

# Barriers and Facilitators to Pediatric Emergency Telemedicine in the United States

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## Abstract

**Background:** Pediatric emergency telemedicine has the potential to improve the quality of pediatric emergency care in underserved areas, reducing socioeconomic disparities in access to care. Yet, telemedicine in the pediatric emergency setting remains underutilized. We aimed to assess the current state of pediatric emergency telemedicine and identify unique success factors and barriers to widespread use. **Materials and Methods:** We conducted a telephone survey of current, former, and planned pediatric emergency telemedicine programs in the United States. **Results:** We surveyed 25 respondents at 20 unique sites, including 12 current, 5 planned, and 3 closed programs. Existing programs were located primarily in academic medical centers and served an average of 12.5 spoke sites (range, 1–30). Respondents identified five major barriers, including difficulties in cross-hospital credentialing, integration into established workflows, usability of technology, lack of physician buy-in, and misaligned incentives between patients and providers. Uneven reimbursement was also cited as a barrier, although this was not seen as major because most programs were able to operate independent of reimbursement, and many were not actively seeking reimbursement even when allowed. Critical success factors included selecting spoke hospitals based on receptivity rather than perceived need and cultivating clinical champions at local sites. **Conclusions:** Although pediatric emergency telemedicine confronts many of the same challenges of other telemedicine applications, reimbursement is relatively less significant, and workflow disruption are relatively more significant in this setting. Although certain challenges such as credentialing can be addressed with available policy options, others such as the culture of transfer at rural emergency departments require innovative approaches.

Key words: emergency medicine/teletrauma, pediatrics, policy, telehealth

## Introduction

Over 19 million children receive care in an emergency department (ED) each year, representing 27% of all ED visits.<sup>1</sup> However, fewer than 7% of EDs in the United States have all the necessary supplies for managing pediatric emergencies, and there are critical deficiencies in trained

pediatric emergency personnel throughout the country.<sup>2,3</sup> These problems are particularly acute in small hospitals and hospitals located in rural geographic areas, leading to substantial socioeconomic disparities in access to high-quality pediatric emergency care. A potentially innovative solution to these challenges is emergency telemedicine, whereby clinicians use real-time audiovisual technology and electronic health records to provide emergency care from a remote location. Under a telemedicine model, pediatric emergency medicine specialists in a “hub” hospital can quickly evaluate, manage, and triage children presenting to a remote hospital, or “spoke,” that initiates consultations. Emergency telemedicine could in theory improve the quality of pediatric emergency care at small hospitals,<sup>4,5</sup> facilitate effective triage and transport to referral hospitals,<sup>6</sup> reduce costs by eliminating unnecessary transports,<sup>7,8</sup> and reduce rural-urban disparities in access to care.<sup>9</sup>

Because of these potential benefits, the Institute of Medicine recently endorsed the role of pediatric emergency telemedicine in the U.S. healthcare system.<sup>10</sup> Yet, telemedicine in the pediatric emergency setting remains relatively underutilized compared with other types of telemedicine.<sup>11–13</sup> Prior work identified issues related to licensing, credentialing, medical malpractice, and reimbursement as major barriers to the general use of telemedicine in healthcare.<sup>14,15</sup> However, the relative importance of these barriers in the field of pediatric emergency telemedicine is unknown, leaving clinicians, healthcare administrators, and policy makers with little guidance about how and where to best implement this technology.<sup>10,16,17</sup>

To fill this knowledge gap, we surveyed current, former, and planned pediatric emergency telemedicine programs in the United States. We sought to assess the current state of pediatric emergency telemedicine and identify both critical success factors and unique barriers to widespread use. Our goal was to facilitate the sharing of lessons learned and help stakeholders assess the generalizability of commonly cited barriers to the development and sustainability of this potentially valuable healthcare delivery strategy.

