors. Yet teams varied in the frequency with which they engaged in these behaviors. Six of the 24 core teams engaged in more teamwork, working together both internally and externally and thus exhibiting more emergent interdependence. In contrast, the

Table 1. Representative Data Illustrating Study Concepts

Concept	Illustrative Data
Teamwork within the Core	
Coordination	Delegating tasks T11: Senior Resident 11, to Medical Student 11C: ''Okay, I'll work on that with you because [Intern 11F] is so busy.''
Monitoring and backup	Backing up T3: During morning rounds with a patient: At one point a family member asked a question and Senior Resident 3 began to answer then received a phone call while he was talking to the family member; Attending Physician 3 stepped towards Senior Resident 3 to take his phone. Attending Physician 3 answered for him. Updating Intern 23M to physician group: ''I talked to Care Coordination about [patient] . . .''
Analysis and planning	Decision making about a care plan Attending Physician 2, describing a decision made collectively during a patient round: ''I mean if you think about that conversation and—'cause I can't right now think who brought it up first and that's how seamless that conversation was between me and [patient] and [medical student]. And [Intern MM], [Intern MM] was in on that, too.''
Teamwork with the Periphery	
Coordination	Identifying who's who T9: The physician group happened to see the surgical group with whom they shared a patient while in a hospital hallway. Senior Resident 9 introduced herself to the surgical attending physician and explained that they share [patient]. Inviting to the decision-making conversation T22: The physician group arrived at a patient room; the patient's family was not present. Intern 22A called the parent to discuss the plan for the patient with the family member.
Analysis and planning	Framing the task T23: Intern 22K asked a patient family member if they were familiar with patient rounds then said that the idea is to ''try to make sure the family is involved and come up with a plan.'' Asking for input T4: Intern 4P, to nurse: ''has he been draining much fluid?'' Decision making about a care plan T2: After rounding on a patient in the patient's room with the surgeons, the nurse, and the patient family present: Attending physician: ''perfect world . . . we agreed together. They had knowledge we didn't have, and we could ask them in front of the family.''
(Core) Team Cognition	
Shared mental model of core-team interaction	Characterizing the core's work as joint Senior 16, comment to researcher: ''Because we have so many patients, communication is key—who's calling who, and reporting back.'' Establishing a plan for core interconnectedness T15: The senior resident said that while she normally would delegate the interns to put in orders for one another, today she would help with that and help with other work, and she asked the attending to at times take the lead in the patient rooms because she would be busy entering the patient orders.

Table 1. (continued)

Concept	Illustrative Data
Shared mental model of team membership	Characterizing peripheral members as a part of the team Senior Resident 2, in interview: "It's really nice to have nurses on rounds . . . they're just as important of a team member." Establishing a plan for involving periphery members T22: The attending said, "I'm a big fan of doing everything inside the room" and that the team should use "lay language so [the family] can understand." The attending also asked the team to "try to get nurses in on every round" and to update the white boards in the patient rooms with the care plan.

remaining 18 teams tended to favor internal or external teamwork or to exhibit both less frequently. To better understand how core teams could develop inter-dependent work patterns, I now focus on the pattern by which team interactions unfolded in the six emergently interdependent teams. In the subsequent section, I draw from the remaining 18 teams to contrast the process of emergent interdependence with patterns in teams that were more isolated (working independently from the periphery) or underdeveloped (independent work within the core).

Syncing up. The six emergently interdependent teams were distinct in that throughout each morning as they rounded on each patient, they consistently engaged in periods of simultaneous core and core–periphery teamwork. During these brief periods, the boundary around the work expanded to incorporate both the core and the periphery. Specifically, the team boundary expanded as the relevant periphery members (e.g., nurse, specialist, and patient or their family members) were integrated into the work of analyzing and planning care for a case. In doing so, core members framed the task at hand, such as explaining to families what the process of rounds would entail. In team 15, Medical Student 15F explained to the patient's family as the physicians entered the patient's room that they were "gonna talk about [patient] then a plan." Additionally, core team members asked for specific input. For example, during a patient round in Team 4, Intern 4P asked the patient's nurse whether the patient (who had a chest tube for draining fluid from his lungs) had been draining much fluid. More-general questioning to draw periphery members into the decision making was also a common tactic among the six emergently inter-dependent core teams. Core team members might look at a nurse and ask, "Any changes this morning?" (Intern 4P), or look at a patient or family and ask, "Any other questions?" (Intern 23M). Specific and general questioning helped to solicit participation from periphery members. Moreover, asking for input was coupled with joint decision making. In some cases, I described this joint decision making in my field notes as a "back and forth" conversation involving core and periphery members, a pattern that is evident in the following field-note excerpts:

Team 11 (during a patient round): Into the room, with the nurse. Medical Student 11SH presented; the nurse added information about the monitor, then the attending

physician interjected. Intern 11M also asked about the recent episode and the patient's parents answered, then the attending started to talk again.

Team 4 (as a patient round was beginning): Attending Physician 4 said, ''Oh, here's our surgeons'' as the patient's surgeon and surgical nurse walked up to the room. They collectively discussed the patient and possible actions such as trying to swap out the current chest tube with a bigger tube.

During these collective decision-making episodes, periphery members contributed knowledge that moved the conversation forward, as exemplified in an excerpt from notes on Team 23:

The nurse said, ''Oh, I did see the cultures come back.'' Intern 23M: ''Oh, they did?'' The intern opened a chart on the computer, and they looked, all gathered around the computer. They talked about what antibiotic to send the patient home on.

Attending Physician 2 acknowledged the benefit of these in-person, real-time interactions for using periphery knowledge, after Team 2 rounded on a patient in the patient's room with the surgeons, the nurse, and the patient's family present. This physician said it had been the ''perfect world. . . . We agreed together. [The surgeons] had knowledge we didn't have, and we could ask them in front of the family.'' These teams integrated the periphery members into the work of analyzing patient cases and developing care plans.

This teamwork with the periphery expanded the team's boundary, and critically, this occurred *simultaneously* with continued teamwork within the core team—in this way the core team continued to look like a team with a boundary that could expand. Most notable, the core members supported one another with backup behaviors as the periphery was engaged. For example, core members frequently used mobile computers to input notes and orders for the patient on whom the core team was rounding. In Team 15, in one patient room the senior resident stated that they needed an order for Levsin for the patient and asked Intern 15F, ''Can you do it?'' Intern 15F was at a mobile computer and replied, ''Okay, I can do it'' and input the order. Similarly, core support members wrote the care plan on the whiteboard hanging in the patient's room, as a record to which periphery members could later refer. For example, during a patient round in Team 4, Intern 4P presented the patient's information during the round (engaging in analysis and planning with the periphery) while Intern 4FM wrote on the whiteboard. Additionally, when a core member was paged or called, teammates would step in to respond if the person being contacted was busy (e.g., amid talking with a periphery member). For example, in Team 15, during a patient round Intern 15FM was engaged in a conversation with other core members and the patient, patient's family, and nurse; Intern 15FM was paged, and then Intern 15FS took the pager and left the room to respond.

