ABSTRACT

BACKGROUND AND OBJECTIVES: Pediatric hospitalists are expected to be adept at effective teamwork; yet, studies in which researchers describe teamwork practices in general pediatric inpatient settings are lacking. Our aim in this study was to examine the roles that general pediatric team members assume in real-life settings and how team members conduct teamwork practices on family-centered rounds.

METHODS: In the ethnographic tradition, we observed a general pediatric team on a hospitalist service, focusing on family-centered rounds, and conducted in-depth interviews with interns, senior residents, and faculty. We collected data in the form of field notes from observations and transcribed interviews and used constant comparison methods to create codes and generate themes. We used Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) as an analytic lens and organizing framework.

RESULTS: Communication occurred in both structured and unstructured ways. Situation monitoring happened during routines, such as running the list, and led to creating a plan of patient care through shared decision-making. Some leadership characteristics were not exclusive to 1 team member. Finally, mutual support occurred through task completion and empowering learners; for example, attending physicians empowered senior residents, who also helped interns.

CONCLUSIONS: Our findings aligned with some, but not all, teamwork principles from TeamSTEPPS; misalignment may be due to contextual factors, such as the need to provide medical education and the development of grassroots routines (eg, running the list). Context is a key consideration when developing interventions to enhance teamwork on inpatient medical wards.
Excellence in clinical care is predicated on the assumption that having highly functional teams is essential for the delivery of optimal care.1–4 Consequently, research on teams and teamwork, built over the course of 30 years in the business and psychology fields, has informed efforts in medicine; specifically, models for effective team practices have been adapted.3,5 For example, Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS), created and embraced by the Agency for Healthcare Research and Quality, endorses key principles of teamwork (including communication, situation monitoring, leadership, and mutual support) and defines practices that support those principles.5 TeamSTEPPS is a widely used, evidenced-based model to improve teamwork in medicine across the United States.11–18 However, critical differences in the context in which medical teams work and interact cannot be understated.6,7,19–21 For example, teams in the operating room, the ICU, and the medical ward confront different challenges, such as geography, staffing, and acuity.22

Pediatricians are expected to be effective team members and adept at teamwork practices.19,23–25 However, little is known about the nature of teamwork in general pediatric inpatient settings; therefore, foundational knowledge to develop interventions to enhance teamwork is limited. Borrowing interventions from well-studied medical teams, such as resuscitation or trauma teams, ignores context as a critical factor for team functioning in a general pediatric inpatient setting.22,26 Therefore, we conducted an in-situ study to describe and analyze the current team practices.

Ethnography is a qualitative research methodology that is used to collect data via observations and interviews in natural settings. We used ethnography to study the natural setting of a general pediatric inpatient ward and to richly describe social interactions and team activities in that context.19,27–29 We delimited our exploration to teamwork on family-centered rounds (FCR) because this is a time when the team comes together and makes decisions; in addition, FCR have been shown to increase the perceptions of teamwork among medical providers.10 Specifically, we asked, “What teamwork-related roles do general pediatric inpatient team members espouse and, in these roles, how do team members conduct teamwork practices on FCR?” To explore our data’s goodness of fit with a research-derived model of teamwork, we used TeamSTEPPS as an analytic lens and a framework for reporting our findings.

METHODS
The institutional review board approved the project; individuals participating in interviews provided written consent, and the team observations were exempted.

Context and Participants
The general pediatric inpatient team, also known as the pediatric hospital medicine team, participated in daily attending rounds using an FCR format to provide care for patients in a free-standing, quaternary-care children’s hospital. FCR occurred inside patients’ rooms, where the team engaged the family in discussion and, ultimately, medical decisions.6,12 Elements of effective FCR essentially call for teamwork (eg, summarizing the plan in the presence of the team to improve communication).30 Thus, we believed that FCR were an opportune time to observe teamwork. In our study, FCR generally lasted 2 to 3 hours and were conducted on general pediatric wards in 2 adjoining buildings of the same hospital.

