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Barriers and Facilitators of High-Efficiency Clinical Pathway Implementation in Community Hospitals

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A B S T R A C T

BACKGROUND: An intervention that involved simultaneously implementing clinical pathways for multiple conditions was tested at a tertiary children's hospital and it improved care quality. We are conducting a randomized trial to evaluate this multicondition pathway intervention in community hospitals. Our objectives in this qualitative study were to prospectively (1) identify implementation barriers and (2) map barriers to facilitators using an established implementation science framework.

METHODS: We recruited participants via site leaders from hospitals enrolled in the trial. We designed an interview guide using the Consolidated Framework for Implementation Research and conducted individual interviews. Analysis was done using constant comparative methods. Anticipated barriers were mapped to facilitators using the Capability, Opportunity, Motivation, Behavior Framework.

RESULTS: Participants from 12 hospitals across the United States were interviewed ($n = 21$). Major themes regarding the multicondition pathway intervention included clinician perceptions, potential benefits, anticipated barriers/challenges, potential facilitators, and necessary resources. We mapped barriers to additional facilitators using the Capability, Opportunity, Motivation, Behavior framework. To address limited time/bandwidth of clinicians, we will provide Maintenance of Certification credits. To address new staff and trainee turnover, we will provide easily accessible educational videos/resources. To address difficulties in changing practice across other hospital units, we will encourage emergency department engagement. To address parental concerns with deimplementation, we will provide guidance on parent counseling.

CONCLUSIONS: We identified several potential barriers and facilitators for implementation of a multicondition clinical pathway intervention in community hospitals. We also illustrate a prospective process for identifying implementation facilitators.

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Asthma, pneumonia, and bronchiolitis are leading causes of childhood hospitalization,[1,2] and clinicians' poor adherence to evidence-based guidelines contributes to poor health outcomes for children hospitalized with these illnesses (longer recovery time/hospital stay, higher rates of transfer to intensive care, and increased risk of readmission).[3–6]

Clinical pathways are a proven tool for improving clinicians' guideline adherence and patient health outcomes,[7–19] and initial studies indicate rapid, simultaneous implementation of multiple clinical pathways is feasible and effective.[10,20–22] The goal of the Simultaneously Implementing Pathways Study (SIP) trial (NCT05206695) is to evaluate this potentially higher efficiency approach by simultaneously implementing pediatric asthma, pneumonia, and bronchiolitis pathways in community hospitals. Some previous studies have explored barriers to single-condition pediatric pathway implementation in community hospitals retrospectively. A study by Ralston et al examined barriers to bronchiolitis pathway implementation in children's and community hospitals,[23] a study by Leyenaar et al identified facilitators of pediatric pneumonia pathway implementation in children's and community hospitals,[24] and a study by McDaniel et al identified facilitators of asthma pathway implementation in community hospitals.[25] However, there are no studies of multicondition pathway implementation, and none has illustrated a process for prospectively using qualitative study findings to refine implementation plans.

Thus, our objectives in this qualitative study were to prospectively (1) identify potential barriers and facilitators of implementing a multicondition pathway intervention in community hospitals (for the SIP trial) and (2) map identified barriers to behavior change targets and additional facilitators using an established implementation framework. Our study is meant to illustrate this mapping process and to broadly inform implementation efforts in community hospitals.

METHODS
Study Setting, Design, and Participants

In fall 2021, recruitment began for the SIP study, a parallel cluster-randomized controlled trial. Forty community hospitals and nested children's hospitals were enrolled. In winter 2021–2022, participants were recruited for this qualitative study. Analysis of this study preceded implementation of the multicondition pathway intervention, which began in summer 2022 (Fig 1). The trial will evaluate the clinicians' adoption of evidence-based practices and patient-centered health outcomes.

