

Quality Improvement in Pediatric Emergency Medicine

Charles G. Macias, MD, MPH

From the Department of Pediatrics, Center for Clinical Effectiveness, Evidence Based Outcomes Center, Texas Children's Hospital, Baylor College of Medicine, Houston, Tex

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Address correspondence to Charles G. Macias, MD, MPH, 6621 Fannin St, Suite A2210, Houston, TX 77030 (e-mail: cgmacias@texaschildrens.org).

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ABSTRACT

Pediatric patients, who accounted for 17.4% of US emergency department (ED) visits in 2010, present unique challenges that can impede an ED's ability to provide optimal care. To meet the growing demand for comprehensive, high-quality care, health care systems are incorporating quality improvement (QI) methods to reduce costs and variations in care and to improve access, safety, and ultimately the outcomes of medical care. This overview of QI initiatives within the field of pediatric emergency medicine explores how proven QI strategies are being integrated into efforts that target the care of children within the broader emergency care community. These initiatives are categorized within the domains of education, infrastructures supporting QI efforts, research, and community/government collaborations. Professional societies supporting education, such as the American Academy of Pediatrics, have made several

strides to cultivate new health leaders that will use QI methodology to improve outcomes in pediatric emergency care. In addition to educational pursuits, professional societies and QI organizations (eg, Children's Hospital Association) offer stable infrastructures from which QI initiatives, either disease specific or broadly targeted, can be implemented as large-scale QI initiatives (eg, quality collaboratives). This overview also provides examples of how QI methodology has been integrated into research strategies and describes how the pediatric emergency medicine community can spread innovation and best practices into the larger emergency care community.

KEYWORDS: emergency department; pediatric emergency medicine; quality improvement

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THERE IS A growing demand in the United States for comprehensive, high-quality health care.^{1–3} Patients in need of emergent, urgent, and nonurgent care (including chronic care) add to large emergency department (ED) volumes. Data from the National Estimates from the Healthcare Cost and Utilization Project (HCUP) suggest that during 2010, there were 1 to 3 million ED visits, and 17.35% of those visits were by patients who were under the age of 18.⁴

The Institute of Medicine's (IOM) "Emergency Care of Children: Growing Pains" report acknowledges that gaps exist in the quality of care provided to children.⁵ There are contextual elements, specific to pediatric patients, that impede an ED's ability to provide comprehensive, high-quality care, some of which includes an increased risk of medical errors due to the lack of standardized dosing because of size variation in the pediatric age range; young children's inability to provide a medical history or clearly communicate complaints; and the unique physical and developmental characteristics of children that can affect treatment strategies and medication regimens.^{5,6}

Several strategies exist to overcome the described barriers to providing high-quality pediatric care to children in emergent care settings; however, the array of options has led to an unevenness in the care delivered.⁵ Health care

systems are incorporating quality improvement (QI) methods to reduce errors, reduce costs and variations in care, and improve access, safety, and ultimately the outcomes of medical care.⁷ Given the important role that the ED serves in today's health care system, it is an ideal setting for QI efforts.

This overview of QI initiatives within the field of pediatric emergency medicine (PEM) explores how proven QI strategies are being integrated into efforts that target the care of children within the broader emergency care community. These initiatives are categorized within the domains of education, infrastructure supporting QI efforts, research, and community/government collaborations.

EDUCATIONAL OPPORTUNITIES

Professional societies are targeting leaders in pediatric emergency care settings with aims of engaging and training champions in quality improvement. The American Academy of Pediatrics (AAP) Section on Emergency Medicine (SOEM) is the professional society that hosts the greatest number of PEM subspecialty members (>1000 members).⁸ In 2010, the AAP SOEM—with funding from the AAP and a R13 grant from the Agency for Healthcare Research and Quality (AHRQ)—developed a national leadership conference centered on quality and safety in

Table 1. Best Practices: Quality Improvement Examples Presented at the 2010 PEM Leadership Conference*