Team members included pediatric hospitalists who served as the attending physicians, 1 to 2 senior pediatric residents (second, third, or fourth year), 2 to 4 pediatric interns, and 1 to 2 clerkship medical students. Team members (with the exception of students) worked at a free-standing children’s hospital with a large residency program (182 residents) and hospitalist section (37 faculty). Each team member had a different duration of service, ranging from 1 to 4 weeks. Pediatric hospitalist attending physicians (PHAs) rotate weekly. Senior pediatric residents (hereafter referred to as seniors) rotated monthly and provided longitudinal oversight but departed midrounds the morning after overnight call because of work-hour restrictions. Pediatric interns rotated monthly but often had nonconsecutive weeks on service because of competing requirements.

Observation
Dr Falco conducted 25 hours of observations of FCR with a general pediatric inpatient team from September 2014 to December 2014; data were collected until a repeatable pattern in people’s behavior was found. A total of 23 to 27 people in 4 to 5 teams were observed over periods of up to 4 days. As a PHA, Dr Falco served as an “insider observer,” getting close enough to the team members to understand their perspectives but was not involved in directing patient care during observations. Dr Falco took extensive field notes over the course of a convenience sample of 10 days, including 1 weekend day.

Interviews
We invited all the members of the general pediatric inpatient team, whom we observed on FCR, to participate in 1-on-1 interviews; 4 agreed to be interviewed. To increase our database, we expanded the invitation to all members of the team from February 2015 to December 2015. All but 2 interviews occurred during the 2014–2015 academic year; most interviews were within 6 months of the observations. In sum, 5 interns, 4 seniors, and 4 PHAs participated in interviews. Interview questions were focused on the role of the team member and used to explore specific instances when the team members worked or did not work well together. Dr Falco conducted and audiotaped all interviews, which were transcribed verbatim.

Data Analysis
We analyzed data concurrently with their collection and generated a database of field notes (130 pages) and interview transcripts (102 pages). We used principles of grounded theory (eg, constant comparison) to guide our analysis and ATLAS.ti to manage the data. For example, Dr Falco created codes in an iterative and inductive manner based on concepts and patterns in the data and, in consultation with Dr Balmer, revised interview questions to explore these concepts and patterns. Dr Falco discussed
codes with Dr Balmer during monthly meetings; together, they organized codes around roles and team processes and then created themes from clusters of codes (Fig 1). For example, 1 theme was that the senior residents’ role encompassed running the list, which allowed them to efficiently organize the tasks for each patient and review the interns’ work.

To check trustworthiness, Dr Balmer reviewed field notes written by Dr Falco and coled 1 interview to provide modeling and feedback on interview techniques. We triangulated interview data from PHAs, senior residents, and interns and analyzed interview data in conjunction with field notes. Dr Falco met with groups of PHAs, seniors, and interns and presented the findings to check if their experiences resonated with the researchers’ interpretations; they confirmed agreement. Later in the analysis, we revisited the TeamSTEPPS model. It proved to be particularly useful as an analytic lens and organizing framework because of its focus on team processes, such as communication, leadership, situation monitoring, and mutual support. In line with our ethnographic methodology, the examination of the contextual factors that shape the expression of the TeamSTEPPS principles was included in the analytic process.

RESULTS
The principles of TeamSTEPPS include communication, situation monitoring, leadership, and mutual support, whose definitions are included in Table 1. The results are organized to illustrate how the practice of each principle was manifested.

Communication

Interviews
In the interviews, interns identified themselves as the primary communicators when it came to patient care, both written and verbal. For example, 1 intern commented on being the “primary documentarian” for patients, which included writing notes and orders. Another explained the importance of their role as communicators: “You’re the first point of contact for the team about that patient, and you’re the first point of contact for the family about medical questions.”

In contrast to structured communication endorsed by TeamSTEPPS, interns did not report a structured way of talking about patients, and PHAs did not discuss communication in overt terms. However, seniors talked a lot about “running the list” (ie, the everyday routine of reviewing the tasks for each patient’s treatment plan for the day with other team members using the patient list). Although the primary intent of running the list was situation monitoring (see below), it did create an efficient and structured process by which senior residents and interns shared information. Running the list was an example of a basic (or grassroots) routine, which was 1 of 2 contextual factors that shed light on the pediatric inpatient setting.