## Materials and Methods

### STUDY DESIGN AND SUBJECTS

We performed a telephone survey of current, former, and planned pediatric emergency telemedicine programs in the United States. The survey was administered between January and April 2013. To be eligible, programs had to be hospital-based and provide on-demand pediatric emergency services to one or more external spoke hospitals. We identified potentially eligible programs in three ways: (1) a review of the medical literature; (2) formal inquiries to pediatric professional medical associations, telemedicine advocacy groups, and pediatric emergency

training programs; and (3) snowball sampling, in which additional programs were identified by survey respondents. First, we searched the peer-reviewed and gray literature databases (PubMed, Scopus, and Google Scholar) for references to specific programs. Second, we sent a preliminary program list to all members of the American Academy of Pediatrics Section on Telehealth Care and the American College of Emergency Physicians Section on Pediatric Emergency Medicine, asking them to confirm these programs and identify additional programs at any stage of development. We also e-mailed the leadership of the American Telemedicine Association Pediatric Telehealth Special Interest Group as well as a physician contact at every hospital in the United States with a fellowship in pediatric emergency medicine.<sup>18</sup> Third, at the completion of each survey, we reviewed the working list of programs and asked respondents to identify any programs we may have missed.

These three strategies yielded a combined total of 29 programs (12 current, 3 former, and 14 planned). We invited all current and former programs as well as a subset of planned programs to participate in the survey (*n* = 23). We continued to recruit additional planned programs at random until we achieved saturation, defined as the point in which additional surveys did not generate new information.<sup>19</sup> This strategy resulted in 20 distinct programs in the final sample (response rate of 87%). Because certain programs requested that more than one representative complete the survey (e.g., an ED physician and representative from the hospital's telehealth office), we surveyed a total of 25 individuals.

**SURVEY INSTRUMENT**

The survey consisted of a standard set of close-ended questions as well as a flexible set of open-ended questions. We based the survey questions on a conceptual framework of telemedicine adoption developed from a review of the general telemedicine literature.<sup>14,20,21</sup> The final instrument covered three domains: (1) program characteristics, including length of time in operation, home department of the program within the hub site, program aims/mission, number of spoke sites, average number of consultations, and sources of funding; (2) barriers and challenges to program implementation; and (3) policy and practice recommendations to increase the use of pediatric emergency telemedicine. Current programs were asked questions related to all three domains, whereas former and planned programs were asked only about the second two domains. Surveys were administered by the lead author and a research assistant who took detailed notes on responses to open-ended questions. The survey questions, along with all of the study procedures described in this article, were approved by the RAND Corporation's Institutional Review Board, and informed consent was obtained at the time of survey administration.

**DATA ANALYSIS**

We performed both a quantitative and qualitative analysis. For the quantitative analysis, we summarized key hub hospital characteristics using data from the 2010 American Hospital Association Annual Survey and generated descriptive statistics on responses to the close-ended survey questions. For this analysis we excluded programs that were not hospital based, did not serve spoke sites, or had an integrated telemedicine program (i.e., did not have a specific program

around this service line but rather included pediatric emergency telemedicine under a much broader umbrella).

For the qualitative analysis, we used standard qualitative analysis techniques to identify themes in the responses to open-ended questions. Based on the recommendations of Miles and Huberman,<sup>22</sup> the thematic analysis incorporated both themes from the literature that informed the topics covered in the survey, as well as new unanticipated themes and subthemes that emerged.<sup>23</sup> A hierarchically organized codebook was developed to identify and summarize themes and patterns.<sup>24</sup> MaxQDA version 10 qualitative research software was used to facilitate data handling, coding, and thematic analyses. Qualitative results are presented as a list of potential barriers and recommendations with illustrative quotes to provide examples of key concepts. For this analysis we included all surveyed programs.

**Table 1. Characteristics of Included Programs**

CHARACTERISTIC	N (%)
Hospital type	
Exclusively pediatric hospital	7 (41)
Mixed adult and pediatric hospital	10 (59)
Ownership	
Nonprofit	12 (71)
Government	5 (29)
For profit	0 (0)
Member of a multihospital system	7 (41)
Hospital beds	
200–299	4 (24)
300–399	2 (15)
400–499	5 (29)
500+	6 (35)
Region	
Northeast	6 (35)
South	4 (24)
Midwest	1 (6)
West	6 (35)
Located in one of the top 100 largest cities in the United States	11 (65)
Development stage	
Current/ongoing	9 (53)
Planned	5 (29)
Closed	3 (18)
Only programs that met inclusion criteria for the quantitative component of the study ( <i>n</i> = 17) are included.	

**Results**

**PROGRAM CHARACTERISTICS**

Of the 20 programs recruited to participate, 3 were subsequently excluded from the quantitative analysis because they were not hospital based, did not serve spoke sites, or had an integrated program. The remaining 17 programs are described in *Table 1*. Programs were generally in mixed adult and pediatric hospitals (59%), nonprofit hospitals (71%), and hospitals with over 400 beds (64%).

