Original Investigation

A National Assessment of Pediatric Readiness of Emergency Departments

Marianne Gausche-Hill, MD; Michael Ely, MHRM; Patricia Schmuhl, BA; Russell Telford, MA; Katherine E. Remick, MD; Elizabeth A. Edgerton, MD, MPH; Lenora M. Olson, PhD, MA

IMPORTANCE Previous assessments of readiness of emergency departments (EDs) have not been comprehensive and have shown relatively poor pediatric readiness, with a reported weighted pediatric readiness score (WPRS) of 55.

OBJECTIVES To assess US EDs for pediatric readiness based on compliance with the 2009 guidelines for care of children in EDs; to evaluate the effect of physician/nurse pediatric emergency care coordinators (PECCs) on pediatric readiness; and to identify gaps for future quality initiatives by a national coalition.

DESIGN, SETTING, AND PARTICIPANTS Web-based assessment of US EDs (excluding specialty hospitals and hospitals without an ED open 24 hours per day, 7 days per week) for pediatric readiness. All 5017 ED nurse managers were sent a 55-question web-based assessment. Assessments were administered from January 1 through August 23, 2013. Data were analyzed from September 12, 2013, through January 11, 2015.

MAIN OUTCOMES AND MEASURES A modified Delphi process generated a WPRS. An adjusted WPRS was calculated excluding the points received for the presence of physician and nurse PECCs.

RESULTS Of the 5017 EDs contacted, 4149 (82.7%) responded, representing 24 million annual pediatric ED visits. Among the EDs entered in the analysis, 69.4% had low or medium pediatric volume and treated less than 14 children per day. The median WPRS was 68.9 (interquartile range [IQR] 56.1-83.6). The median WPRS increased by pediatric patient volume, from 61.4 (IQR, 49.5-73.6) for low-pediatric-volume EDs compared with 89.8 (IQR, 74.7-97.2) for high-pediatric-volume EDs ($P < .001$). The median percentage of recommended pediatric equipment available was 91% (IQR, 81%-98%). The presence of physician and nurse PECCs was associated with a higher adjusted median WPRS (82.2 [IQR, 69.7-92.5]) compared with no PECC (66.5 [IQR, 56.0-76.9]) across all pediatric volume categories ($P < .001$). The presence of PECCs increased the likelihood of having all the recommended components, including a pediatric quality improvement process (adjusted relative risk, 4.11 [95% CI, 3.37-5.02]). Barriers to guideline implementation were reported by 80.8% of responding EDs.

CONCLUSIONS AND RELEVANCE These data demonstrate improvement in pediatric readiness of EDs compared with previous reports. The physician and nurse PECCs play an important role in pediatric readiness of EDs, and their presence is associated with improved compliance with published guidelines. Barriers to implementation of guidelines may be targeted for future initiatives by a national coalition whose goal is to ensure day-to-day pediatric readiness of our nation's EDs.

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Author Affiliations: Author affiliations are listed at the end of this article.

Corresponding Author: Marianne Gausche-Hill, MD, Department of Emergency Medicine, Harbor–University of California, Los Angeles, Medical Center, 1000 W Carson St, PO Box 21, Bldg D9, Torrance, CA 90509 (mgausche@emedharbor.edu).

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During the last 2 decades, US investigators have focused on improving the pediatric readiness of emergency care settings, primarily emergency departments (EDs).[1-3] In 2001, the American Academy of Pediatrics and the American College of Emergency Physicians promulgated the first joint guidelines on the care of children in EDs.[4,5] The importance for EDs to maintain a state of readiness to care for children cannot be overemphasized because day-to-day readiness affects disaster planning and response and patient safety.[6] Studies subsequent to the publication of these guidelines used probabilistic and comprehensive samplings of EDs in the United States and showed relatively poor compliance with the guidelines.[7,8]