Observation
Although interns identified themselves as the primary communicators in patient care, they were not the sole communicators, on the basis of observational data. Rather, a medical student and a senior communicated with the team and the families on FCR, respectively, regarding, for example, a patient with abdominal pain:

**PHA:** What about the patient’s physical [examination]?
**Student:** Her abdomen is soft with good bowel sounds.
**Intern:** She did not have abdominal pain when I examined her. I talked about going home with the family [now that there is no abdominal pain].
**Senior:** I also talked with the mother yesterday about possibly going home today.

As shown above, several team members also contemporaneously pooled their own information regarding the patient. Sharing of information was facilitated and stimulated when PHAs (and less frequently, seniors) posed questions on FCR. This process of pooling information from numerous team members stood in contrast to the TeamSTEPPS model’s focus on structured communication in a specific situation (hand off) and ensuring that a

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**FIGURE 1** Illustration of code-to-theme development.
message was given and understood properly (closed-loop communication). In observations, partnering in patient care entailed multiple communicators with the family and various sources of information coming from different team members. This partnership between team members with different levels of experience and training was necessary because of the educational environment of a teaching hospital.

**Situation Monitoring**

In the interviews, seniors reported that 1 of their duties was to review the interns’ work. Running the list was a grassroots routine that applied to situation monitoring; because the team reviewed each person’s tasks as a group, the seniors (and other team members) were aware of what actions needed to happen for each patient. One senior described the following: “I think immediately after rounds…running through the list because…sometimes on rounds, things can happen quickly, or things might get lost in translation.”

The quote gives a granular view of how running the list contributed to the pediatric inpatient setting. Seniors also double-checked the interns’ work, both to assess correctness and ensure that details “don’t get missed.” One explained, “[If we mentioned it on rounds…[you] make sure it actually gets done…consults, images, things like that.” By running the list and double-checking, seniors monitored their progress toward the goal of providing optimal patient care and balancing the workloads of the other team members.

**Observation**

Observation confirmed that seniors engaged in situation monitoring when they ran the list and at other times on FCR. The types of information that individual team members shared when they pooled their information created the team’s shared mental model of patient care. Shared mental models included individual team members’ thoughts surrounding patient status, working diagnoses, medical knowledge, plans of care, and potential systems issues. In the following example, a PHA and senior share their thoughts about the selection of an antibiotic, which is part of the plan of care for a patient with osteomyelitis:

**PHA:** When it comes to choosing an antibiotic, if you choose vancomycin, you’ll have no end point. We don’t expect the cultures to grow; so, you might commit the child to vancomycin for weeks…. We could choose clindamycin, or we could use other antibiotics for the same type of coverage. We can wait until 48 hours or change over now.

**Senior:** So, we could start antibiotics that the child could also go home on, or we can wait for the cultures and then change over. I might say to start clindamycin now because that would be only 1 medication that the child could go home on. Plus, we can see how the child responds now instead of waiting until later, after we change to clindamycin.

Double-checking the intern’s work and creating a shared mental model both reveal the collaboration of team members in their care of patients and the educational environment in which the team operates.

**Leadership**

*Interviews*

When interviewed, no participants used the term “team leader.” However, seniors and PHAs were presumed to be team leaders because of their level of training. They considered themselves to be supervisors and facilitators, respectively; both encompassed attributes of a team leader. One PHA said, “I’m not necessarily the leader or the boss… I try to help them [senior residents] lead.” They talked about guiding the learners in developing the plan of care and pointing out the resources available to the team rather than dictating the plan of care. Seniors organized the team as a means to manage team resources; namely, they prioritized patients and tasks. One senior reported, “I was in charge of

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**TABLE 1 Team Principles and TeamSTEPPS Definitions**