As the internal and external teamwork unfolded in tandem, they notably did not compete for resources. Rather than the core team's internal work coming at the expense of external work, the core backup behaviors facilitated boundary work; as Intern 18T explained, having someone else step in to place patient orders allowed her to ''focus on communication with the families and nurses.'' Likewise, analysis and planning with the periphery members did not come at the expense of internal work. Rather, this engagement of the periphery created

opportunities for backup behaviors that set the stage for further teamwork within the core (discussed further below). In essence, these core teams had expanded the shell around the team to include periphery members, and the internal and external teamwork necessary to do so supported each other.

These synchronous periods were possible because core team members iteratively distributed their focus such that some interfaced with the periphery while others monitored the team and its work and provided backup, and because these synchronous periods were wedged between cycles of separate external and internal coordination periods, effectively holding those separate periods together.
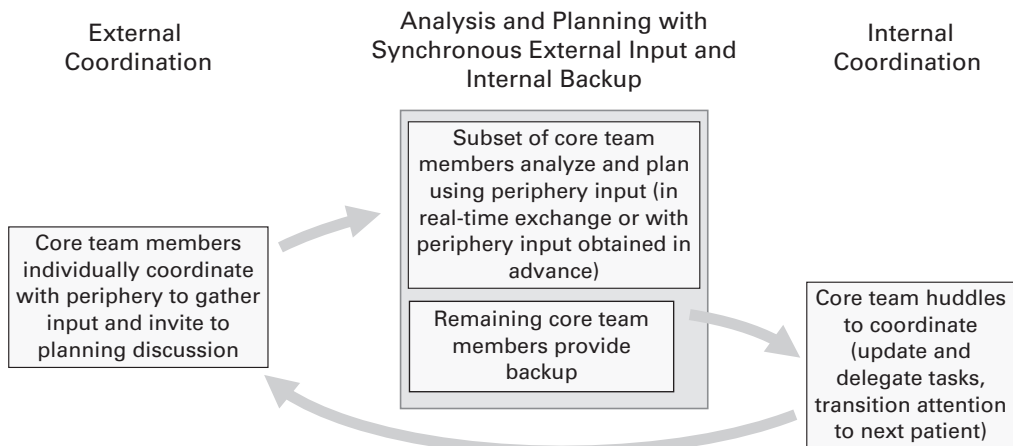
Synchrony via a dynamic division of labor. One key to a core team's ability to work as a team both internally and externally was that some core members interfaced with periphery members during the synchronous periods, while others simultaneously served as within-core backup. This distribution of focus shifted across synchronous periods such that core members who focused outward in one synchronous period might focus inward in the next, or vice versa. These shifts in focus were coordinated in that the core members who engaged in the above-described external teamwork typically had a formal tie to the patient at hand (e.g., interns and medical students who were assigned as primary providers). The remaining subset of core team members who were not interacting directly with the periphery instead focused on supporting the core team members who were doing so. This support typically included the medical student and intern who were *not* assigned as the patient's primary caregivers, and it potentially included the senior resident and the attending physician, who was in an oversight role. In this way, the core teams capitalized on limited task assignments to engage in a pattern of shifting attention over time, which allowed for the core team as a unit to simultaneously, if briefly, focus internally and externally.

Synchrony as intertwined with cycles of internal–external coordination. Before a core team began discussing a given patient (conducting the patient's round) and, thus, before they could potentially engage in simultaneous core and periphery teamwork, the six emergently interdependent core teams tended to coordinate with periphery members to invite them to the patient round. Most often this coordination included nurses, but it could also involve others such as a social worker, a specialist, or the patient's family. This began first during the time before morning rounds each day (one to two hours depending on shift start). During this time, the medical students and interns typically divided patients, and each person focused only on the patients they had been assigned to cover individually. Thus this work was typically dyadic, between a core member and periphery members. As 9 a.m.—the scheduled start of morning rounds—neared, as well as before each patient round, core group members took steps to ensure that the information from the periphery members would be available during the patient round. For example, in Team 15, the physicians realized that they did not understand an electronic note from a radiologist. The team walked to a different floor in the hospital to find the radiologist in person. This step to coordinate an in-person conversation allowed the core team to discuss with the radiologist the patient case and the implications of the imaging about which the radiologist had written the note.

With this information, they then walked back to the patient's room and continued to develop the patient's care plan with other periphery members. Teams also invited specialists and other periphery members to join a patient round; e.g., for a patient round in Team 23, physicians coordinated with other roles in advance so they could enter the patient's room with a geneticist, the patient's nurse, a nutritionist, and a care coordinator. In Team 2, ahead of one patient round, the senior resident called the nurse, who happened to be at a desk near them; two nurses then got up and joined the physicians standing by the patient's door. Similarly, teams ensured that patients' family members were present for morning rounds, even calling them to participate by phone if they could not be in the hospital. Overall, these teams coordinated with relevant periphery members, which enabled real-time conversations with the periphery (or at minimum using updated input from the periphery) during patient rounds—a key component of the synchronous periods described above.

Synchronous periods were also followed by the team boundary's retraction back to the core. As core team members exited patients' rooms, these members' focus and activities shifted inward. Core team members began to update one another based on the backup behaviors that had occurred, engaging in what Intern 18T referred to as "read-backs." For example, if orders that had been decided during the patient round were entered into the electronic system, the person who had entered those orders might report having done so, so that the core team could determine which tasks remained and then coordinate regarding who would do them. (In Team 4, after a patient round, Intern 4P said, "Quickly recapping, I put in . . ." and described patient notes she put into the electronic health system while they had been rounding.) Similarly, if one person had answered someone else's phone, they might report back the outcome of that phone call and discuss next steps. Core team members might also provide other, general updates and jointly work out any problems. For example, in Team 2 a new patient was admitted, creating a challenge to adapt and find a way to see this patient during morning rounds, as one person from the team would need to see the patient before the full team collectively rounded on the patient. The core members discussed this and developed a plan for sequencing their remaining patient rounds: Intern 2D would temporarily split from the other core members to see that new admission, and then the core could reconvene and round on the new patient together. Thus backup behavior during engagement with the periphery prompted a need for updating, setting the stage for coordination.

A process model of emergent interdependence. As an entire process, then, the synchronous periods held together separate periods of external and internal coordination. That is, the synchronous phase's periphery integration was possible because of prior coordination with the periphery, while the synchronous phase's within-core backup set the stage for subsequent within-core coordination. As the core completed that within-core coordination, they could then transition their attention to the next patient and to coordination with the relevant periphery members, and so on. Moreover, the division of attention during the synchronous phase meant that external and internal work became reinforcing: an external focus could create a need for internal backup, while attention internally could allow for greater external focus. This pattern of work was best characterized as involving synchronous periods that, critically,

Figure 3. Process Model of Emergent Interdependence in Dynamic Teams

External
Coordination

Analysis and Planning with
Synchronous External Input and
Internal Backup

Internal
Coordination

Core team members
individually coordinate
with periphery to gather
input and invite to
planning discussion

Subset of core team
members analyze and plan
using periphery input (in
real-time exchange or with
periphery input obtained in
advance)

Remaining core team
members provide
backup

Core team huddles
to coordinate
(update and
delegate tasks,
transition attention
to next patient)

facilitated more teamwork both internally and externally, or more emergent interdependence. This pattern is depicted in the stylized process model shown in Figure 3, and see also Figure 4A for an excerpt of core team data fitting this pattern.