Category	Aim	QI Intervention	Outcome
Throughput	<p>Decrease overall length of stay for all ED patients by 10%.</p> <p>Reduce TID for admitted and discharged patients and reduce occurrences of LWBS.</p>	<p>Coordinated the care team, changed the rooming process, and standardized bedside supplies.</p> <p>Kaizen—to generate quick solutions and gains for the department in both TID and LWBS. Lean methodology to streamline patient throughput from patient arrival to discharge. Process improvements included: 5s to remove needless equipment and standardize patient care rooms and nurses' stations with supplies; SOPs were implemented to instill consistency among practice; WIP caps were used at triage and admission, and additional nurses were instated to diffuse wait times.</p>	<ul style="list-style-type: none"> • Despite an increase in ED volume of 12.8%, the site decreased overall length of stay by more than 15% to 148 min without an increase in staffing. • TID for admitted patients was 6.78 h before intervention and 3.75 h after implementation of intervention. • LWBS decreased to approximately 1.9%, which generated additional revenue for the ED.
Throughput and respiratory	To decrease the time to steroid administration and decrease TID for children with a mild and moderate asthma exacerbation.	Instituted a triage-based protocol for the administration of oral steroids.	<ul style="list-style-type: none"> • The median time to steroids between the groups was statistically significant; 104 vs 43 min ($P < .0001$). • During the intervention weeks, asthmatics spent a median of 65 fewer minutes in the ED than during control weeks (255 vs 320, $P = .004$). The mean TID was 267 vs 233 min in those patients who did not receive the intervention compared to those who did receive the intervention.
Respiratory	Examine the effect of contiguous ED rooms with dedicated staff on the timeliness of ED care for children presenting with an asthma exacerbation.	A contiguous block of 6 rooms (known as the respiratory cohort) were staffed by 1 nurse, 1 respiratory therapist, and 1 physician provider. Primary outcomes were time to steroid and time to inhaled beta agonist.	<ul style="list-style-type: none"> • Run charts showed that patients in cohort rooms more consistently had median time to steroids from arrival below 60 min (recommended by the NHLBI for early intense treatment for asthma). • Median time savings for receipt of steroids and beta-agonist from ED arrival were 17 and 19 min respectively for patients placed in the cohort vs regular rooms. Median time savings from room placement were 7 and 9 min, respectively, for patients placed in cohort vs regular rooms.
Pain and sedation	To outline a change management plan for implementing a new pain management technique for femur fractures in PED.	Multi-modal training and reinforcement mechanisms allowed for rapid uptake of new techniques among the existing nursing staff, house officer, and attending personnel.	<ul style="list-style-type: none"> • 6 mo after the introduction—31 ultrasound-guided nerve blocks were placed in 30 patients by 7 different attending physicians—4 fellows—and 2 emergency medicine residents. 9 attending and 18 residents observed or assisted in the femoral block procedures. • Median time until next requested pain medication was 9 h with an interquartile range of 7 to 12 h. There were no block failures or complications. Good feedback with multiple requests for repeat procedures after the initial block wore off.

<p>Medication errors</p>	<p>To reduce medication errors by utilization of a pharmacist in the ED.</p>	<p>Standardized triage decisions, activated necessary health care providers, aligned the care delivery need with necessary resources, and allowed parallel task completion between physicians and nursing staff.</p> <p>A pharmacist was introduced in the ED during the busiest shift (1400 to 2400 h), 7 days a week. The pharmacist intervention data was abstracted 17 mo before and 17 mo after introduction of the pharmacist in the ED.</p>	<ul style="list-style-type: none"> • After implementation of this process, 95% of patients with long bone extremity fractures treated with IV opioids received a first dose within 45 min of arrival, compared with a preintervention baseline average of 20%. • There was a significant difference in the number of interventions: 159 in the preceding months and 705 in the staffed months.
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TID = time in department; LWBS = left without being seen; 5s = sort, straighten, shine, standardize, sustain; SOP = standardization of operating procedure; ED = emergency department; PED = pediatric emergency department; WIP = work in progress.