Physician site leaders from hospitals enrolled in the SIP trial were invited to participate in this qualitative study. We used purposeful sampling; hospitals and participants were selected because they could provide an "information-rich," deeper understanding of phenomenon of interest for the study.[26,27] Hospitals were sampled to represent the diversity of settings in which the trial was taking place. Participants were purposefully sampled based on active involvement in inpatient care of children hospitalized with respiratory illnesses because the goal of the study was to identify barriers and facilitators of implementing the inpatient multicondition pathway intervention and refine the intervention before launching the trial. We stratified hospitals by type

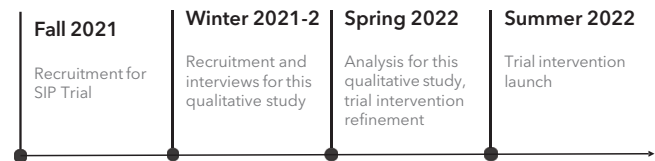| Fall 2021	Winter 2021-2	Spring 2022	Summer 2022
Recruitment for SIP Trial	Recruitment and interviews for this qualitative study	Analysis for this qualitative study, trial intervention refinement	Trial intervention launch

FIGURE 1 Timeline.

(community versus nested children's hospitals) and US geographic region, then we approached 12 site leaders that were initially selected at random within these strata to create a diverse mix in terms of these hospital characteristics. We then sampled more site leaders as needed when participants declined, using this same stratification. Site leaders were all pediatric hospitalists, and they were asked to recruit additional pediatric hospitalists and other interdisciplinary participants (eg, nurses, nurse educators). We used this snowball technique to increase the diversity of clinical roles relevant to the trial. Verbal consent was obtained from all participants. Gift card incentives were provided to compensate participants for their time. This study was approved by our institutional review board.

Data Collection

We designed a semistructured interview guide using the Consolidated Framework for Implementation Research (CFIR).[28] The interview guide contained open-ended questions with semistructured probes (Supplemental Table 4). CFIR outlines major domains that influence implementation: intervention characteristics, characteristics of the individuals involved, the process of implementation, inner setting (hospital), and outer setting (economic, political, and social context of the hospital). Given we were asking about hypotheses regarding future implementation efforts, we deemed it important to ground that inquiry by first broadly exploring past implementation experiences. So, we began interviews with this exploration. We then moved into questions that addressed each CFIR domain for the future SIP intervention.

Individual interviews were conducted by the research team via videoconference between November 2021 and January 2022 and lasted approximately 45 minutes. Interviewers included an undergraduate student, a research project manager (MSc), an anthropologist/research scientist (PhD), and pediatric hospital medicine faculty and fellows (MDs) interested in implementation research. All had some prior experience with qualitative interviewing, with some having several years of experience. None had preexisting relationships with the participants they interviewed. The interview guide was reviewed as a group before initial interviews, with ongoing discussion throughout the interview process about interview technique (eg, use of probes) and iterative refinement of questions. All interviews were recorded and transcribed, and an accuracy check was performed before analysis.

Analysis

We analyzed qualitative interview data using constant comparative methods, in which data within and between interviews were compared and coded iteratively as part of an inductive process.[29]

We collected interview data that focused on understanding the context and process of implementing pediatric pathways in community hospitals, performed initial open coding, identified focused codes and categories, performed focused coding, and developed a conceptual model. Once a preliminary codebook was developed, 4 team members met to review the first 3 transcripts, compare codes to ensure agreement, and discuss clarifications. All transcripts were subsequently coded independently by two team members with different professional roles (anthropologist/ research scientist or pediatric physician). Analysis was performed in parallel during the interview period, and interviews were continued until the research team agreed no new relevant concepts or insights were emerging from the data (saturation). CFIR was used as a reference tool during this process to help ensure we conducted a thorough analysis that considered all CFIR domains; however, themes were not deliberately coded to CFIR domains to preserve a more inductive analytic process (honors what emerges from the data themselves, rather than mapping data to predetermined frameworks).[29] To ensure rigor, we involved diverse study team members and participants (triangulation), engaged in critical reflection on individual biases of team members (reflexivity) and reviewed findings with study participants and solicited feedback (member-checking). Coding was performed using Dedoose (version 7.0.23; Los Angeles, California).