Isolated and Underdeveloped Teams

In contrast to the process of emergent interdependence described above, many teams failed to engage in a synchronous period of internal and external teamwork and failed to work interdependently with the periphery or within the core team.

Isolated teams: Lack of interdependent work with the periphery. Some teams were best characterized by an inward focus and isolation. This manifested in multiple ways: a failure to coordinate with the periphery, the addition of core-only decision-making periods, and/or the outright exclusion of the periphery. These missteps converged in a failure to engage in analysis and planning with the periphery during patient rounds. Figure 4B shows an excerpt of team data fitting this pattern.

When teams failed to coordinate with the periphery prior to patient rounds, it hampered their ability to engage in analysis and planning with the periphery (i.e., they failed to engage in synchronous internal *and* external work). For example, in some core teams, I did not observe any attempt to invite periphery members to patient rounds. In these cases, nurses were present for a patient round only if they by chance observed the physicians entering the patient's room and joined them. For example, the Team 14 core gathered in a patient's room (day 4, patient 9), and the nurse walked over. In a brief interview right after the patient round, the nurse explained that there was ''no call'' to invite him to the patient round, but he ''just saw them [the physicians]'' and walked over. In other instances, the core teams failed to initially coordinate with specialists, such as when Team 20 (day 1, patient 6) could not finalize a patient

Figure 4. Representative Data Illustrating Different Teamwork Patterns over Time
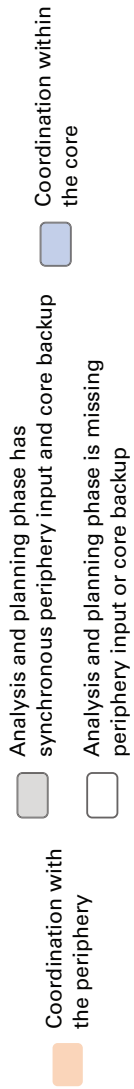
A: Emergent Interdependence—Internal and External Teamwork (Team 18, excerpt from day 2)
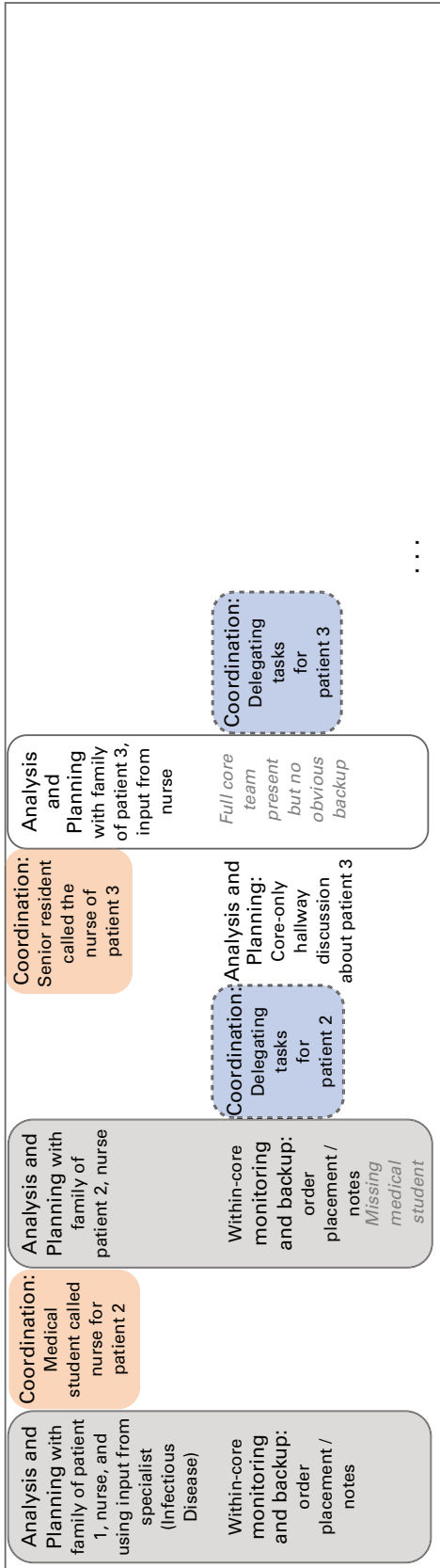
Figure 4. (continued)

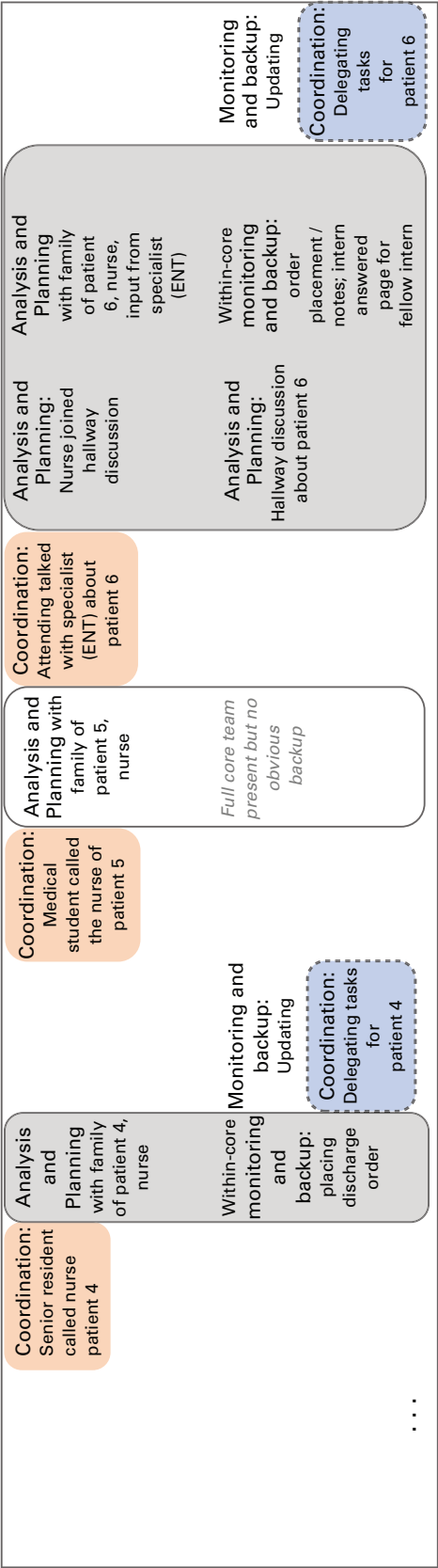A: Emergent Interdependence–Internal and External Teamwork (Team 18, excerpt from day 2)