In 2006, the Institute of Medicine report on the future of emergency care in US health care systems[9,10] noted that increased ED volumes and a decrease in the number of EDs led to overcrowding, boarding of patients in the ED awaiting availability of inpatient beds, and frequent ambulance diversions, which affect emergency care access, especially for children. The report highlighted the state of pediatric emergency care in the United States as uneven, with some hospitals well-prepared and others challenged by the lack of local resources or personnel to care for children.[10] The report also recommended that "hospitals should appoint 2 pediatric emergency coordinators—one a physician—to provide pediatric leadership for the organization."[10(p322)]

The Emergency Nurses Association joined the American Academy of Pediatrics and the American College of Emergency Physicians in cosponsoring pediatric readiness efforts.[11] These key professional organizations, along with the federal Emergency Medical Services for Children (EMSC) program of the Health Resources and Services Administration, formed a national coalition to target improvements in pediatric readiness.[11-13] Updated policies, such as the 2009 guidelines for care of children in EDs, toolkits, and other online resources, have been developed to promote pediatric readiness in the United States and abroad.[11-21] In 2011, a national steering committee of these stakeholders was assembled to implement a public health initiative to address the previously reported disparate state of pediatric readiness of EDs. The first step of this initiative, known as the National Pediatric Readiness Project (NPRP), was a web-based assessment of ED readiness for children, as measured by compliance with the 2009 national guidelines. The objectives of the first phase of the NPRP were to assess all EDs of all 50 states and all US territories for compliance with the guidelines (pediatric readiness); to identify gaps and barriers to implementation of the guidelines for future quality initiatives; and to evaluate the effect of the presence of physician and nurse pediatric emergency care coordinators (PECCs) on pediatric readiness.

At a Glance

- Previous assessments of readiness of emergency departments (EDs) have not been comprehensive and have shown relatively poor pediatric readiness.
- This study reports on a web-based assessment of all EDs in the United States for compliance with national guidelines for pediatric readiness.
- 4149 (82.7%) EDs responded, representing 24 million annual pediatric ED visits.
- Readiness was better in higher-volume pediatric EDs and those that had physician and nurse pediatric emergency care coordinators.
- Barriers to guideline implementation were reported by 80.8% of EDs.
- The study demonstrated improvement in pediatric readiness of EDs compared with previous reports.

Methods

The national steering committee developed a 55-question web-based assessment (http://www.pedsready.org) based on the sections of the 2009 guidelines addressing coordination of patient care, physician/nurse staffing and training, quality improvement activities, patient safety initiatives, policies and procedures, and availability of pediatric equipment. Hospital demographics, including ED configuration and annual overall and pediatric patient volume, were also collected.

This assessment was reviewed and approved by the institutional review board at the University of Utah, Salt Lake City. Participation in the assessment was voluntary. The final dataset contained the hospital name and was available only to the study team that conducted all of the analyses.

Piloting and Weighting of Assessment Items

As the largest state encompassing a diverse patient population, California was designated to pilot the assessment. Previously, a subpanel of experts from the national steering committee was assembled to develop weighting criteria for the assessment (K.E.R., Amy H. Kaji, PhD, MD, L.M.O., et al; unpublished Pediatric Readiness and Facility Verification; April 2012).[22] Based on the results of the expert panel and the results of the California Pediatric Readiness Project, 24 of the questions were weighted in the national assessment to generate an overall weighted pediatric readiness score (WPRS) for each hospital (eAppendix in the Supplement). The WPRS was normalized to a 100-point scale. The final weighting for each section for the national assessment included 19 points for coordination of care, 10 points for physician/nurse staffing, 7 points for quality improvement, 14 points for patient safety, 17 points for policies/procedures, and 33 points for equipment and supplies. Additional field testing occurred in 2 states and 1 territory to assess survey deployment and to evaluate the changes made from the California Pediatric Readiness Project (K.E.R., Amy H. Kaji, PhD, MD, L.M.O., et al; unpublished Pediatric Readiness and Facility Verification; April 2012).