*In 2010, the American Academy of Pediatrics Section on Emergency Medicine developed a national leadership conference centered on quality and safety in pediatric emergency care. The national conference provided an opportunity to exchange best practice models and illustrate applications and outcomes in the ED setting.

pediatric emergency care. The national conference provided an opportunity to exchange best practice models and illustrate applications and outcomes in the ED setting (Table 1).

The SOEM now dedicates a portion of its annual programming at the AAP’s National Conference and Exhibit to QI education—which addresses improvement science, performance measurement, patient safety and medication errors, QI research methodologies, rapid cycle process improvement, evidence-based practice, data transformation, and transitions of care. Other professional societies serving the PEM community have targeted physician education in QI. A PEM Special Interest Group for the Academic Pediatric Association has hosted similar QI programming, including sessions tailored for PEM audiences and focused on quality and performance measurement, best practices in QI, QI collaboratives and financial drivers for QI held in conjunction with the Pediatric Academic Societies annual meeting.

Education through subspecialty specific journals remains a valuable means of reaching all clinical providers in the field. For example, a recent issue of *Clinical Pediatric Emergency Medicine* was dedicated to quality improvement.⁹ This coincides with a growing movement for specialty journals to publish more QI reports and QI research.

INFRASTRUCTURES SUPPORTING QI

Professional societies also support QI efforts within the field of PEM. After the PEM QI leadership conference’s positive reception, the SOEM created the Committee on Quality Transformation (COQT) in 2010. The prioritization of QI work within the field of PEM is carried out by 6 task forces (Table 2). Each initiative or activity sponsored by the COQT adheres to the following objectives:

- To educate PEM physicians on AAP, national, and international quality initiatives.
- To promote and lead change in the areas of quality and outcomes management for PEM.
- To develop quality improvement leaders within PEM.
- To engage and support SOEM members in Maintenance of Certification (MOC) level 4 activities.

The AAP and national QI organizations (ie, Children’s Hospital Association) also serve as integral support systems for disease-specific or domain-specific (eg, evidence-based guidelines) quality initiatives, within the field of PEM, with one example being the Pediatric Septic Shock Collaborative. The general aim of the collaborative is to use goal-directed therapy¹⁰ to reduce mortality among children with septic shock. The collaborative comprises 47 hospitals along with their respective academic institutional partners in the United States and Canada. Fifteen hospitals were involved in the first cycle of the collaborative, which lasted for 12 months. Using the knowledge gleaned from the Plan–Do–Study–Act cycles from phase 1, the collaborative will expand its efforts to the remaining 32 hospitals. Participating sites are collecting baseline data on metrics and have the option of implementing an advanced tier

Table 2. Committee on Quality Transformation Activities

Activity	Description
Evidence-Based Guidelines	<ul style="list-style-type: none"> • Hosting of evidence based guidelines, evidence summaries, and pathways on a quality Web site (www.pemfellows.com). • Developed a shared baseline (pathway) to support the activities of a Pediatric Septic Shock Collaborative. Currently developing a pathway for the Value in Inpatient Pediatrics Network's inaugural project on bronchiolitis.
Education	<ul style="list-style-type: none"> • Working in conjunction with the AAP SOEM Fellowship Director's Committee to develop a standardized fellow trainee curriculum for quality and safety.
Patient Safety	<ul style="list-style-type: none"> • Identifies QI topics and speakers for the annual AAP NCE pediatric emergency medicine program. • Working in conjunction with the education task force to develop a fellow trainee patient safety multimedia curriculum. • Developed a project to improve the quality of handoffs in the ED (with a goal of providing level 4 Maintenance of Certification from this project).
Performance Measures	<ul style="list-style-type: none"> • Validity and reliability testing of a metric for weight in kilograms at 13 institutions. • Vetting of collaborative metrics for evaluating quality improvement in the management of pediatric septic shock.
QI Processes and Collaboratives	<ul style="list-style-type: none"> • Supporting the Pediatric Septic Shock Collaborative housed within the AAP SOEM but working in partnership with other organizations (ie, Children's Hospital Association). • Will form the framework for developing proposals for future quality collaboratives (eg, asthma and bronchiolitis).
Research	<ul style="list-style-type: none"> • Organized focus groups with PEM QI researchers to identify common barriers in quality improvement research. • Conducting a survey of the PEM community to identify strategies for removing barriers when conducting QI research.