Figure 4. (continued)

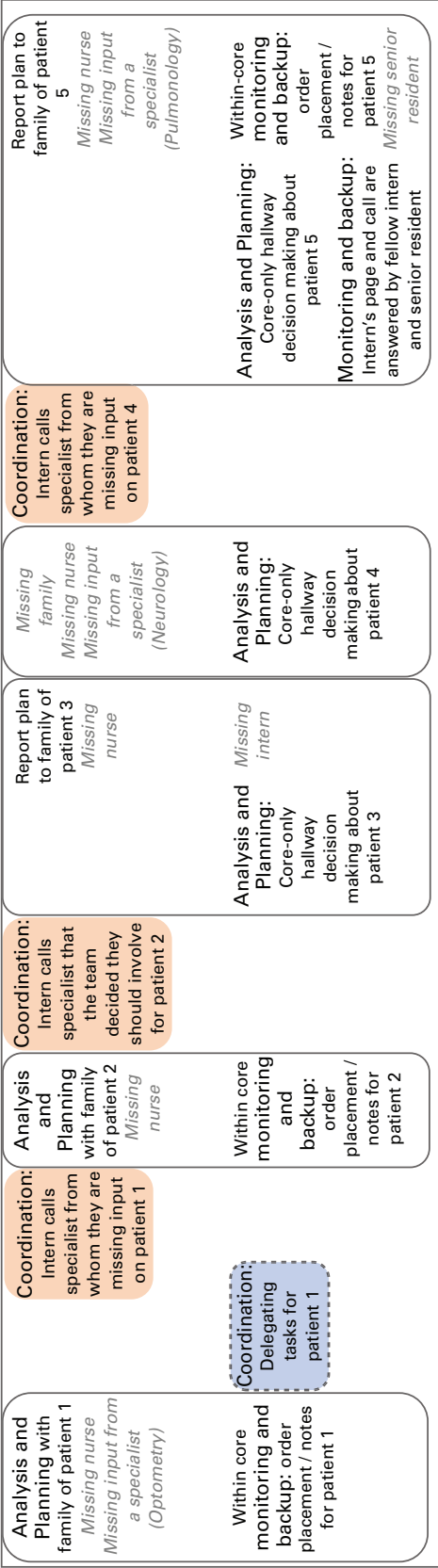*B: Lack of External Teamwork (Team 10, excerpt from day 2)*

Figure 4. (continued)

C: Lack of Internal Teamwork (Team 12, excerpt from day 1)

Analysis and Planning with family of patient 1; mention of input from others involved (respiratory therapy, physical therapy, palliative care)

Missing half of core team; no backup

Analysis and Planning with family of patient 2

Missing nurse

Analysis and planning: In hallway, core remains split with intern on the phone; attending repeats the plan for the prior patient and the senior resident confirms

Missing half of core team; no backup; in hallway, two interns talk with a pharmacist about patient 1

Analysis and Planning with family of patient 3

Missing nurse

Missing one intern and the senior resident (on computers / phones) and medical students (left to look for nurse (who did not join)

Analysis and Planning: Core-only hallway discussion about monitoring oxygen levels (re: patient 4)

Planning with family of patient 4

Nurse asked to be updated later and left

Missing one intern (in hallway on the phone)

Analysis and Planning: In hallway, medical student and senior resident recap the plan; core opened x-ray on computer and continued to determine care plan for patient 4

Report plan to family of patient 5, mention of input from others involved (Neurology)

Analysis and Planning: Core-only hallway discussion about patient 5

Missing medical student who returned to patient 4's room; another medical student left to look for the nurse (who did not join)

care plan because they had not yet obtained relevant information from two specialists. For these patient rounds wherein the core team had failed to coordinate first with the periphery, they lacked the relevant people or information to be able to engage in a synchronous period of internal *and* external teamwork, as the periphery could not be integrated.

An inward focus also manifested in core members' expressed desire to be on the same page, which could delay potential engagement of the periphery. As the senior resident on Team 7 put it, they wanted to ensure the core group had a ''united front'' when talking with periphery members about the care plan. This action involved spending ample time discussing patients in what some called ''pre-rounds'' in a hospital hallway, without periphery members. For example, at one point, Team 1 was engaged in one of these core-only pre-rounds in a hallway outside of the relevant patient's room. The patient's nurse saw them and walked over, but the core was tightly huddled and did not acknowledge or open up the circle to make room for the nurse. These lengthy core-only conversations were often followed by the core team entering the patient's room and recapping much of that conversation: reviewing again the patient's history, restating the assessment, and reporting the plan that the core had determined in the hallway. Although the periphery was told of the plan, they were not involved in its development.

Finally, teams might simply exclude the periphery altogether. This was true even when periphery members were present, at which time they still might be ignored. In two instances, Team 1 was in a patient room with a specialist, but there was no conversation with the specialist. For other rounds, core teams did not talk with the family, used medicalese (language that patients and patient families might not have understood), or even failed to wake up a sleeping family member of a patient, as happened in Team 12:

> The patient's dad was asleep. The attending physician did an exam then talked with the other team members. . . . The dad woke up at this point. . . . Attending Physician 12, Senior Resident 12, and Intern 12SG began to talk amongst each other (not with the dad).

The emphasis on the core and exclusion of the periphery were often followed by an inability to finalize a plan, as noted above, or a need to backtrack. For example, in Team 21 the core group spent time talking through—on their own—a plan for discharging a patient at 4:30 p.m. Partway into that conversation, the senior resident walked away from the group and came back reporting that the nurse had updated information: the patient could go home now (9:30 a.m.). The initial time talking without the nurse had been wasted and created a need to redo the team's planning. Excluding the periphery outright during patient rounds could also lead to later interruptions. For example, when core teams exited a patient's room and subsequently realized that they lacked sufficient input from periphery members to make a care plan, one core member would typically then contact that periphery member, and this would inevitably lead to later distraction as the core team attempted to move on to discuss other patients.

Interruptions could also arise if a patient's family member, nurse, pharmacist, specialist, or other periphery member had a question about the care plan. For example, in another observation of Team 21, the core group was rounding

on their eighth patient one day when the sixth patient's nurse found them and interrupted to ask if it was okay for patient 6 to go elsewhere in the hospital for an electroencephalogram (EEG) test while unhooked from a monitor. The core team had not accounted for this conflict of orders (to both get an EEG and stay connected to a monitor) when they had discussed the patient earlier, notably without the nurse. Team 21 finished the round on patient 8, then went back to patient 6's room to re-round and update their plan. The failure to initially involve the nurse in this case led the team to redo their decision making.