Descriptions of the nine current programs are provided in *Table 2*. The median year of initiation for the nine programs currently in operation was 2007 (range, 1998–2012). The mean number of annual consultations across sites was 45 (range, 12–85). Three programs (33%) were reimbursed for consultations by one or more payers, and one program (11%) required spoke hospitals to pay a fee for access to telemedicine services. Other sources of funding included external grants (78% of programs) and internal hospital funding (56% of programs).

Three former programs were identified, with two (67%) ending operations in 2011–2012 and the other ending operations in 2009. The mean number of annual consultations prior to closure was 19 (range, 4–47). Reasons cited for closure included prob-

lems with making a business case for telemedicine to hospital administrators, perceptions of limited value beyond phone consultation in a fast-paced ED environment, and persistently low consult volumes.

**BARRIERS AND CHALLENGES**

*Credentialing.* Both planned and current programs noted that credentialing, the process by which physicians at hub sites receive permission to practice at spoke sites, is one of the biggest barriers to greater use of pediatric emergency telemedicine. Participants called the credentialing process a “nightmare” because a large number of physicians must complete onerous and redundant paperwork for each spoke site. In some ways this process was streamlined by the Centers for Medicare & Medicaid Services’ (CMS’s) 2011 rule and Joint Commission standards allowing for “credentialing by proxy,” which permitted spoke hospitals to rely on the credentialing and privileging decisions of the hub hospital. One participant described credentialing by proxy as a “huge step forward.” Multiple participants echoed the statement: “although the process is still a burden, credentialing is less than a problem than it was two years ago.”

**Table 2. Descriptions of Current/Ongoing Programs**

PROGRAM	YEARS IN OPERATION	LEAD DEPARTMENT AT HUB SITE	NUMBER OF SPOKE SITES	ESTIMATED CONSULTS PER YEAR	PROGRAM MISSION/AIM	REIMBURSED FOR CONSULTS BY ONE OR MORE PAYERS	SPOKE SITES PAY FEE FOR ACCESS
University of California, Davis	2003–present	ED	18	48	Improve patient care in underserved areas	Yes	No
Boston Children's Hospital	2012	PICU	1	<sup>a</sup>	Improve decisions regarding transport and generate referrals/differentiate program from competitors	No	No
Vermont Children's Hospital at Fletcher Allen Healthcare	2003–present	PICU	12	12	Improve patient care in underserved areas	No	No
University of Arkansas	2007–present	ED	24+	Not reported	Improve patient care in underserved areas	No	No
Oregon Health and Science University	2007–present	PICU	10	85	Reduce unnecessary transports and improve pretransport care	Yes	No
University of New Mexico	2012–present	ED	1	<sup>a</sup>	Reduce unnecessary transfers and provide education	No	No
Massachusetts General	1998	PICU	30	40	Stabilize patients for transport	No	Yes
Eastern Maine Medical Center	2005	PICU and trauma surgery	15	40	Improve patient care in underserved areas and facilitate and improve transport decisions	Yes	No
Children's Hospital of Orange County	2007	PICU	2	50	Facilitate the transfer process	No	No

<sup>a</sup>Missing for programs less than 1 year old at the time of the survey. ED, emergency department; PICU, pediatric intensive care unit.

Yet, for two major reasons, the CMS rule did not completely solve the credentialing problem. First, many community hospitals are unwilling to modify their bylaws to accept credentialing by proxy. According to one participant, “bigger community hospitals that want control and are concerned about liability won’t accept credentialing by proxy while smaller hospitals are often willing.” Second, despite the CMS rule certain states do not allow credentialing by proxy. As a result, the majority of planned and current programs completed full credentialing packages for physicians. Three current programs took a different approach; they concluded with selected spoke sites that credentialing was not necessary and chose to operate without it. One participant explained that “credentialing is not necessary because we are playing an advisory role rather than providing care at the remote site.” Another argued, “We do not do credentialing because what we are doing is the same as a phone consultation.”

*Integration into established workflows.* According to several participants, telemedicine “adds another step” or “15 min” when a phone call could suffice. Similarly, spoke site physicians may deem it unnecessary to initiate a consult if they have already decided to transfer a patient. As one participant noted, “there is a culture to treat or transfer and in either case, a consult adds more work.” According to another participant, “this extra step can be a major barrier when [the hub site physicians] are very busy or when a patient is critical and there is a high anxiety situation.” One participant argued that few programs think about operations and the impact on workflow in advance. He commented, “90% can’t answer the simple question . . . how long does a consult take?”