AAP = American Academy of Pediatrics; SOEM = Section on Emergency Medicine; QI = quality improvement; NCE = National Conference and Exhibit; ED = emergency department; and PEM = pediatric emergency medicine.

intervention bundle applicable to their own systems of care delivery. The advanced-tier intervention bundle focuses on the timely recognition of septic shock with rapid escalation of care management. There is a particular focus on the rapid delivery of antibiotics in conjunction with timely intravenous fluid resuscitation.

The American Board of Pediatrics (ABP) requires that diplomates demonstrate an ability to assess the quality of care they provide and implement quality improvement strategies as part of the MOC prerequisite. One way that physicians can meet the Performance in Practice requirement is through meaningful participation in an ABP-approved quality improvement project.¹¹ The Pediatric Septic Shock Collaborative functions as an opportunity for participating physicians to earn MOC credit for Performance in Practice; other collaborative work supported by AAP SOEM activity includes a collaborative targeting improved patient safety through systematic processes of patient handoffs in the ED.

RESEARCH

Quality health care has been described as doing the right thing, at the right time, in the right way, for the right person—and having the best possible results. For PEM providers, this demands creation of the evidence to define gaps in quality to identify the best possible strategies for individual decision making and for informing shared baselines in QI initiatives, and for improving uptake of QI innovation within and across health care institutions. For the subspecialty of PEM, this requires investments in health services research, comparative effectiveness research, and elucidation and validation of clinical decision rules.

Two networks have systematically contributed to multicenter PEM research in the United States, the Pediatric Emergency Medicine Collaborative Research Committee (PEMCRC, a committee of the AAP's SOEM) and the Pediatric Emergency Care Applied Research Network (PECARN). These PEM research infrastructures are essential to the enhancement and expansion of research related to QI in PEM. The PECARN infrastructure is funded by the Health Resources and Services Administration through the Emergency Medical Services for Children (EMSC) program and has successfully obtained millions of dollars in funding from the National Institutes of Health and other federal agencies.¹²

Health services research, which is pertinent to understanding variations in care and outcomes in PEM, has been integrated into working groups within quality-based organizations such as the CHA (formerly Child Health Corporation of America and the National Association of Children's Hospitals and Related Institutions). The Pediatric Health Information System (PHIS), housed in CHA, is a comprehensive pediatric database containing clinical and financial data of more than 6 million patient cases.¹³ Individual investigators^{14,15} have used the PHIS database to conduct research on health care infrastructures. Infrastructure organizations such as the CHA, with their administrative, statistical, and study design support, have facilitated and accelerated the productivity of health services research through PEM-specific PHIS research groups.

Although the objective for improving QI research is a nascent goal of the PEMCRC and its partnership with the COQT, the larger and more robustly funded PECARN has contributed to 3 domains of QI research. First, they have conducted research in describing the state of quality

of care delivery in PEM. One particular study is validating a structured implicit review instrument to measure the quality of care provided to children presenting to EDs.¹⁶ The factors associated with differences in quality of care among a cohort of EDs and patients across the United States will also be identified. In combination with other national efforts, the tool could be used to develop quality benchmarks and policy recommendations. There has been a scarcity in performance measures designed to assess the quality of pediatric emergency care.¹⁷ PECARN investigators, through the support of an EMSC Targeted Issues grant, have developed a balanced scorecard for quality measurement in pediatric emergency care settings.¹⁸