Assessment Deployment

The national steering committee sought assistance from the EMSC program managers in each state and from their respective professional organizations at national and local levels for assessment deployment. Using the 2009 American Hospital Association database, a list of all hospitals was sent to the EMSC program managers in all 50 states, the District of Columbia, and 8 US territories to review and finalize the list. Only hospitals

with EDs open 24 hours per day, 7 days per week were assessed, excluding Veterans Affairs and prison hospitals. The NPRP assessment was then deployed in 5 staggered cohorts, with each cohort representing approximately 900 hospitals. The NPRP assessment remained open for approximately 3 months for each cohort, with rollout ranging from January 1 through August 31, 2013 (eTable 1 in the Supplement).

The ED nurse manager of each hospital was sent as many as 5 postal, email, and/or telephone invitations to complete the assessment.[23] To increase awareness among all hospital leadership, the ED medical directors and hospital chief executive officers were also notified of the assessment, but ED nurse leaders were asked to enter the data. Standardized outreach was supplemented through awareness campaigns by local American Academy of Pediatrics, American College of Emergency Physicians, Emergency Nurses Association, and state hospital association groups. Each EMSC manager was also sent weekly state response rate reports.

On completion, each respondent received their ED's WPRS along with the mean WPRS of EDs of similar patient volume and of all EDs in the database, which updated dynamically with additional responses. On completion of the assessment, each respondent received a gap analysis of results by section of the assessment, links to online resources to address identified gaps (http://www.pediatricreadiness.org), and a 1-year subscription to PEMSoft, a comprehensive web-based pediatric emergency medicine resource.[24] An interactive map was also available on the website with response rate results by state that were updated daily (eFigure in the Supplement).

Data Management and Analysis

Data were analyzed from September 12, 2013, through January 11, 2015. Assessment responses were collected in commercially available survey software (Checkbox, version 5.5.2; Checkbox Survey, Inc) and imported into statistical software (SAS, version 9.3; SAS Institute) for analysis. Hospitals were divided into quartiles and categorized by reported annual volume of pediatric patient visits in the ED. Low volume indicated fewer than 1800 patients; medium volume, 1800 to 4999 patients; medium to high volume, 5000 to 9999 patients; and high volume, 10 000 or more patients. The number of pediatric ED visits was estimated for hospitals missing pediatric visit data. The sum of all pediatric ED visits was divided by the sum of all total ED visits for hospitals that reported both numbers within each volume category. This proportion was then used to estimate the number of pediatric ED visits for those EDs missing these data.

Hospital configuration was defined by the availability of a physician in the ED and inpatient pediatric resources as *standby* (a physician was on call to the ED), *basic* (a physician was present 24 hours but with no pediatric inpatient services), *general* (a physician was present 24 hours and an inpatient pediatric ward, with or without a neonatal intensive care unit, was available), and *comprehensive* (a physician was present 24 hours and an inpatient pediatric ward and a pediatric intensive care unit, with or without a neonatal intensive care unit, were available).[25] The ED configuration was defined as an ED in a children's hospital, a freestanding ED (with no inpatient facilities for adults or children), a standby ED, a separate ED in a basic or a general hospital, and a general ED where adults and children are seen in the same physical space.[7] Hospital location was classified as urban, suburban, rural, or remote using the US Department of Agriculture's 2013 12-part county urban influence codes classification scheme.[26]

Statistical methods included frequencies and percentages for categorical data and medians for quantitative variables. Each WPRS was adjusted by removing all points associated with having a PECC and then dividing by 81 (total number of points possible excluding the PECC questions). The adjusted WPRS was compared across hospital volumes and configurations using the Kruskal-Wallis test with P values of less than .05 considered significant. Adjusted relative risks and 95% CIs were calculated to examine the relationships between PECC presence and reporting of all positive responses within a scored section. Based on descriptive analyses, the covariates of annual pediatric patient volume, hospital configuration, and location were chosen to adjust relative risks using modified Poisson regression with generalized estimating equations to account for clustering within states.[27]

