Abstract:
Pediatric emergency care is conducted primarily outside of academic medical centers. This care is variable among and between pediatric based providers and general emergency medicine physicians. As studies have noted these variations, there has been focus on ways to broadly improve this care and decrease variation in the non-academic community hospital setting. Initial successes have been realized in pediatric emergency preparedness, learning collaboratives and telemedicine. Although these initiatives show promise in building improvements of care for the community pediatric population, the focus towards maintaining and increasing quality in this population requires additional attention. We review current successes and offer perspective for possible future directions.

Keywords:
Quality improvement; pediatric emergency medicine; simulation; learning collaborative; telemedicine

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Pediatric Emergency Medicine Quality of Care: Strategies for Continued Improvement

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Pediatric emergency care is conducted primarily outside of children's hospitals and academic medical centers with approximately 90% of pediatric patients seen by emergency physicians within a general emergency department (ED).[1] This trend is likely to further increase as healthcare consolidates and more pediatric academic medical centers develop networks that include community hospitals to provide the "right care to the right patient at the right location for the right cost."[2] Several studies have reviewed variation in the quality of pediatric emergency medical care delivered among providers based on specialty and training. Differences in care were shown to exist in procedure rates of abscess incision and drainage, invasive testing in febrile pediatric patients, and chest X-rays in asthma. In these areas, higher quality care was shown to be provided by pediatric-trained physicians.[3-5] In Massachusetts, the number of pediatric emergency medicine patients transferred from non-academic medical centers to academic medical centers for routine medical care increased 36% from 2004 to 2014, which

correlates with concern that pediatric care is becoming more concentrated at academic medical centers.[6] Part of this variation in quality and increasing transfer rates for routine pediatric emergency medicine patients may be due to a lack of comfort with this lower-volume population among general emergency medicine physicians. To overcome this, hospital systems have increased the numbers of pediatric emergency medicine and/or acute care pediatric providers within general EDs. This strategy can be challenging for pediatric providers tasked with practicing in environments lacking the resources and patient volume necessary for appropriately treating pediatric patients. In an alternative approach, some hospital systems have developed pediatric emergency medicine-focused education programs to increase familiarity with the unique needs of this patient population.[7] Other programs have focused on ensuring all hospitals treating children have resources for emergency care for children.[8] In this article, we review examples of successful strategies to expand evidenced-based pediatric care in non-academic medical centers including hospital readiness, simulation, and the formation of collaborative learning communities.

HOSPITAL PEDIATRIC READINESS

The National Pediatric Readiness and the related Emergency Medical Services for Children (EMSC) projects, have worked to improve the ability of EDs to care for children. These projects have developed specific initiatives aimed at improving pediatric care in these facilities, including designation of a pediatric emergency care coordinator and a focus on pediatric-specific equipment.[8] Readiness to care for this population is based on in-person site surveys which evaluate preparedness for the evaluation and care of pediatric patients.[9] Based on these results, attention is placed on developing interventions to continuously improve the quality of pediatric care outside of pediatric specialty centers, and as such, this approach is being utilized in facilities where pediatric readiness has been suboptimal. Beyond the implementation of pediatric care coordinators and site surveys to evaluate and address readiness for pediatric care, EMSC has shown hospitals with higher pediatric readiness scores have improved outcomes for pediatric patients. In the state of Arizona, an association with decreased pediatric mortality after statewide participation in the EMSC verification process was seen.[10] Kessler et al similarly found improved care of children with sepsis in emergency departments with higher pediatric readiness scores.[11]

SIMULATION

In order to expand on EMSC and preparedness, Whitfill et al provided in-situ simulation to 12 community hospitals in Connecticut, through the International Network for Simulation-Based Pediatric Innovation, Research and Education (INSPIRE) network.[12] Using three simulated ill pediatric cases, Auerbach was able to monitor compliance to guidelines and the quality of resuscitations and teamwork, showing improved pediatric readiness after simulation.[12] This group has subsequently expanded this study to 10 hospitals in Indiana, where they have consistently observed improved pediatric readiness scores.[13] Pediatric readiness, as well as simulation evaluations, represent generalizable tools to improve the quality of pediatric emergency care in a variety of community hospital settings.

Beyond using simulation for evaluation of pediatric readiness, other approaches have focused on utilization of this tool for latent safety threats, communication errors and trauma care. Errors in medicine often arise due to human factors, such as poor teamwork and communication.[14,15] Several studies have demonstrated safer, higher quality of care when providers work as a team. This can be challenging in EDs, where the providers—nurses, physicians, clinical assistants, pharmacists—do not consistently work together. There have been noted successes utilizing newer communication strategies, in addition to simulation, in interdisciplinary team training. These interventions focus on improving non-technical cognitive and interpersonal skills, such as communication and teamwork, essential for maintaining high quality patient care. An in-situ simulation program teaching TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) is used in healthcare settings to train staff in techniques to promote patient safety.[16] TeamSTEPPS demonstrated consistent improvement of perinatal morbidity and successes with interprofessional team dynamics.[17,18] In 2018, Bayouth et al used simulation to increase pediatric trauma resuscitation preparedness at rural hospitals with low frequency of pediatric care.[19] They successfully increased comfort with skills and also improved team performance during resuscitation. Crisis resource management (CRM), focused on communication and non-technical skills, improves the performance and dynamics in pediatric teams in academic settings and may hold promise in

community care environments for acutely ill or injured pediatric patients.[20] Boston Children's Hospital (BCH) was among the first academic centers to provide in-situ simulation to network (community) hospital members as hybrid courses, combining knowledge-based scenarios and CRM simulations to foster learning. The benefit of such training is to encourage both practice and sharing of knowledge and skills in a multidisciplinary team based environment, which in turn, leads to retention. Although there are few CRM and TeamSTEEPS training scenarios focused on pediatric care in community EDs, the incorporation of these platforms into more traditional educational programs shows promise as a means to increase the quality and safety of high risk, low frequency pediatric care in non-academic community medical centers.