<table>
<thead>
<tr>
<th>Principle</th>
<th>TeamSTEPPS Definition</th>
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<tbody>
<tr>
<td><strong>Communication</strong></td>
<td>“The process by which information is exchanged between individuals” Includes structured ways to communicate that are complete, clear, brief, and timely for the exchange of information, hand offs, and closed-loop communications, wherein the receiver of information repeats back his or her understanding.</td>
</tr>
<tr>
<td><strong>Situation monitoring</strong></td>
<td>“The process of actively scanning behaviors and actions to assess elements of the situation or environment,” which “ensures [that] new or changing information is identified for communication and decision-making” Situation monitoring leads to situational awareness. When both situation monitoring and situational awareness are verbalized by team members, a shared mental model is created, which is “the perception of, understanding of, or knowledge about a situation or process.”</td>
</tr>
<tr>
<td><strong>Leadership</strong></td>
<td>The linchpin of teamwork with a focus on the plan of care: creating it, communicating it, watching it play out, and adjusting it Making decisions. Directing others. Managing resources to accomplish the plan of care. “Essence of teamwork”</td>
</tr>
<tr>
<td><strong>Mutual support</strong></td>
<td>Team members ask for help and offer help to one another. Includes conflict resolution, verbal feedback, and assistance with tasks, which is also known as backup behavior</td>
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organizing the team and making sure that there were plans for patients and making sure that we’re as efficient as possible.” Like seniors and PHAs, interns did not consider themselves to be team leaders, although they often discussed initiating the plan of care.

Observation
Observation revealed aspects of leadership, such as resource management and operationalizing a jointly created plan of care. PHAs and seniors jointly managed the resource of time by coordinating FCR. Prioritizing patients on FCR was a grassroots routine that elucidated the pediatric inpatient setting in which the team operated. In the example below, a PHA and senior prioritized seeing patients who were to be discharged:

PHA: Do we have any potential discharges on the team?
Senior: We can go do [floor] 6 North. Things are quiet there, and there are some possible discharges.

Building on the process of communication and the establishment of a shared mental model, several team members, especially seniors and PHAs, mutually decided on the plan of care. Unlike the TeamSTEPPS model, in which the leader assumes responsibility, several team members contributed to the creation of the plan:

Senior 1: I think the patient meets criteria for irritable bowel syndrome.
PHA: Yeah, sounds like it.
Senior 1: What concerns me is that we have been escalating our pain control.
PHA: So, what’s the plan?
Intern: We could give them the option of staying here with the current regimen or going home on something else.
Senior 2: I do not want to continue [intravenous] pain medication [the current regimen].
PHA: Hmm-mmm. What stronger [nonsteroidal anti-inflammatory drug] could we use?
Silent pause.
Senior 1: Toradol.

PHA: Yes, Toradol can be given as an oral medication at home. We need to talk to the family about what to expect…

In this situation, the PHA used questions to further the discussion about the plan of care, as mentioned above in the Communication section. Consistent with what seniors and PHAs said in interviews, they were dominant voices in conversations about creating a plan of care. Operating in an educational environment, PHAs and seniors often used questions to facilitate teaching and learning on FCR.

Mutual Support
Interviews
During interviews, seniors reported establishing procedures whereby interns turned to seniors for assistance not simply by performing tasks but also answering questions. One senior described the role as “…helping them out when they had questions [and] being the person that they could go to when they were trying to figure things out….” Interns often reported feeling supported when seniors offered to help them and, at the same time, stepped back and allowed them to make choices. One intern explained: “When you feel like there’s someone who is proactively concerned about whether or not you’re overloaded, you feel, like, more supported. You feel like you’re more on a team. …You feel more of a sense of sharing in the tasks that need to be completed.” The grassroots routine of prioritizing an intern’s patients on FCR was a form of mutual support when an intern had clinic in the afternoon because it gave the interns more time to complete their tasks.

PHAs created a triad of mutual support by empowering and supporting seniors. One PHA reported, “I guess my ideal role, what I strive to do, is to empower my senior resident to act like an attending.” When seniors were unavailable (eg, postcall, in clinic, or off-site), PHAs stepped in to the role of the senior; in doing so, they provided more than simple assistance with tasks. Some PHAs actually identified themselves as the safety net for the team, which is another form of mutual support. One shared how she describes to families her role compared with that of seniors and interns: “They are the first-line care providers for your child, but I am the backup. I’m the safety net.”