*Lack of physician buy-in.* Lack of physician buy-in at the hub hospital is a significant barrier to success. Physicians at the hub hospital why they should manage the logistics of setting up a telemedicine consult when, in their opinion, it often does not add value beyond a traditional telephone call. In the words of one participant, “many are not convinced that pediatric emergency telemedicine improves patient care.” Lack of physician buy-in is a barrier at the spoke hospitals as well. Numerous program representatives mentioned the need to “sell reluctant spoke sites on the value of telemedicine.” Multiple programs conduct active outreach to recruit spoke sites; in fact, only a small handful of programs reported being approached by remote sites interested in receiving telemedicine services.

Participants shared several theories why remote sites “rarely ask for pediatric emergency telemedicine and often actively resist it.” First, community hospitals that typically transfer sick children are not eager to extend the interaction and potentially prevent transfer. In the words of one participant, “the docs are terrified and just want to get the patient out.” According to another participant, “For an anxious clinician who is transferring a patient, they don’t care whether decision-making is slightly improved or not. They have decided that the patient deserves to be transferred and they want to get the patient out in an efficient way.” Second, spoke site physicians may worry that hub site physicians will not be respectful and will tell them “how to do their jobs.” One participant explained, “Some are against it because they think we are supervising them or criticizing them in

public . . . the stakes are raised when the patient’s family is present.” Third, some spoke site physicians want to “go it alone” and find the concept of “frontier medicine” appealing. Finally, participants noted that some spoke site physicians don’t trust the hub hospitals and fear that “we are trying to take jobs.”

When rural, remote facilities serve Native American tribes, there are additional hurdles to obtaining buy-in. According to one participant, “there is a historical trauma that the tribes carry of outside entities coming in.” Furthermore, “There is a disconnect between what we are offering and advocating for [telemedicine services] and what they really need (e.g., a new clinic.)”

*Misaligned incentives.* Participants commented that a significant problem for planned and current programs is that incentives are not appropriately aligned: “The true benefit of telemedicine is to society, and maybe the insurers, rather than the institutions in the system.” Several participants explained that when telemedicine allows a sick child staying in the community rather than being transferred, the family avoids a long, inconvenient trip to a large medical center. Even for children who end up being transferred, the consult helps “reduce the parents’ stress” and sets expectations for the transfer process. Physicians at the hub hospital, in contrast, understand that when telemedicine is offered as a service, they must spend additional time responding to consults, thus adding to their workload. According to one participant, “The [hub] hospital gets to wave the flag that they offer this service, but the [hub] doc just has to work harder for no additional compensation.” The hub hospital as a whole has a great deal to lose. If a transfer is prevented as a result of telemedicine, “this is good for everyone but the hub.” One participant explained that in that scenario the hub is “losing a potential patient and losing the time it took to turn the patient away.”

*Lack of reimbursement.* According to the majority of program representatives, inadequate reimbursement or lack of reimbursement was not a major barrier in starting their programs. For example, one stakeholder commented, “we ignored reimbursement . . . we provided a service that was necessary.” Another said that “our focus was much less about being paid for it . . . the impetus was not financial, but appropriate care.” Programs generally managed to obtain grants and internal hospital funding by convincing administrators that telemedicine was “central to their mission,” would generate or sustain referrals, or “differentiate the hospital from its competitors.” Even the small subset of programs that reported being reimbursed by one or more payers noted it did not cover program costs: “We are getting reimbursed for consultations but that doesn’t pay for it.” According to a planned program participant, “Even if we can bill, that is not likely to sustain the program by itself.”

There were two leading reasons why current and planned programs did not bill (or anticipate billing) for consults. First, certain payers would not reimburse. Second, select programs that could bill did not because they felt the process was too time-consuming: “The hospital wishes we billed but we don’t want to navigate it.” Another participant noted, “It is a lot of work to document a high level consult.

It is hard enough to see the patient via a telemedicine let alone do all this extra work.”

That said, most programs viewed inadequate reimbursement as a significant barrier to long-term sustainability: “We can only operate on borrowed capital for so long.” Another participant noted, “Value and reimbursement are critical to sustainability.” Yet this view was not universal. Two participants noted that in the future reimbursement will be a nonissue because of accountable care organizations and global payments where “what matters is quality and efficiency rather than getting paid for each encounter.”