COLLABORATIVE LEARNING COMMUNITIES

The emergence of these communication strategies has allowed the focus to shift to improving other aspects of the quality of clinical care. Dharmar et al, identified a wider gap between the quality of care provided for pediatric patients at 4 rural non-academic hospitals compared to the care provided at an urban academic pediatric specialty center.[3] One potentially effective technique to begin to close this gap can be through the creation of learning communities: groups of stakeholders working collectively in a shared learning process focused on a similar improvement goal. Although the structure, timeline and amount of support vary by project and location, learning communities work together to adapt and implement improvement strategies by broad member collaboration. This methodology brings together diverse groups to work towards a common goal based on interdisciplinary and inter-hospital learning. The number of quality improvement collaborative (QIC) studies in the literature has increased over the last 10 years and a systemic review of these studies suggests that they were generally effective at improving many of the processes and outcomes desired.[21] Collaborative models have demonstrated an increase in the rate of improvements achieved by individual institutions that participate in the groups. The successful application of QIC to sustainably improve the quality of care in a variety of healthcare setting suggests that the learning communities' model may be a viable approach to improve the quality of pediatric emergency medical care outside the context of academic pediatric centers.

Quality improvement collaborative strategies have been adopted as the primary methodology used by the Institute for Healthcare Improvement's Breakthrough Series (BTS), bringing together large teams to focus on short term improvement projects.[22] For instance, the Children's Hospitals' Solutions for Patient Safety (SPS), is a network of children's hospitals collaborating to eliminate serious harm to hospitalized children utilizing the BTS model. SPS successfully employed learning communities, reducing a number of negative outcomes from surgical site infections and hospital-acquired conditions, to serious safety events by focusing initiatives on leadership, transparency and collaborative meetings.[23,24] Examples of the application of learning communities based on the BTS model include: 1) increasing chlamydia screening among at-risk young women by approximately 14% in community clinics;[25] 2) reducing length of stay and standardization of care in neonatal abstinence syndrome;[26] and 3) improving appropriate antibiotic usage among pediatric pneumonia patients.[27]

Caring for pediatric patients in low volume settings within a general medical system can present challenges for implementing pediatric quality improvement initiatives. It is widely known that evidence-based guidelines, with appropriate implementation strategies, decrease variation and improve care.[28] BCH initially sought to adopt pediatric emergency medicine-focused quality improvement initiatives with evidence-based guidelines at *individual* community hospitals within their outreach network. One such project successfully decreased the baseline use of computed tomography (CT) in minor head trauma among network hospitals, with hospitals working individually, or siloed, and not as a collaborative.[29] Based on the success of this project, BCH has extended beyond individual hospital quality work to the development of a network-wide learning collaborative between the academic center and its community hospitals to decrease the use of broad spectrum antibiotics for pneumonia. In addition, a network-wide learning community initiative has been added to the annual goals of each community hospital within their network. Learning communities provide substantial advantages, transcending the capacity of an individual network hospital by providing a collaborative environment in which stakeholders work together in a facilitated setting to implement quality improvement initiatives. In addition, they represent a successful, generalizable approach to promote beneficial, sustainable changes among pediatric health care providers.

TELEMEDICINE

Despite the best work of ensuring readiness and increasing quality (especially for diagnoses most commonly seen in community hospitals), the breath of possible diseases and their presentations remains another challenge. Telemedicine has provided promise for real-time collaboration, leveraging information technology to enhance care across distances with consultation, supervision, diagnosis and intervention assistance.[30] These programs are well-developed and have been successful in the adult population, as a critical adjunct in the field of adult stroke and critical care, showing improved quality of care in this patient population.[31,32] A number of pediatric telemedicine links have been developed which are showing early promise for this patient population.[33,34] When telemedicine consultation was compared to telephone consultation alone, improved communication and quality of care was found.[35-37] Although these tools show promise, they have yet to show a change in clinical outcomes and are deserving of more robust studies.[38] As we look forward, telemedicine access will hopefully become a more routine method of providing support to physicians managing ill and injured children at non-pediatric centers.

SUMMARY

Improving quality of care for children in non-academic, community hospitals presents unique challenges. These challenges are compounded by competing demands from hospital leadership to service their larger adult patient population and more abundant financial incentives currently focused on the adult patient population. As pediatric care will and should continue to be managed heavily in the community setting, pediatric academic centers are encouraged to continue and even increase support for community hospital-based emergency medicine programs. Pediatric emergency readiness has been the first step focused on improving the ability to provide appropriate care in the community. The second has focused on increasing pediatric-based knowledge and decreasing variation among providers of pediatric community emergency care. This knowledge support needs to include real-time access to services such as telemedicine. Further development and implementation of collaborative initiatives between community hospitals and academic centers is vital to improving care for this patient population. With improved quality initiatives and the development of specific measures in this arena, financial incentives may be within reach to support evidence-based outcomes in pediatrics.

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