Results

Of the 5017 ED assessments sent, 4149 (82.7%) were completed. Six reported having no ED open at all times, and 6 duplicate entries were excluded from the analysis, leaving a total of 4137 responses (response rate, 82.5%). The overall median WPRS was 68.9 (interquartile range [IQR], 56.1-83.6), which increased by pediatric patient volume. Low-volume EDs had a median WPRS of 61.4 (IQR, 49.5-73.6); medium-volume EDs, 69.3 (IQR, 57.9-81.8); medium- to high-volume EDs, 74.8 (IQR, 60.9-87.9); and high-volume EDs, 89.8 (IQR, 74.7-97.2) (Kruskal-Wallis $P < .001$).

Performance on Guidelines Sections

The number of responses by hospital location, hospital configuration, and ED configuration by pediatric patient volume category are summarized in **Table 1**. We found that 97.8% of respondents work in nonchildren's hospitals and care for 82.7% of children in US states. Low-volume hospitals (39.3%) see fewer than 5 children per day, and 69.4% of hospitals see fewer than 14 children per day.

Coordination of the ED for the Care of Children

Of the 4137 ED respondents, 1966 (47.5%) reported a physician PECC, and 2455 (59.3%) reported a nurse PECC. In 1737 responding EDs (42.0%), both types of PECCs administrated and coordinated care of children in the ED (**Table 2**).

Physicians, Nurses, and Other Health Care Practitioners Who Staff the ED

Lower-volume hospitals reported a higher percentage of family medicine-trained physicians caring for children (78.9%) compared with high-volume hospitals (32.1%), where most physicians caring for children were trained in emergency medicine (88.6%) or pediatric emergency medi-

Table 1. Sample Characteristics

	Responding EDs, No. (%)				
		Pediatric ED Volume Category			
	All (N = 4137)	Low (n = 1626)	Medium (n = 1244)	Medium to High (n = 706)	High (n = 561)
Hospital geographic location					
Urban	2435 (58.9)	593 (36.5)	731 (58.8)	580 (82.2)	531 (94.7)
Suburban	379 (9.2)	122 (7.5)	184 (14.8)	70 (9.9)	3 (0.5)
Rural	830 (20.1)	531 (32.7)	253 (20.3)	40 (5.7)	6 (1.1)
Remote	430 (10.4)	371 (22.8)	56 (4.5)	1 (0.1)	2 (0.4)
Not categorized	63 (1.5)	9 (0.6)	20 (1.6)	15 (2.1)	19 (3.4)
Hospital configuration					
Standby	165 (4.0)	161 (9.9)	4 (0.3)	0	0
Basic	2192 (53.0)	1122 (69.0)	730 (58.7)	252 (35.7)	88 (15.7)
General	1342 (32.4)	300 (18.5)	463 (37.2)	379 (53.7)	200 (35.7)
Comprehensive	398 (9.6)	22 (1.4)	43 (3.5)	72 (10.2)	261 (46.5)
Other	40 (1.0)	21 (1.3)	4 (0.3)	3 (0.4)	12 (2.1)
ED configuration					
General	3518 (85.0)	1414 (87.0)	1175 (94.5)	651 (92.2)	278 (49.6)
Pediatric	90 (2.2)	1 (0.1)	2 (0.2)	4 (0.6)	83 (14.8)
Separate pediatric	235 (5.7)	4 (0.2)	15 (1.2)	33 (4.7)	183 (32.7)
Standby	165 (4.0)	161 (9.9)	4 (0.3)	0	0
Freestanding	89 (2.2)	25 (1.5)	44 (3.5)	15 (2.1)	5 (0.9)
Other	40 (1.0)	21 (1.3)	4 (0.3)	3 (0.4)	12 (2.1)

Abbreviation: ED, emergency department.