Regardless of programs’ ability to bill for telemedicine services and directly recoup costs, participants felt that there was a solid business case for telemedicine. Participants noted that it can “develop and solidify relationships with community hospitals,” “grow referral networks,” and “strengthen branding.” According to one participant, “for the institution providing the service, you can become the provider of choice first and foremost in the rural site’s mind. ... It can ultimately increase volume to other specialty care providers because you are recognized as an institution that can provide services.”

*Usability of technology.* According the several stakeholders, the ease of use and the comfort level of physicians engaging with the equipment remain ongoing barriers. One stakeholder noted, “Equipment can be hard to use and it looks like you don’t know what you are doing to the person on the other end. It is an ongoing challenge to keep people competent when volume is low.” Yet the

cost of the technology itself is no longer a leading barrier. The technology required for telemedicine programs used to be prohibitively expensive; however, participants noted that in recent years costs have declined dramatically: “Financial barriers are now less of a problem.”

**POLICY AND PRACTICE RECOMMENDATIONS**

Participants shared multiple pieces of advice for planned pediatric emergency telemedicine programs. Topics included directions on selection of spoke hospitals, cultivation of clinical champions, engaging physicians with the technology, strategies for obtaining buy-in from spoke hospitals and physicians, increasing volume, and integrating with other emergency telemedicine programs in the region (*Table 3*).

**Discussion**

In a comprehensive survey of current, former, and planned pediatric emergency telemedicine programs, we identified several key barriers to effective implementation. Several of these barriers are consistent with known challenges to implementing telemedicine in the broader healthcare environment, including credentialing, lack of buy-in among both hub and spoke providers, misaligned incentives, and difficulty with technology. However, several of these barriers are unique to the emergency setting. For example, many respondents noted how telemedicine can substantially disrupt the carefully balanced workflow of the busy ED. This indicates that telemedicine must

**Table 3. Potential Facilitators to Pediatric Emergency Telemedicine Programs in Development**

DOMAIN	SPECIFIC RECOMMENDATION
Selection of spoke hospitals	When choosing spoke hospitals to include in a network, program administrators should first consider ease of implementation. They should begin with sites that are likely to be the most straightforward (e.g., sister hospital with a shared electronic health record.) Once they have worked out logistical and administrative hurdles, then they should expand and begin to select sites based on need.
Cultivation of clinical champions	Program administrators should cultivate clinical champions at both the hub and spoke sites. In addition, there tends to be a great deal of emphasis on the identification of physician champions. It is equally important to cultivate nurse champions who set up equipment and coordinate the consultations.
Physician engagement with technology	Lack of comfort with equipment is a major reason why physicians elect not to use telemedicine and instead opt for a phone consult. To improve their comfort level, encourage physicians to engage with the technology as much as possible outside of consults. For example, offer educational programming via telemedicine and do frequent testing of equipment.
Obtaining buy-in from spoke sites	In cases where spoke hospitals must be convinced that a pediatric emergency telemedicine program is worth the effort, bundle a pediatric emergency telemedicine program with a menu of other service lines or programs. For example, program administrators can offer pediatric emergency telemedicine among other offerings where spoke sites already see value (e.g., telestroke).
Obtaining buy-in from hub physicians	Hub site physicians may view consults as additional work, and this can inhibit buy-in. Program administrators can incentivize physicians to provide consults by removing other responsibilities/allowing telemedicine consults to replace another time-consuming activity. For example, administrators can remove the requirement that physicians drive to do a remote clinic once a month.
Improving volume	Spoke sites may fail to initiate consults if they are unclear regarding the proper use of telemedicine. If volume is low, program administrators can provide education to spoke hospitals regarding when exactly to use telemedicine. They should provide specific instructions and examples of when a consult should be initiated. To improve volume, closed systems can impose a health system-wide rule that any phone consult be rolled over into telemedicine.
Common platform for telemedicine within hub site	To improve efficiency, program administrators should have all telemedicine programs within the hospital under one umbrella. A common platform not specific to service line provides economies of scale.

offer more than just marginal benefits for patients to justify physicians' investment of time. Additionally, respondents noted that the current mindset for many small rural departments is to transfer sick children to regional centers of excellence. Implementing telemedicine as a strategy to keep sick children in their community will clearly involve a paradigm shift in the current thinking regarding emergency pediatric transfers.