The backtracking incited by the initial exclusion of periphery members could create a staccato pattern to the work, whereby core teams jumped around from patient to patient as periphery members continued to interrupt them. Team 10, which involved the fewest nurses during rounds of all study teams (32 percent) and generally excluded other periphery members (see Figure 4B for a snapshot), exhibited this staccato pattern (e.g., order of patient discussions on the team's second day together, by patient number: 8-1-2-3-4-8-5-8-6-8-5-6-7-4-8-9-10-8-10). The backtracking stemmed from a lack of periphery involvement in planning and analysis. For example, when the core team first discussed patient 5, they realized they lacked input from the pulmonologist. Later, the pulmonologist stopped the core team in a hallway, interrupting their workflow, and they together discussed a new plan for patient 5 (though, notably, other periphery members were not present, nor were they notified until later in the day). This was counter to what I observed in the six emergently interdependent teams, for which discussions about any given patient were more clustered in time such that those teams moved sequentially through their patients (i.e., the above string would instead be 1-2-3-4-5-6-7-8-9-10). The exclusion of the periphery thus risked the latter interjecting later with questions (in person or by paging/calling) such that the workflow was somewhat disjointed. In some teams, strings of interruptions fueled further emphasis on the core and exclusion of the periphery as the core team shifted into ''sit rounds''—not at the bedside and involving only the core members—in order to complete decision making before noon, when some team members were scheduled to attend educational sessions.

Finally, failing to involve the periphery in real time meant that the periphery did not know what plan had been made. If the core team ordered something (e.g., administration of a medication) that a nurse needed to execute, the action would wait until the nurse noticed the order in the computer system. As one nurse reflected, due to juggling multiple patients, it ''could be hours before I see a note on a computer,'' and that included ''STAT orders.'' In contrast, a nurse directly learning of an order as it was being decided would allow the nurse to execute the task more quickly. Overall, overemphasis on the core and exclusion of periphery members from analysis and planning were associated with backtracking and delays to patient care.

Underdeveloped teams: Lack of interdependent work within the core. Still other core teams were best characterized by an outward focus that inhibited the emergence of synchronous periods and within-core teamwork (see Figure 4C for an excerpt of team data fitting this pattern). This was most notable in core teams failing to engage in within-core backup behaviors while some core members interfaced with the periphery. At times, these core teams

expressed concern about working efficiently or not overwhelming a patient and patient's family, which were both thought to be achieved by dividing patients across core team members and then not bringing all of these members into a patient's room for a patient round. In these instances, a subset of core members would enter a patient's room to analyze a case and make a plan, while the others waited in the hallway. As a result, core members in the hallway could not possibly back up the other core members—pages and calls to core members in the patient's room went unanswered, and notes and orders were not completed until after rounds. During an instance like this in Team 8, I noted that Medical Student 8D, who had waited in the hallway, drifted away from the other core members who were also waiting. Field notes indicate that he was ''hopping/skipping and looked really bored and disengaged.'' Some core members used this time to find a computer and do some of their own work, though this could lead to their getting left behind when the rest of the core team exited the patient's room and moved on to the next patient. The group that had moved on would then realize they had lost someone, call them, and wait for the person to rejoin them. Critically, without backup behaviors, there was less need for updating, and the work generally evolved in a more independent manner. In these teams, when the core subset rounding on a patient left the patient's room, members who had missed pages or phone calls would break off from the others to return the page or call, further fracturing the group and fueling independent work.

By failing to work together within the core as some members discussed a patient case with the periphery, these teams could not keep up with the work and faced bottlenecks. For example, in Team 22 one day, the core team failed to engage in ongoing backup and updated delegation of tasks; later in the afternoon, the team realized that an intern had become a bottleneck and had still not executed part of a plan that had been decided in the morning. Thus the core group's emphasis on the periphery could lead to splitting up for a patient round, which could lead to more splitting up. As a result, core members could not work together and capitalize on their role redundancies.

The Efficiency Benefits of Emergent Interdependence

An analysis of team efficiency metrics bolsters the narrative that 18 teams failing to work interdependently—either internally, externally, or both—worked more slowly due to backtracking and bottlenecks. Using the 24 core teams from the study's first phase (those for which full information is available), I find that the six teams identified as exhibiting emergent interdependence (both internally and externally) had similar patient loads relative to the other 18 teams (8.5 and 8.7 patients, respectively, $p = .319$). Yet t-tests reveal they completed morning rounds faster ($M_{Interdependent} = 116$ minutes; $M_{Non-Interdependent} = 151$ minutes, $p = .004$), had fewer days of the week in which they finished late ($M_{Interdependent} = 7$ percent of days finished after 11:30 a.m.; $M_{Non-Interdependent} = 56$ percent of days finished after 11:30 a.m.; $p < .001$), and the team's patients were on average in the hospital for a shorter period (average patient length of stay: $M_{Interdependent} = 3.02$ days; $M_{Non-Interdependent} = 5.40$ days, $p = .002$). These six interdependent teams also had shorter average patient lengths of stay when the values are adjusted for patient complexity (as assessed via All Patients Refined Diagnosis Related Groups), though this difference did not quite reach

statistical significance ($M_{Interdependent}$ = 0.95 adjusted length of stay; $M_{Non\text{-}Interdependent}$ = 1.31 adjusted length of stay, p = .07).[2,3]

Enablers of Within-Core and Core–Periphery Teamwork: Team Launches and Shared Team Cognition

In this complex and high-stakes environment, most teams were best characterized as isolated or underdeveloped; yet as described above, a handful of core teams came to work interdependently both internally and externally. The data suggest that the initial conversations, among solely the core team members as they first gathered at the start of their week, varied widely in content and could set the stage for later teamwork. Specifically, I find that these initial conversations, or ''core team launches,'' could establish two relevant shared mental models (Mohammed, Ferzandi, and Hamilton, 2010) among the core team members. Mental models are cognitive representations of a system (Rouse and Morris, 1986), and shared (or team) mental models reflect overlapping of individuals' mental models—they are emergent states that characterize the team (Marks, Mathieu, and Zaccaro, 2001; Mohammed, Ferzandi, and Hamilton, 2010). Here I focus on two shared mental models—that of the core-team interaction and of team membership (see Table 1)—and how they guide attention to affect internal or external teamwork, respectively. Below I define and present evidence of each shared mental model; then I discuss the mechanism linking them to the teamwork behaviors.