To achieve system wide improvements in health care quality, outcomes, and resource allocation, comparative effectiveness research needs to be targeted, designed, and conducted, and reported in ways that are responsive to the circumstances of pediatric patients.¹⁹ The rapid nature of PEM care delivery makes comparative effectiveness research important to the provider who must swiftly diagnose and manage several conditions. PECARN has been involved in several studies to definitively determine the right care to deliver to the right child at the right time. One current study is focused on identifying an ideal fluid management strategy for children with diabetic ketoacidosis using neurological and neurocognitive outcomes.²⁰ Another study compares the safety and efficacy of 2 benzodiazepines in the treatment of status epilepticus.²¹ A third study compares the safety and efficacy of intravenous magnesium versus standard of care alone in shortening the duration of a pain episode in acute vasoocclusive crises among children with sickle cell disease.²²

Finally, PECARN has focused strategies on knowledge translation—understanding how best to bridge the gap between what physicians know and what physicians' practice.²³ Among the most effective types of evidence-based research to establish shared baselines of care are the derivation and validation of clinical decision rules. Clinical decision rules (CDRs) are decision-making tools for specific disease processes containing variables from the history, physical examination, or simple diagnostic and therapeutic decisions. CDRs are derived from original research and can aid the practitioner in determining the likelihood of the presence or absence of a condition and delineate the prognosis and likelihood of treatment success.²⁴ CDRs have been developed for several disease processes treated by PEM clinicians and studied by investigators in PEM research networks including the Pediatric Emergency Medicine Collaborative Research Committee (eg, clinical decision rules for identifying children at low risk for appendicitis²⁵ and for identifying children at low risk for meningitis²⁶). Research by Kuppermann et al in conjunction with PECARN derived and validated 2 clinical decision rules to minimize unnecessary computed tomography scans by identifying children at very low risk for traumatic brain injury.²⁷ With a goal of conducting meaningful and rigorous multi-institutional research, PECARN's expansion into knowledge translation research has led to a current interrupted time series trial

to implement those clinical decision rules through computerized clinical decision support, thus using the electronic medical record to efficiently translate research into practice.²⁸

COMMUNITY/GOVERNMENT COLLABORATIONS

To meet the increasing demands for comprehensive care across the entire continuum of care, PEM has made several strides to disseminate knowledge and experiences by collaborating with community and federal infrastructures involved in the emergency care of children. The EMSC program is the only federal structure solely dedicated to improving care for children in emergent care settings (not limited to prehospital settings) and has supported QI in pediatric emergency care through 3 strategies. First, EMSC has supported research through a Targeted Issues grant mechanism that funds investigator-initiated research. Two examples of recently funded Targeted Issues grants are the development of a quality measures balanced scorecard, and a study evaluating the impact of a pediatric asthma education program on improving the quality of care (addressing the IOM quality domains of effectiveness, efficiency, and patient-centered care) in the ED setting. Moreover, the EMSC program uses several methods to facilitate the dissemination and sharing of knowledge generated by its grantees, which includes a newsletter, Webcasts, and toolboxes.²⁹ The weekly newsletter disseminates information on pediatric emergency care and prehospital research; activities of relevant federal agencies and national organizations; and education and funding opportunities to its 1500 subscribers. The Webcasts assist EMSC program grantees with the dissemination of their research and the sharing of best practices to a larger audience, and they promote dialogue with those entities that are responsible for implementing the research. Finally, the toolboxes permit more in-depth presentation of research beyond peer-reviewed journals. One example is the work of EMSC Targeted Issues grant, "Defining Quality Improvement Measures for Pediatric Emergency Care." This toolbox features a prepopulated PubMed search string, examples of model practices from academic institutions using performance measures to improve pediatric emergency care, and a breakdown of the 60 performance measures identified through expert consensus to comprehensively reflect pediatric emergency care.

Second, the EMSC program has contributed to the development of the pediatric emergency care infrastructures at the state and national level through its state partnership program to implement measurement improvement strategies. This program provides funding to 56 states and territories to improve capacity to treat pediatric emergencies primarily through the collection and assessment of performance measures that assess the quality of pediatric emergency care in the prehospital and hospital setting. These performance measures, which are collected every 3 years, provide a national picture on long-term efforts to ensure that basic and advanced life-support ambulances are equipped with the recommended pediatric equipment; prehospital providers have access to pediatric medical

direction; hospitals have the capability to treat pediatric medical and trauma emergencies; and hospitals have defined guidelines and processes in place to transfer a pediatric patient to a higher level of care when appropriate.³⁰ Through sharing of best practices, state programs have been able to drive initiatives aimed at improving quality of care throughout regions in their respective states.