Once coding was complete, excerpt reports were generated, and team members used these reports to write memos (short summaries with exemplary quotes). Then, the study team met to discuss these memos and refine them. This discussion aided in developing a conceptual model of implementing the SIP intervention in community hospitals. We identified potential facilitators/ refinements to the implementation plan in 2 stages. First, we reviewed potential facilitators identified within the interview data. Next, we reviewed barriers identified in the interview data, and each barrier was matched to a behavior change target and implementation strategy using the Capability, Opportunity, Motivation, Behavior (COM-B) Framework and the Behavior Change Wheel developed by Michie et al.[30] The framework outlines 3 conditions needed for behavior change: capability (an individual's psychological and physical ability to participate in an activity), opportunity (external factors that make a behavior possible), and motivation (conscious and unconscious cognitive processes that direct and inspire behavior). The Behavior Change Wheel specifies implementation strategies/facilitators aimed at addressing deficits in each of these conditions. We collaboratively mapped each barrier to a COM-B condition, then selected a facilitator using the Behavior Change Wheel. We cross-referenced this list of potential facilitators with the facilitators already planned as part of the SIP study to refine and strengthen our trial facilitation plan.

RESULTS
Participants

A total of 21 participants were interviewed: 14 physicians, 2 nurse practitioners, 1 pediatric pharmacist, 1 respiratory therapist, 1 pediatric nursing supervisor, 1 nurse educator, and 1 nurse. Only 3 potential interviewees did not respond to interview requests so other participants were approached. There were 1 to 3 participants from a total of 12 hospitals across the United States; characteristics of those hospitals are described in Table 1. Major themes are summarized in Table 2 and detailed next.

Themes: Prior Implementation Efforts
Prior Implementation Experiences

Participants described a variety of prior quality improvement (QI) work, such as improving timeliness of documentation and implementing pathways. Common activities described in this QI work included assembling an interdisciplinary group, delivering education, reminding clinicians of new workflows/behaviors, modifying the electronic health record, and measuring and reviewing performance.

Most interviewees felt that their hospitals had open, effective, and informal communication patterns. Overall, respondents painted a positive picture of their fellow clinicians being broadly accepting and even excited to implement new interventions to enhance their practice of evidence-based medicine. Prior implementation experience, younger age of clinicians, and hospital participation in academic research were all seen as predictors of successful implementation:

"Everybody works together, whether it be medical students, intern, resident, nurse practitioner, attending, dietician, I feel like everybody works together for the most part." [Nurse practitioner]

Barriers to Prior Implementation Efforts

Prior implementation efforts varied considerably in respect to objectives and barriers, but some key themes included lack of stakeholder buy-in, lack of consensus, and technical barriers with the electronic health record:

"Challenges we've had … is getting the other departments to see the importance of doing [implementation] projects in the first place." [Physician]

Regarding a prior implementation project focused on improving discharge summary completion in the electronic health record: "Sometimes a resident might have started a discharge summary. So, starting a discharge summary, it automatically gets assigned to an attending [sometimes wrongly by the electronic health record]." [Physician]

Evaluation Methods

Virtually all participants described evaluation of implementation efforts by using electronic health record review and/or reports that monitored their adoption of evidence-based practices. Almost all participants mentioned the importance of evaluating both improving processes and long-term patient outcomes:

"We reviewed our readmission rates prior to the study, and afterwards … there was a significant improvement in our readmission rates once we implemented that project." [Nurse practitioner]

TABLE 1 Characteristics of Hospitals and Interview Participants

Hospital Number	US Geographic Region	Hospital Type	Total Hospital Beds (Adult and Pediatric)	Annual Volume of Inpatient Pediatric Admissions	Participant(s) Professional Role
1	West	Community hospital with pediatric beds	>250	21–40	Nursing educator Nursing supervisor Physician
2	Northeast	Community hospital with pediatric beds	>250	<20	Physician
3	Northeast	Children's hospital nested within larger hospital/nonfreestanding	>250	41–60	Nurse Physician
4	West	Children's hospital nested within larger hospital/nonfreestanding	>250	>250	Physician
5	Midwest	Community hospital with pediatric beds	>250	<20	Physician
6	Northeast	Community hospital with pediatric beds	>250	<20	2 Physicians
7	South	Children's hospital nested within larger hospital/nonfreestanding	>250	21–40	2 Nurse practitioners Physician
8	South	Children's hospital nested within larger hospital/nonfreestanding	>250	61–80	Pharmacist Physician
9	South	Children's hospital nested within larger hospital/nonfreestanding	>250	21–40	Respiratory therapist Physician
10	West	Children's hospital nested within larger hospital/nonfreestanding	>250	41–60	2 Physicians
11	Midwest	Children's hospital nested within larger hospital/nonfreestanding	>250	61–80	Physician
12	West	Community hospital with pediatric beds	>250	21–40	Physician