   Shared mental model of core-team interaction. Team interaction mental models (or simply team mental models) refer to a team's cognitive representation of ''roles and responsibilities of team members, interaction patterns, information flow and communication channels, role interdependencies, and information sources'' (Mathieu et al., 2000: 274), and they specify ''interpersonal interaction requirements'' (Mohammed, Ferzandi, and Hamilton, 2010: 880). Here I focus on whether core team members developed a shared mental model of core-team interaction.
   In some initial gatherings of core members at the start of the week, the discussion included communications about whether and how core members would work together. For example, in Team 22, the senior resident stated that she would put orders in for the interns during rounds and suggested ''let's do read-backs'' after patient rounds (i.e., the team would go over orders that had been decided, and the senior resident would report what was done and what remained). The attending physician then stated, ''It's all about teamwork,'' seemingly supporting the senior resident's suggested role clarification and proposal for how to interact, while reiterating the need to work together. Similarly, in Team 18, the attending physician referred to how he would ''back up'' the senior resident. The resident then described how their ''multiplicity of tasks'' would evolve over time so that they would collectively ''work out'' who was

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[2] 1.0 indicates the patient stay was equal to expectations given the case complexity; greater than 1 indicates a longer stay than expected; less than 1 indicates a shorter stay than expected.
[3] The differences observed in morning rounds' length, days finishing after 11:30 a.m., and both length of stay and adjusted length of stay are consistent with estimation in OLS models controlling for patient load.

doing what along the way. Here the conversation highlighted the need for communication with one another to both help each other and to monitor and update their task lists. Such communications indicate that the team was developing a shared sense that their work would be interconnected. Additionally, the data from team launches was consistent with interview data. In teams that had a conversation like the ones described above, interviewees described their work in terms of interconnectedness. For example, Intern 5K described the core group as a ''machine,'' indicating a perception that individual parts are working together.

Shared mental model of team membership. Mental models of team membership refer to ''team members' models of who are, and who are not, team members'' (Mortensen, 2014: 909). While Mortensen (2014) focused on divergence in such mental models, I focus here on the other end of the spectrum: a shared mental model of team membership—specifically a shared model of peripheral roles as part of the work.

In some team launches, the team discussion included communications about potential periphery members. For example, in Team 13, the attending physician emphasized that they use ''family-friendly language'' in the rooms and that while on morning rounds, they ''aim for everything to be said inside the room.'' This implied that the core team should discuss the care plan with at least the patient and patient's family, rather than separately making decisions among only the core members. Senior Resident 13 added that, ahead of a patient round, someone should call the patient's nurse to ensure the nurse would also be present. These communications were similar to those in Team 2, in which the attending physician emphasized that patient rounds are ''family-centered rounds.'' Later the attending physician added that a goal for the team is to ''involve the nurses as much as possible.'' In sum, these communications suggest that people in periphery roles would be a part of decision-making conversations—that they were a part of the work. This is consistent with what participants expressed in interviews. For example, at the end of the week, Senior Resident 2 reflected on nurses, saying that ''they're just as important of a team member.''

Mechanism linking team cognition to behavior: Attention to core members. Individual core team members' attention to fellow core members followed from establishing a shared mental model of core-team interaction. When the team launch established that the team members would work together—and how they would work together—to collectively manage their evolving tasks, the core team members stayed together (rather than splitting up) and looked for opportunities to support one another. As Medical Student 9A stated in an interview, she had been ''taught'' to ''help out the team,'' and so ''the important role I can play . . . [is to] help out with being observant, filling in cracks if anything gets missed.'' Another medical student (20M) described the need for ''paying attention'' to each other. Senior Resident 3 echoed this idea in an interview, emphasizing the importance of ''everyone being cognizant of everybody else's responsibilities.'' This individual-level observation of and attention to one another allowed core members to see where help was needed and then actually provide that help. For example, in Team 5, the senior resident

heard a decision to place an order for a patient and then placed the order electronically. Senior Resident 5 then said, ''Hey [Intern 5B], I already put in (the order).'' Intern 5B responded, ''Oh! Somebody's been eavesdropping.'' Senior Resident 5 replied, ''I'm super good at eavesdropping,'' and they laughed. Though said in a jovial way, this indicated the attention that teammates had given each other and that enabled the senior resident's behavior. Similarly, Intern 18T stated of the team's senior resident and attending physician, ''They recognize when their assistance is needed.'' As noted, individual support—particularly during patient rounds while some core members engaged the periphery—was associated with generally more-interdependent (versus independent) work, resulting in more support and an emergent team-level pattern of behavior characterized by interdependence within the core team.

   Attention to periphery members. Similarly, establishing that people in peripheral roles should be a part of the work may have cognitively activated this broad set of potential team members and thereby guided attention toward those periphery members. For example, as noted above, in the launch for Team 2, the team discussed involving families in ''family-centered rounds''; subsequently the attending physician highlighted that they should ''focus on the family'' when discussing a care plan in a patient's room. Similarly, Team 8 had an initial conversation about involving patient family members, suggesting that members would think of the patient's family as a part of the team; Medical Student 8M later recalled in an interview that he knew to ''look at the family when he presented'' the patient's information during a patient round. This attention also applied to other peripheral roles. For example, in Team 9, a medical student recalled in an interview that they had been ''taught'' to ''call nurses,'' and so she worked with the other medical student to ensure that for every case, ''one would call the nurses.'' Thus in Team 9, this initial team conversation (which established that the nurses were a part of the team) had directed individual attention to the nurses at the start of each patient round. Subsequently, the attention to periphery members made it more likely that the core would actually work with the periphery. As Senior Resident 23 noted in an interview, there was a need to ''remember'' the nurse so that the nurse could then be invited to and participate in the patient round. Similarly, I observed the role of attention in situ. In Team 22, the core team entered a patient's room and found the parent was absent; someone asked where the patient's mother was, which was followed by calling the mother by phone and discussing the patient care plan with her. Here the inquiry suggested that the team member was thinking about the patient's family member, which led to finding a way to include her in the patient round. In contrast, in Team 12, as noted above, the core team entered a room where a patient's family member was sleeping; the core members did not wake up the parent and faced toward one another (not toward the parent), then discussed the care plan without the parent. Overall, the individual attention to periphery members could allow for integration of those periphery members—particularly during patient rounds—such that the core team as a unit exhibited a general pattern of interdependent work with the periphery.

Team launch facilitators. Although uncovering the antecedents to what core teams discussed in initial conversations was not the purpose of this study, the data do suggest that context may have been associated with whether the core team had an initial discussion at all. First, the core-team launch seemed to be associated with the task environment—both urgency (patient acuity or case load) and physical location (whether the core team convened in a hospital ward in front of a patient room versus in a designated work space) may have distracted from having a core-team launch at all. To the latter point, and using all 37 teams for which complete core-team launch information is available, I find that core teams were more likely to initially convene in a hospital hallway (25/37) than in their dedicated work space (12/37). Of the teams that started their Monday in a hospital hallway, only 40 percent (10/25) exhibited evidence of initially establishing a shared mental model about team membership and/or core-team interaction; in contrast, of the core teams that started their Monday morning in their team work space, 83 percent (10/12) had those initial conversations.