Insufficient volume is another problem that is relatively unique to pediatric emergency telemedicine programs. We found that that one program closed because of low volume, and low volume contributes to an ongoing workflow challenge, as physicians cannot maintain their skills on equipment that they rarely use. Case volume is a difficult issue in all telemedicine applications, as volume needs to be high enough to justify investment in the telemedicine technology but not so high as to justify the presence of full-time, in-person specialists at the spoke site. Here, we find that most programs are struggling at the low end of the volume spectrum. If volume is too low, it is difficult to justify a program, and workflow challenges persist; if it is too high, spoke sites may need to develop other strategies to manage pediatric emergencies, such as expanded use of clinical protocols or hiring of dedicated pediatric emergency specialists.

Contrary to our expectations and to most of the existing telemedicine literature,<sup>20,25,26</sup> participants did not identify reimbursement as one of the biggest barriers to the adoption and sustainability of telemedicine. Many of the current and planned programs we surveyed devised strategies to operate without reimbursement. Although we could not assess the extent to which inconsistent reimbursement is a barrier to entry, it seemed to be a surmountable problem for current programs in the short term. Given that not all programs that could get reimbursement were even seeking reimbursement, it seems like efforts to target reimbursement as a method of expanding use of pediatric telemedicine may have limited impact.

Nonetheless, our study did identify some key policy actions that could be taken to improve utilization of this technology. First, credentialing policy is in need of an update for the telemedicine era. Our findings suggested that credentialing by proxy is not uniformly feasible or practical. Furthermore, in the emergency setting, where large numbers of pediatric emergency specialists at the hub site are expected to care for patients at large numbers of hospitals, traditional credentialing is impossible. Indeed, it may be worth rethinking the credentialing paradigm for emergency medicine. For example, "site of care" legislation that redefines the site of emergency care as where the physician is, rather than where the patient is, could overcome this problem, as well as the cross-state licensing problem.

Second, policy efforts are needed to realign the incentives to make telemedicine attractive for all stakeholders, at both the hub and spoke sites. This may be accomplished by getting payers more involved because payers stand to gain the most in terms of cost savings through potential transfers averted. Payers could create financial incentives for telemedicine use, independent of simple reimbursement.

In the meantime, participants in our study highlighted several concrete actions to make pediatric emergency telemedicine more effective under the current system. Programs should choose spoke

sites carefully, first engaging sites that are feasible and have engaged leadership. Once the concept has been proven and hospitals are ready to conduct outreach efforts based on need, initiatives like the Health Resources and Services Administration Emergency Medical Services for Children Pediatric Readiness Project, which surveys all U.S. hospitals about their capabilities for caring for pediatric emergencies, can help program directors identify target hospitals.<sup>27</sup> Also, our study identified the need for robust evaluation efforts to determine the effect of telemedicine on key outcomes, including mortality and costs. Despite the promise of telemedicine, uncertainty surrounding its effectiveness remains a key barrier to expansion.

This research has several limitations. First, because we searched specifically for pediatric emergency telemedicine programs, we may have missed more integrated programs that cover numerous service lines including pediatric emergency telemedicine under one broad umbrella and do not widely market their pediatric emergency telemedicine capabilities. Second, because we excluded programs that were not hospital based, we did not capture the experiences of private programs that provide telemedicine consults. Third, because we only surveyed self-identified current, planned, or former programs, we could not evaluate barriers to entry (e.g., which factors discourage interested institutions from taking the first steps toward program development). Finally, we did not survey spoke sites, which could potentially offer a different perspective on program barriers.

Future work is needed to determine the optimal strategies to overcome barriers to entry, as well as determine the overall effectiveness of pediatric emergency medicine. In the meantime, this work confirms that key barriers exist to successful program implementation, and certain barriers identified in the general telemedicine literature do not translate to pediatric emergency telemedicine. Some of the barriers identified here, such as the challenge of credentialing and the misalignment of incentives preventing hub and spoke sites from optimally collaborating, are amenable to immediate policy remedies. Other barriers, such as disruptions to the ED workflow and the need to change the "culture of transfer" at small rural hospitals, are more difficult to address. Given the large number of children in the United States without access to pediatric emergency specialty care, this challenge seems worth the effort.

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## Disclosure Statement

No competing financial interests exist.

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