"The ultimate, the end all, be all way of assessing the efficacy of a pathway is seeing if you're changing the care of the patient." [Physician]

Improvements in Care Processes and Quality

Success stories and resulting improvements fell into 3 categories: initiating data audit and feedback to identify weaknesses, enhancing communication via shared language and standardization, and improving patient outcomes by engaging interdisciplinary teams:

"I think one thing that went well is that it created a common language for providers, especially with the respiratory measurements." [Physician]

Participants reported that engaging interdisciplinary teams improved effectiveness of interventions and improved patient outcomes:

"What has gone well is getting the buy-in from the different departments. So, the [emergency department] group has changed some procedures … so that speeds up the time from when they present to triage to when they get up to the pediatric floor. The pharmacy

department … agreed to stock the first dose of antibiotics on the pediatric floor and the nurses have been trained to be able to safely and appropriately mix the first dose." [Physician]

Themes: SIP Multicondition Pathway Intervention

Clinician Perceptions of the Intervention

Clinicians were generally very positive about the SIP intervention. They expressed desire to keep up with evidence-based guidelines and standardizing practices. Some had concerns that emergency medicine physicians and/or nonpediatric trained respiratory therapists may have difficulty accurately assessing and diagnosing pediatric patients. However, they expressed that if the SIP pathways contained clear guidance on evaluation and inclusion/exclusion criteria, they would be viewed as excellent tools that could simplify workflows, act as a guide for trainees, ease decision making, and shorten length of stay:

"I haven't seen the pathways, but I have faith that they [physicians] have the skills to follow the pathways. So, I think knowing,

TABLE 2 Major Themes and Exemplary Quotes

Theme	Quotation
Prior Implementation Efforts	
Prior implementation processes *Participants described assembling teams, standardizing practice, delivering education, developing new workflows, measuring and reviewing performance, and creating decision support tools.*	"We created a multidisciplinary team to create this pathway, establish it; and we did create some order panels within EPIC [electronic health record]."
Barriers and challenges *Participants described the challenges of educating multiple groups of clinicians with varying schedules, maintaining motivation and momentum, and getting buy-in from clinicians in other units.*	"Keeping all of them on board and getting them educated can be difficult. The emergency room is manned by many, many, many providers that work different shifts, different times."
Evaluation methods *Participants described using electronic health record data to track performance and improvements in care.*	"We're basically collecting as the project is ongoing, we're collecting data. Basically, … the time it takes patients to get up from the emergency room to the pediatric floor, the time it takes for the nurses to get intravenous access and get labs done. And the time it takes for the hospitalists to get lumbar puncture done. And eventually the time it takes for the nurse to get antibiotics. So that's the data we're collecting right now, and it looks promising."
Improvements in care processes and quality *Participants described a variety of positive changes from prior implementation efforts that included enhanced communication through standardized language, identification of weaknesses in clinical workflows, more efficient workflows, and improved clinical outcomes.*	"The asthma pathway was really amazing, because we were doing our data, and you could see that kids that would typically get admitted, they were home within 5 hours. So, that was a great incentive to do that at that level."
SIP Multipathway intervention	
Clinician perceptions of the intervention *Participants described positive clinician reactions to the SIP intervention, including broad acceptance and excitement, especially at academic institutions and among those with quality improvement interests or fewer years of clinical experience.*	"I think they'll love it. Yeah, I think they'll love it. We're always looking to stay up to date and practice evidence-based medicine. Most of our folks are pediatric hospitalists and that's all they do, and so they're very passionate about staying up to date on the literature and things like that."
Potential benefits of the intervention *Participants described a variety of potential benefits of the intervention including access to clinical decision support tool templates and evidence-based clinical pathways that could be widely distributed, reductions in unnecessary care, and improvements in efficiency.*	"So, I think the benefit would be to streamline this education to our whole facility, so these kids aren't exposed to things they don't necessarily need exposed to."
Anticipated barriers and challenges *Participants described major anticipated barriers, which included limited time/bandwidth of clinicians, rotation/turnover of staff, parental concerns about perceived lack of treatments/tests, and difficulty changing practice across other hospital units, such as the emergency department.*	"Well, most of my patients are coming through the emergency [department] (ED), so I would have to have the buy-in from the ED physicians"
Potential facilitators *Participants described several potential facilitators, including clear pathways/protocols with adaptable elements, creation of a team environment, buy-in from parents/caregivers, and creation of standardized clinical decision support tools.*	"Having something that's prepared, that's validated, that cites the resources or the studies that it's coming from."
Resources needed for implementation *Participants described helpful resources for implementation, including educational resources, data collection support, and funding for clinician time.*	"So that's something, if you have some good educational resource that I can tap into, educate myself first and then educate everybody else, not a 100, 200-page document, because that kind of time is really challenging, but something, if you would advise, that would be very helpful."
SIP, Simultaneously Implementing Pathways Study.	