Second, one could conjecture that the leader's qualities would determine the content of a team launch, but the data do not support this. I observed that different teams staffed by the same senior resident or same attending physician had different launches. For example, in one of the teams (Team 24) that initially convened in a hallway outside a patient room (and did not initially establish shared mental models), the attending physician later revealed in an interview that she wished they had sat down together on Monday morning so that she could think about what to say, instead of being distracted by getting started. Moreover, in an earlier team (Team 14), the same attending physician convened with the core team in their dedicated work space, and that team did establish a shared mental model about core-team interaction (e.g., they discussed how medical students could be observant and help with tasks, especially when it got busy). Similarly, Team 18 first convened in the team's work space and established a shared mental model of team membership (e.g., discussing the involvement of patients and families). In a subsequent week, Team 20 was staffed with the same senior resident. This core team initially convened in a hospital hallway outside a patient room (versus in their dedicated work space), and perhaps surprisingly given that they could see periphery members moving about in the hallway, they did not discuss work with these members. These patterns suggest that the context of the core team's initial gathering related to its content.

DISCUSSION

Facing similar conditions, some dynamic teams in this study came to exhibit emergent interdependence both internally (within the core team) and externally (with the shifting set of peripheral members). The study's findings suggest that engagement in phases of synchronous internal and external teamwork was integral to emergent interdependence. During these synchronous phases, core team members backed up one another and integrated the periphery into analysis and planning. These phases were possible because of their embeddedness between separate cycles of external and internal coordination of work and because core team members divided their attention during the synchronous phases, with some focusing internally and others externally in such a way that internal and external work came to be reinforcing. Additionally, the findings

reveal that the subset of teams exhibiting emergent interdependence worked more efficiently, as captured by the timing of daily task execution and patients' length of stay in the hospital. Finally, the results suggest that conversations at the initial gathering among core team members only could establish shared team cognition among these members and thus fuel subsequent team interaction patterns. These findings make multiple contributions to research on dynamic teams, external activities, and team launches.

Dynamic Teams

As Hackman developed a model of the conditions for team effectiveness, focusing on the importance of stability in membership and boundaries, he and his colleagues also noted the existence of ''sand dune teams'' that break from that stability (Hackman, 2002; Hackman and Wageman, 2005; Ginnett, 2019). Research exploring the functioning of such teams with dynamic membership, often referred to as ''fluid'' or ''dynamic'' teams, has grown in recent years (e.g., see Edmondson, 2012; Mortensen and Haas, 2018), but the implications for interdependence remain unclear (Wageman, Gardner, and Mortensen, 2012). Much of the research on temporary teams, for example, promotes the implementation of some kind of boundary to inform interdependent work (Valentine and Edmondson, 2015), yet this is not possible in dynamic teams that both are temporary and face fluid membership during the team's lifespan. Research has also acknowledged the value of not simply spanning a clear and fixed boundary but, instead, working with ''noncore contributors,'' or more-temporary periphery members (Cummings and Pletcher, 2011: 75; Edmondson, 2012). And given the ephemeral nature of these peripheral contributions, research has suggested that core members are well served by ''flexibly managing their boundaries'' (Choi, 2002: 203) and bringing ''on board'' the less-core, shifting set of team members (Ancona, Bresman, and Caldwell, 2009: 219). Yet we still lack a deep theory of the process by which team membership can dynamically shift over time.

By taking a fine-grained view of what work is done, when, and by whom, the emergent theory here addresses this open question of how a team can expand and contract its boundary while looking like a real team. Specifically, the theory details the process of coordination to arrange for collaboration with the periphery, of the team boundary's temporary expansion as some core members integrate periphery members into analysis and planning while other core members simultaneously offer backup, and then of the boundary's subsequent retraction when core members coordinate internally as required by the backup and new planning. Of note, my findings suggest that the critical synchronous phase of both internal *and* external teamwork is achievable because core team members at times divide their focus, a division that can shift over time. This role flexibility is consistent with past studies of dynamic contexts that detail the value of extra-role behaviors (Valentine, 2018), role shifting (Bechky and Okhuysen, 2011), role negotiation (Bechky, 2006), generally ''monitoring changing task demands'' (Thomas-Hunt and Phillips, 2003: 125), a more top-down directed delegation of tasks (Klein et al., 2006), and the use of more-unprogrammed means of coordination, such as general policies rather than rigid rules or authority (Argote, 1982). These studies implicitly acknowledge that team members have some redundancy in their abilities so that they can flexibly

divide their work, which can be particularly relevant in unpredictable environments (Hollenbeck et al., 2002; Ellis et al., 2003). Similarly, with regard to external teamwork, research has also documented that different team members can and perhaps should engage in those external activities (e.g., Carson, Tesluk, and Marrone, 2007). Thus this study is consistent with extant research on role flexibility but goes further to suggest that these flexible shifts are critical to a team's ability to expand and contract its boundary over time, thereby exhibiting emergently interdependent work despite its dynamic conditions.

Moreover, the findings suggest that teams that engage in these emergently interdependent patterns also work more efficiently. This suggests that, in line with classic views that structure can help to "transcend the limitations of" attention (Simon, 1997: 289), emergent structure—the emergent patterns of team interaction distributed both across time and people—can support work in dynamic teams.

External Activities

Previously, research on external activities has suggested a tradeoff between internal and external activities (e.g., Ancona and Caldwell, 1992; Choi, 2002). Consistent with research on attentional limitations (March and Simon, 1958), this tradeoff is typically understood in terms of teams' limited resources. The resulting prescriptions recommend engaging in some balanced, moderate level of internal and external activities, as both cannot be maximized at once; teams often achieve this by cycling between the two over time (Gersick, 1988; Ancona, 1990; Choi, 2002; Ancona and Bresman, 2007). Yet research has also demonstrated that a select few teams can achieve high levels of both internal and external behaviors and may perform best when they do so (Ancona and Caldwell, 1988, 1992; Ancona, 1990; Bresman, 2010; Myers, 2021). This raises the question of how teams might come to engage in both without facing a tradeoff.

This study addresses the above question by suggesting a critical, not previously discussed synchronous phase of both internal and external teamwork embedded between separate external and internal coordination periods. During the synchronous phase, having some core team members focus internally on backup behaviors allowed other core members to devote their attention externally to integrate periphery members into analysis and planning. Moreover, having some members focus externally on working with the periphery created opportunities for internal backup behaviors as core members supported one another (e.g., answering an outward-facing member's phone). In this way a team's internal and external work could reinforce each other—a starkly different story than that in extant work, which suggests that the two compete for resources. Indeed, this study suggests that without these synchronous periods, a team might overemphasize either internally or externally and thus work less efficiently. That is, when the synchronous period is absent, teams are more likely to focus on ensuring that the core is cohesive or on engaging with the periphery, which could come at the expense of working interdependently with the periphery or within the core, respectively. Thus this study's findings support past documentation of cycles of separate external and internal activities, but the findings challenge the documented tradeoff between the two

by introducing a synchronous phase and, in doing so, go beyond extant research.