Finally, EMSC supports special programs targeted at improving quality of care in PEM such as the National Pediatric Readiness project.³¹ The EMSC Program is partnering with the AAP, the American College of Emergency Physicians, and the Emergency Nurses Association to ensure that all EDs that treat children have a baseline capability to provide the appropriate resources and care to an ill or injured child. This project will begin with a national online assessment of approximately 5000 EDs nationwide. It is based on the Guidelines for the Care of Children in the Emergency Department.³² The ability to improve quality of care through ED readiness is driven by immediate feedback in the form of an individual gap analysis on the basis of consensus based areas of priority; a pediatric readiness score with a benchmark score against facilities with similar pediatric ED volume; and access to a free online tool kit of performance improvement resources. The Pediatric Readiness tool kit was designed with the purpose of empowering nursing and physician ED providers with QI resources and tools. An evaluation component has also been built into the tool kit for iterative improvement of the project tools.

Partnerships with other agencies and organizations have evolved to improve the quality of care in PEM. For example, through an Interagency Agreement, the EMSC program and the National Highway Traffic Safety Administration (NHTSA) responded to a recommendation by the IOM report to develop evidence-based prehospital care protocols for the treatment, triage, and transport of patients, including children.³³ This was a significant step in enhancing the quality of prehospital care because it provided a consistent method for developing, implementing, and evaluating prehospital treatment protocols for emergency medical systems (EMS). The EMSC Program through its National Resource Center moved forward with this recommendation by beta testing the development phase of the draft Evidence Based Guideline (EBG) Model Process to create a prehospital EBG for pediatric seizure management.³⁴ NHTSA, with supplemental funding from the EMSC Program, competitively awarded a project to test the entire EBG model process. This led to the production of EBGs for prehospital pain management and the use of Helicopter EMS.³⁴ NHTSA is now in the process of assessing implementation and sustainability, including financial and political impact, of prehospital EBGs in 5 states.

FUTURE OF QUALITY INITIATIVES IN PEM

PROVIDERS

The cultivation of health leaders is a step toward improving outcomes of pediatric emergency care. Professional societies supporting education, such as the AAP's Section on Emergency Medicine, have set provisions for

a national common QI curriculum for fellowship trainees. Continuing education programs, Webinars, podcasts, and subspecialty specific journals can provide additional QI education for subspecialty practitioners when the opportunities are strategically integrated into the routine agendas of sponsoring organizations and editors. The ABP's MOC requirement for Performance in Practice will leverage QI work among PEM subspecialists seeking American Board of Pediatrics subspecialty recertification.

RESEARCH AND RESOURCES

The future of PEM is dependent on the expansion and formalization of QI research robustly supported in the agendas for the existing PEM research networks such as PEMCRC and PECARN. The changing national landscape for funding QI research is evident by the opportunities sponsored through the Patient-Centered Outcomes Research Institute and AHRQ (which supports several ROI's related to emergency care and pediatrics).³⁵⁻³⁷ The recent creation of the Office of Emergency Care Research (OECR) at the National Institute of General Medical Sciences (NIGMS) provides new opportunities for future prioritization of PEM QI research at NIH. To accomplish this, feedback on the gaps in current QI research must be provided to OECR, AHRQ, EMSC, and other entities so that the need for PEM QI research is highlighted in their funding opportunity announcements. Professional societies will continue to provide a conduit for champions in QI to access the aforementioned resources and develop network partners in order to drive best practices in pediatric emergency care. Vigorous questions and methodologies for conducting QI research must be developed by the PEM research community to demonstrate the importance of QI research in PEM. The need to develop timely methods to disseminate QI models and enhance methods to translate practices to the field is also important.