I guess, the exceptions and the inclusion criteria well, will probably help them." [Physician]

Potential Benefits of SIP Intervention
Overall impressions of the SIP project were positive, with participants noting the need for standardized and evidence-based practices in caring for pediatric patients with respiratory conditions.

Reducing unnecessary use of antibiotics and nebulizers, reducing unnecessary imaging (and therefore exposure to radiation), and cost effectiveness were all identified as benefits by participants:

"It's going to be the same treatment plan with every patient that comes in with bronchiolitis. I think that's the benefit." [Nurse educator]

Anticipated Barriers to Implementing the SIP Intervention

Several anticipated barriers to the SIP intervention were described. These included limited time/bandwidth of clinicians, difficulty changing practice across the diverse groups of clinicians involved in the care of hospitalized children (eg, primary care doctors, emergency physicians), and parental concerns about perceived lack of treatments/tests:

"It's going to be manpower and time … Right now, pretty much working every day, every single day, alternate weekends." [Physician]

"Many of us are hesitant to use that word asthma after perhaps only 2 episodes of wheeze in a lifetime and asthma does not always have a very clear definition. So, for the sake of this study, I would say it would be helpful to have a very clear consensus on how you define asthma." [Physician]

"So, I think just maybe education for all the [respiratory therapists], because not all of them work with children. And I think that's a big barrier for a pediatric hospital based in an adult hospital." [Physician]

"As well as just fear from parents or family members who are trying to push for the best care for their child. And a lot of times that's perceived as more intervention than less." [Physician]

Potential Facilitators

When discussing how the challenges in implementing the SIP intervention could be overcome, participants emphasized incentives and flexibility in educating clinicians. Specific recommendations the provision of high-quality, structured, and easy-to-understand protocols to facilitate implementation and developing a shared electronic platform. Finally, parents needed to be counseled regarding avoidance of unnecessary treatments/tests:

"A shared drive electronically, a central location on the unit and then the residents will have their own separate resources." [Physician]

"I think maybe some family education stuff. We have a lot of parents who come in and ask for chest x-rays, ask for antibiotics, ask for albuterol." [Physician]

Resources Needed for Implementation

Among resources needed to implement SIP, the most frequently requested were educational resources (eg, educational videos that could be accessed anytime), funding for clinician time, and chart review/data collection support. Furthermore, general availability of the study team and consistent communication with site leaders was mentioned:

"Funding would always be welcome, because that is my additional time and that is not budgeted for in my faculty, so essentially it's something I would be doing on my day off. [Physician]

"Ultimately, [the study team/staff] helping us communicate with our information technology folks about what data can be readily pulled from the chart and what data, minimizing the amount of data that requires chart review." [Physician]

Mapping Additional Facilitators using the COM-B Framework and Behavior Change Wheel

Table 3 illustrates the mapping process to refine our overall implementation facilitation plan. We engaged study team members, study participants ($n = 3$), study external facilitators, and an interdisciplinary advisory board in this process. Anticipated barriers identified by participants (discussed previously) were mapped onto the COM-B framework[30] under 1 of the following conditions: Capability, Motivation, or Opportunity. Using the Behavior Change Wheel, these targets for change were then matched to specific implementation strategies. Several strategies were selected for incorporation into the implementation plan, including providing Maintenance of Certification credits for clinicians, providing easily accessible educational videos, emphasizing engagement of emergency department and primary care clinicians, and training clinicians on parent counseling around avoidance of unnecessary treatments/tests