Observation
During observation, seniors and PHAs were not the only ones who offered assistance to interns. There were numerous times when interns mutually asked for and offered support to each other. For example, on FCR, to prevent interruptions of the intern who was presenting, other team members would answer a page or phone call on behalf of the presenting intern.

In addition to stepping in for seniors, and not predominant in TeamSTEPPS, PHAs also empowered the seniors in decision-making:

Senior: What do you think about stopping the antibiotics [in this child with a lower respiratory tract infection]?
PHA: What do you think?
Senior: I’m not sure it’s worthwhile to continue the antibiotics when the viral study [result] is positive…
PHA: I’ll leave it up to you do decide what to do with the antibiotics.

The relationship between PHAs and the team, especially the senior, further demonstrated the educational environment. A summary of the way our results were used to demonstrate the TeamSTEPPS principles are presented in Fig 2.

DISCUSSION
Using ethnography, we described the complex nature of team activities on a general pediatric inpatient ward during FCR. Reported teamwork practices were often, but not always, observed. As with all social activities, some teamwork practices may operate below levels of awareness. More notable was the alignment of teamwork practices with teamwork principles. Using TeamSTEPPS as an analytic lens, we found that teamwork practices and principles often aligned; indeed, team members both reported and demonstrated several TeamSTEPPS principles. Nonetheless, teamwork practices and principles sometimes misaligned because of
contextual factors, such as the need to provide education and the development of grassroots routines.

Our findings reveal that the educational environment of FCR impacts teamwork and sets the stage for overlapping roles because team members collaborate in their care of patients and ask questions to enable teaching and learning. PHAs, seniors, and interns are simultaneously medical providers and teachers and/or learners. In contrast to some TeamSTEPPS principles, multiple team members have their hand in tasks that theoretically could do alone. Our findings also reveal that grassroots routines, such as running the list and prioritizing the interns’ patients on rounds, make work efficient in the pediatric inpatient setting but do not align with a discrete TeamSTEPPS principle. In sum, teamwork models that outline specific practices could be too rigid to capture the fluidity of teamwork across medical contexts. Our findings are consistent with those of other researchers who call into question the constructs that comprise teamwork frameworks because constructs may not match the complex reality of everyday teamwork.36,37

Despite the charge for highly effective teams, few researchers actually examine teams on inpatient medical wards. van Schaik et al36 examined the differences between outpatient and inpatient interprofessional teamwork and found that in contrast to teamwork principles outlined by Salas38, the rotation of residents on the inpatient team caused friction because of the limitations of their understanding of interprofessional roles and of forming mutually supportive relationships. In observing interprofessional rounds, it has also been suggested that medical providers work in groups, not in teams, because members have “parallel independence… rather than parallel interdependence, which is the hallmark of teams.”39 The frequent change in team members on the pediatric hospitalist team remains an area for future research.

Our study sheds light on how to account for context when developing interventions to enhance teamwork on inpatient medical wards. We offer these data-derived practice implications:

• First, account for wards as a “clinical classroom” for multiple levels of learners.

Although role clarity may be important, overlapping roles need not be a drawback;

• Second, include empowering other team members as a leadership role;

• Third, embrace the pooling of information and shared decision-making as a means to harness the benefits of collective knowledge; and

• Finally, consider that grassroots routines, such as running the list and prioritizing patients on FCR, may not fit within teamwork models but can support effective teamwork.

Our study has several limitations. A subset of the possible number of teams and team members were observed and interviewed by 1 researcher; nonetheless, we generated a rich, in-depth description of fewer participants. Interactions among family members, patients, nursing staff, and other providers were beyond the scope of this study. The context and composition of the team may not be transferable to nonquaternary-care teams or general pediatric teams outside of FCR. Finally, our data do not reveal all the facets of TeamSTEPPS.

With our study, we offer a starting point for understanding how the real-life context of a general pediatric inpatient ward impacts teamwork practices. That said, exploring teams that include patients, families, and nurses would offer a broader and patient-centered view of teamwork. Examining teamwork at other institutions, each with their own unique context, would contribute to a general understanding of how to adapt evidence-based models for improving teamwork across diverse medical settings.

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