The finding that there is value in syncing up internal and external behaviors also extends research on entrainment to dynamic teams. Extant research with more-bounded and stable teams finds that team members benefit from entraining not necessarily to the external context (e.g., as discussed in Ancona and Chong, 1999) but to each other (Riedl and Woolley, 2017; Mayo and Woolley, 2021). In my research setting, the syncing up of core and periphery members for analysis and planning was critical, and this entrainment of core and periphery members to each other occurred in some teams despite the challenge of each periphery member having contextual demands from other patient care teams that could make such core–periphery entrainment difficult. Still, the decision of whether to involve a periphery member is not clear-cut, and core teams have some discretion in that decision; while this study speaks to a need to involve some periphery members in this research setting and how that is better accomplished, future work could further explore the relationship between core and periphery members.

(Core) Team Launches

This study also aligns with but extends beyond extant research on team launches and early team events. The findings suggest that a core team's shared mental models of core-team interaction and team membership can emerge during the team's initial meeting. Further, and taking advantage of the temporal ordering of the core team's initial conversation followed by the week's work, the findings suggest that these shared mental models can direct attention and guide subsequent behaviors. Specifically, a shared mental model of core-team interaction could support core emergent interdependence; this aligns with research demonstrating that in more-stable teams, initial understanding of work as interconnected can lead to emergent interdependence (Wageman and Gordon, 2005). Similarly, a core team's shared mental model of team membership could support boundary work; this is in keeping with the idea that expectations about what relationships *should* be can lead to interaction patterns that map onto those expectations (Kilduff and Tsai, 2003: 70–79). Though past work has suggested that these cognition–behavior relationships could be reciprocal (e.g., working interdependently can also affect one's understanding of the work as interdependent; see the discussion in Wageman and Gordon, 2005), the finding here is consistent with prior work establishing that a team's beginning can impact subsequent coordination and performance (Gersick, 1988; Ericksen and Dyer, 2004; Mathieu and Rapp, 2009; Woolley, 2009; Hackman, 2011; Ginnett, 2019). The literature on team launches is robust enough that it is not surprising that I, too, find that events during a (core) team launch may impact subsequent behavior.

Despite these consistencies, considering the current study alongside prior research on team launches and early team events highlights that extant research on team interventions tends to focus on stable and bounded teams, in which the intervention can be administered to the entire team, or this research tends to consider interventions focused on teaching skills to individuals (for a review, see Shuffler et al., 2018). This leaves unclear whether a pseudo team-level intervention could apply in dynamic team settings. Here I

go beyond extant studies of team launches by drawing on research highlighting the importance of core roles (Humphrey, Morgeson, and Mannor, 2009), and the findings indeed suggest value in the *core* team's launch. Further, while past research on team launches has tended to emphasize internal teamwork, this study diverges. Edmondson (2012) noted that team members tend to focus on their own subgroup, such that the physicians in this study would likely focus on themselves and ignore individuals from other disciplines with whom they should work. Building on this insight, the current study suggests that *core*-team launches can address not only teamwork within a core group but also external teamwork with fluctuating periphery members to ensure that the core members attend to the team boundary and engage in that external teamwork.

This study suggests a need for future research on what affects team launches. Some core team members, notably those in the leadership roles of attending physician and senior resident, reported (in interviews) the value of initial conversations about core-team interactions and peripheral members yet failed to implement those conversations. Moreover, and surprisingly, teams with the same leadership launched quite differently from week to week. Prior research suggests that teams tend to want to jump into the work rather than first discussing it (Wageman and Gordon, 2005; Woolley, 2009) and that situational factors such as task complexity (Weingart, 1992) and spaces (Lee, Mazmanian, and Perlow, 2020) can affect team interactions. In the case of inpatient teams, situational factors may lead core team members to initially meet in a hospital hallway near patient rooms rather than in their dedicated work space, and the physical space of this convening could affect the team's launch. Future research on the role of leadership, context, and spaces in dynamic teams—and understanding how to counter or leverage their effects—might be fruitful.

Boundary Conditions and Limitations

My findings may be limited to teams that have highly dynamic membership both in terms of a short lifespan and a shifting set of contributors. Specifically, these conditions may exacerbate the tension between internal and external behaviors that has been documented in more-stable teams. And given the lack of more-traditional structures (stability and a fixed boundary) to help guide the work, the cognitive structures explored here are likely especially relevant to teams with this design and would be less critical in more-stable teams. For example, while the benefit of a shared mental model of core-team interaction may transfer to any temporary team, the value of a shared mental model of team membership involving periphery members may be less critical when those contributing to the work are less in flux, and this could even be disruptive if the team does not depend on resources external to the team. Some preliminary evidence of this possibility lies in research demonstrating that external search for information is beneficial only when information critical to the task resides outside of the team (Woolley et al., 2013). Future research could further explore this.

Moreover, while teams in this study were highly dynamic, the membership changes were still constrained. Teams typically had a stable core for the duration of the week. Turnover in team core roles has been demonstrated to be particularly detrimental to the team's ability to coordinate their work (Summers, Humphrey, and Ferris, 2012; Christian et al., 2014; Stuart, 2017), and when

highly dynamic teams experience turnover among core members, more-frequent launches may be helpful. Additionally, the periphery members in this research setting were somewhat obviously relevant to the work (e.g., if a team could not identify the antibiotic to treat an infection, they would need to involve infectious disease specialists). That is, the task needs indicated the roles that could be involved, and those roles were contained within the organization. Dynamic teams can also span organizational boundaries (e.g., Kerrissey, Mayo, and Edmondson, 2021), in which it may be less obvious whether someone can be brought in to help with the task and who that would be. In these cases, it may be more difficult to implement a mental model of team membership in advance, as hospitals at least provide a broad schema of the types of professions that could be integrated into a team's work.

This study's setting suggests additional boundary conditions to the theory. First, there was a clear, overarching goal to provide quality care to the children in the hospital. This goal is highly compelling. In other contexts, motivation may be a more variable factor that affects focus on individual goals, and individuals may need additional encouragement to work across professional boundaries. To that end, researchers might examine work on turnover and the integration of newcomers to consider factors such as superordinate goals and shared social identity (Kane, Argote, and Levine, 2005; Kane, 2010). Although social identity is likely limited in temporary teams, there may be ways to overcome such motivational issues (Valentine, 2018).

Second, work in medicine is typically very hierarchical, yet status did not emerge in this setting as a critical driver of teamwork behaviors. My observations and interviews suggested that despite status differences within and across professions, this hospital's culture was such that cross-profession and cross-hierarchy input was generally espoused as valuable. In other settings, as much of the literature in medical contexts has found (e.g., Nembhard and Edmondson, 2006), overcoming barriers to teamwork presented by status differences would likely need to be considered. For example, when status hierarchies are emphasized, core team members may need more than an initial discussion of periphery members to redirect their attention to and ensure integration of these lower-status members, while it may take some cajoling to convince higher-status periphery members to work with a focal core team.

Conclusion

Increasingly in today's organizations, teams form quickly and change shape during their short lifespans, making it difficult to understand how to work together and even identify with whom to work. While a large body of research speaks to the conditions that support effective teamwork in more-stable teams, this study offers a step toward understanding how teams with dynamic membership can come to look more like real teams that work interdependently both internally and externally. But we have much to learn.

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