DISCUSSION

This national qualitative study identified anticipated barriers and facilitators of rapidly, simultaneously implementing clinical pathways for

TABLE 3 Matching Barriers to Implementation Strategies/Intervention Refinements

Step 1: Identify a Potential Barrier	Step 2: Match to Behavior Change Target	Step 3: Match to Potential Implementation Strategy
Limited time/bandwidth of clinicians to lead implementation efforts	Opportunity (Physical) (factors outside the individual that make a behavior possible)	Enablement: Incentivize project participation by providing Maintenance of Certification and Continuing Medical Education credits, thereby reducing need to spend time on those activities. Limit implementation tasks to only those that are essential.
Maintaining educational efforts for new staff and rotating trainees	Capability (Psychological) (having the necessary knowledge and skills)	Education: Provide online video training modules that can be accessed anytime, easily and for new staff and/or trainees
Difficulty changing practice across all the settings and groups — especially emergency department (ED)	Motivation (Reflective) (conscious and subconscious decision making)	Education and Persuasion: Provide ED clinical pathways, engage an ED champion, highlight efficiency gains with implementation of the SIP intervention
Parental concerns about deimplementation of treatments	Motivation (Reflective) (conscious and subconscious decision making)	Education: Provide guidance for clinicians to engage in conversations about unnecessary treatments with parents
SIP, Simultaneously Implementing Pathways Study.		

asthma, pneumonia, and bronchiolitis in community hospitals. Unlike freestanding children's hospitals, community hospitals face unique challenges to improving care quality for children, including limited resources and support for pediatric quality improvement efforts.[25,31,32] We prospectively identified barriers and facilitators to implementing this multicondition pathway intervention. The prominent barriers we identified included limited time/bandwidth of clinicians to lead implementation efforts, maintaining educational efforts for new staff and rotating trainees, difficulty changing practice widely across different settings and groups, and potential parental concerns about deimplementation of treatments. We combined potential facilitators from our qualitative interviews with findings from a barrier mapping process, in which we used an established implementation framework to map barriers to additional potential facilitators. Key facilitators identified included provision of maintenance of certification credits, availability of easily accessible educational videos/resources, engagement of emergency department clinicians, and guidance on parent counseling. Our study can guide others in applying this prospective mapping process, and our findings can broadly inform high-efficiency pathway implementation efforts in community hospital settings.

Our findings align with and build on prior studies on this topic. Previous studies by Ralston et al and Leyenaar et al focused on single-condition pathway implementation similarly found that barriers included limited time and support for pediatric implementation efforts (paid/supported time for implementation leaders, administrative support).[23,24] We found in our data that this barrier might be heightened by the greater time demands of multicondition pathway implementation. Another previous study by McDaniel et al similarly reported difficulties in motivating behavior change across different clinician groups, such as emergency department clinicians or those primarily focused on care of adults (eg, respiratory therapists).[25] These prior studies also found similar facilitators to our study, including collaborative culture/creation of a team environment and interdepartmental engagement.[25,23] Our study highlighted new, unique barriers compared with these prior analyses, including parental concerns with deimplementing treatments/tests and maintaining educational efforts for new staff and rotating trainees.

There has been a broad call to enhance the impact of pediatric QI efforts by better integrating such tools from implementation science,[33] and we illustrate a formal process for prospectively mapping barriers to facilitators of pathway implementation. We used the COM-B framework and Behavior Change Wheel,[30] which were developed via a systematic review of the literature on behavior change drawing from a wide array of disciplines including psychology, health promotion, epidemiology, public health, and anthropology. We engaged a broad group in this 90-minute mapping process, in which we reviewed the framework and our mapping of barriers, then engaged in brainstorming facilitators. We found use of the framework promoted a thorough understanding of the drivers of behavior change, from which we were able to successfully brainstorm an array of potential facilitators of the intervention. The main challenge we faced was determining which

facilitators were feasible to support given the resources available. This process does require time and resources that may not always be available for hospital-based QI efforts, but it is possible that this short mapping process could be integrated into QI standard workflows around understanding the current state of a problem and drivers/root causes.