CARE DELIVERY

Common themes emerge as priorities for improving care delivery in pediatric emergency care settings. The American College of Emergency Physicians in conjunction with AHRQ hosted a conference in 2009 to determine how the processes of care delivery in the emergency care system could be used more effectively. The conference addressed how the ED operates, how EDs interact with other parts of the health care system (ie, the continuum of care), and how emergency care could be made more efficient. Although not specifically targeted at children's issues, this conference addressed universal care delivery issues pertinent to pediatric emergency care, such as increasing the value of ED care by increasing information sharing, making patients and families care partners, and, when possible, finding alternatives to the ED. Specific discussions centered around topics directed at systems and work flow redesign (eg, costs of capacity, queuing theory, silo mentality, and handoffs); improving coordination of care for high-cost patients (eg, transitions of care, care

coordination, and complex patients); variations in care; and information technology.³⁸ These general domains overlap with the issues addressed by the IO³⁹ and demonstrate important priorities in QI work within the clinical arena. Strategies that address care delivery will ultimately need to integrate work that enhances the efficiency and effectiveness of the US health care system through shared baselines (including evidence based guidelines/evidence based protocols).^{40,41}

MEASURING QUALITY

High-quality care in pediatric emergency care delivery cannot be defined without appropriate measurement in place to describe structures, processes, and outcomes. There is a burgeoning literature base on ED care measures for children that focuses on general indicators such as wait times,⁴² children who leave without being seen,^{43,44} readmissions,⁴⁵ and resource utilization.⁴⁶ However, to better assess quality indicators in pediatric EDs, descriptors of the care given to children treated in general and pediatric EDs and measures of their clinical course are required.⁴¹

To concisely describe quality through balanced scorecards of metrics and drive iterative improvement, professional societies, funding agencies, regulatory bodies, and academic communities must continue to embrace and accelerate the creation and uptake of measuring robust quality outcomes. Previously described work on the development of metrics from research and academic communities highlights the importance of this endeavor.¹⁷

Relevant quality metric development has not been limited to PECARN, as the 2009 Children's Health Insurance Program Reauthorization Act (CHIPRA) legislation called for the development of the Pediatric Quality Measures Program (PQMP) to develop new and improved measures for child health that can be used by public (Medicaid, CHIP) and private health plans. The Centers for Medicare and Medicaid Services (CMS) and AHRQ collaborated to release a call for grants and to fund 7 national AHRQ-CMS CHIPRA PQMP Centers of Excellence. Among these 7 centers, the Mount Sinai Collaboration for Advancing Pediatric Quality Measures (CAPQuaM) brings together clinical societies, accrediting agencies, the New York Medicaid program, and others in what it terms a 360-degree process to engage stakeholders in rigorous and nuanced measure development. One of the measures assigned to the CAPQuaM is emergency room use for children with asthma. On the basis of input from stakeholders, including a multidisciplinary panel of national experts, the CAPQuaM is looking to improve the current Medicaid measure. Although still in development, early indications suggest that the measure will try to do more than simply count the number of asthmatic children who use the ED, but also to help identify which visits may not have been necessary and/or were preventable,^{47,48} all of which exemplifies a growing recognition of quality improvement assessment of care delivered within a continuum that includes ED-based care. Similarly, the Center of Excellence on Quality of Care Measures for Children with Complex Needs is

developing measures of quality of ED care for mental health.⁴⁷ Physicians and researchers have recommended that future research and initiatives consider the illness severity of patients; outcome measures that focus on lengthening life, relieving pain, reducing disabilities; and satisfying the consumer as vital avenues for measuring the quality of ED care delivered.¹⁷

The future of high-quality pediatric emergency care delivery will be contingent on effective provider training, the availability and effective utilization of QI resources, the translation of research into evidence-based practice, and the measurement of quality of care delivery. As these efforts coalesce for iterative improvement, the ultimate goals of high-quality care for children treated in emergent-care settings will be achievable.

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