A fundamental barrier to implementing evidence-based guidelines is motivating clinician behavior change, and our study found this may be especially difficult across all the diverse groups involved in the care of hospitalized children. Clinicians in primary care, emergency departments, and hospital units may all be involved in care of a hospitalized child. The decisions of each influence the children's overall care quality and health outcomes. For instance, our participants reported, and prior studies have shown that antibiotic decisions around the treatment of pneumonia in the emergency department often influence care/are continued in the inpatient setting, even if they are discordant with guidelines.[34] Additionally, participants were concerned that initiation of preventive inhaled corticosteroids for asthma by inpatient clinicians might conflict with outpatient primary care clinicians' treatment plans. It was not within the scope of our inpatient-focused study to specifically engage and evaluate emergency department physicians' perspectives on improving pediatric care quality. However, previous studies have shown that emergency physicians feel a moral imperative to improve pediatric care and value the availability of educational resources and evidence-based guidelines/pathways.[35] Prior studies have also shown that primary care clinicians identify several barriers to inhaled steroid initiation, including parent uncertainty about the diagnosis of asthma, utility of inhaled steroids, and exact plans around medication usage.[36] They identify asthma action plans as facilitators to overcome some of these barriers. Given these findings, we plan to encourage implementation teams engage champions across all relevant groups/settings in implementation efforts, even though our intervention is primarily focused on the inpatient setting. We will provide educational resources that are relevant to emergency department management and templates of asthma action plans.

Additionally, we found many participants have faced parental concerns when trying to avoid unnecessary medical treatments and tests. This specifically pertained to the bronchiolitis pathway, which emphasizes the evidence-based practice of avoiding chest radiography and administration of albuterol. Participants described that parents may advocate for chest radiography our of concerns for bacterial pneumonia and/or ask for albuterol treatments, especially if other clinicians had administered them in past episodes of illness. Prior studies have demonstrated that specific clinician communication strategies are effective in reducing use of unnecessary treatments.[37] These strategies include beginning with a negative recommendation (eg, "For bronchiolitis, albuterol won't help."), then following with a positive recommendation (eg, "Optimizing hydration and gently suctioning the nose will help."), then closing with a contingency plan (eg, "If things are getting worse, we will discuss other potentially helpful supports."). These

communication strategies also align with the larger literature on de-implementation, which emphasizes concepts of "unlearning" (education on the evidence that a treatment/test is unnecessary) and "substitution" (substituting another behavior/practice for the unnecessary one).[38] As part of our trial facilitation, we will now provide clinicians education and training on these communication strategies to better support deimplementation of unnecessary treatments.

Our study was limited by our sample being predominantly pediatric hospitalists; however, they are our primary target of behavior change in this intervention. Future studies would be strengthened by the recruitment of physicians from other specialties (eg, emergency medicine) and additional interdisciplinary team members such as respiratory therapists and pharmacists. Additionally, we had to ask participants to anticipate potential barriers to implementing the SIP intervention and generate hypotheses, which may or may not ultimately be accurate. However, we tried to anchor these hypotheses by first asking in detail about past experiences, and our study goal was to refine a trial facilitation plan before implementation. We do also plan to conduct a qualitative analysis of implementation barriers after the trial. Last, our sample reflects 12 community hospitals from around the United States, but the findings from these hospitals may have limited ability to generalize more widely because of selection bias. Hospitals participating in the SIP trial may have unique resources (eg, highly motivated pediatric hospitalists, academic affiliations) that enable participation. Additionally, participants in this qualitative study may have unique characteristics, such as higher QI experience. However, the included hospitals were diverse in terms of location, size, and structure, and the participants held diverse clinical roles as well.

CONCLUSIONS

We identified several potential facilitators of implementing a multi-condition pediatric clinical pathway intervention in community hospitals. These included providing Maintenance of Certification credits for clinicians, providing easily accessible educational videos, emphasizing engagement of emergency department and primary care clinicians, and training clinicians on parent counseling around avoidance of unnecessary treatments/tests. We also provided guidance on how to prospectively approach assessing barriers and selecting potential facilitators of implementing evidence-based interventions in community hospital settings. We will integrate these findings into the design and conduct of the SIP trial, which will ultimately determine the effectiveness of this refined intervention on evidence-based care and health outcomes in children hospitalized with respiratory illnesses.

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