Table 2. National Assessment Response Summary[a]

	All Responding EDs (N = 4137)	EDs by Pediatric ED Volume Category			
		Low (n = 1626)	Medium (n = 1244)	Medium to High (n = 706)	High (n = 561)
PECC					
Physician	1966 (47.5)	627 (38.6)	549 (44.1)	368 (52.1)	422 (75.2)
Nurse	2455 (59.3)	899 (55.3)	714 (57.4)	415 (58.8)	427 (76.1)
Physician certifications/training (board)					
Emergency medicine	3418 (82.6)	1127 (69.3)	1117 (89.8)	677 (95.9)	497 (88.6)
Family medicine	2555 (61.8)	1283 (78.9)	769 (61.8)	323 (45.8)	180 (32.1)
Pediatrics	791 (19.1)	147 (9.0)	173 (13.9)	144 (20.4)	327 (58.3)
Pediatric emergency medicine	604 (14.6)	96 (5.9)	113 (9.1)	84 (11.9)	311 (55.4)
Other	1116 (27.0)	505 (31.1)	357 (28.7)	156 (22.1)	98 (17.5)
ED competency evaluations					
Physician	1599 (38.7)	386 (23.7)	489 (39.3)	341 (48.3)	383 (68.3)
Nurse	2757 (66.6)	800 (49.2)	903 (72.6)	563 (79.7)	491 (87.5)
Midlevel practitioner	749 (18.1)	155 (9.5)	245 (19.7)	169 (23.9)	180 (32.1)
Key processes, policies, or procedures					
Pediatric QI process	1867 (45.1)	528 (32.5)	531 (42.7)	375 (53.1)	433 (77.2)
Weigh children only in kilograms	2802 (67.7)	853 (52.5)	893 (71.8)	564 (79.9)	492 (87.7)
Family-centered care plan	2468 (59.7)	821 (50.5)	784 (63.0)	447 (63.3)	416 (74.2)
Pediatric disaster plan	1938 (46.8)	613 (37.7)	577 (46.2)	370 (52.4)	378 (67.4)
Pediatric mental health care	1825 (44.1)	528 (32.5)	575 (46.2)	367 (52.0)	355 (63.3)
Required equipment, median (IQR), % carried	91 (81-98)	87 (78-96)	91 (83-98)	94 (85-100)	98 (91-100)

Abbreviations: ED, emergency department; IQR, interquartile range; PECC, pediatric emergency care coordinator; QI, quality improvement.

[a] Unless otherwise indicated, data are expressed as number (percentage) of responding EDs.

cine (55.4%). Mandatory pediatric emergency care competency evaluations are relatively common for nursing staff (66.6%) but are uncommon for midlevel staff (18.1%) or for physicians (38.7%) (Table 2).

Required Equipment for the Care of Children in the ED

Almost universally (99.5%), ED respondents reported that staff are trained on the location of pediatric equipment in the ED and have a precalculated chart or a length-based tool or use

Table 3. Median Adjusted WPRS by Volume and Presence of PECC[a,b]

Hospital Volume	PECC-Adjusted WPRS, Median (IQR)			
	None	Nurse Only	Physician Only	Nurse and Physician
All (N = 4137)	66.5 (56.0-76.9)	69.7 (58.9-80.9)	75.3 (64.4-85.6)	82.2 (69.7-92.5)
Low (n = 1626)	60.6 (51.0-71.9)	63.2 (54.1-73.6)	66.6 (55.0-80.2)	70.6 (59.7-81.0)
Medium (n = 1244)	69.2 (60.5-77.5)	73.8 (64.4-83.4)	76.5 (70.4-82.4)	81.4 (70.7-90.4)
Medium to high (n = 706)	71.4 (62.1-80.0)	78.1 (69.2-84.4)	81.3 (71.0-88.3)	86.0 (76.7-93.3)
High (n = 561)	74.3 (63.5-80.7)	82.4 (71.9-89.7)	77.4 (68.7-88.1)	93.8 (86.7-98.3)

Abbreviations: IQR, interquartile range; PECC, pediatric emergency care coordinator; WPRS, weighted pediatric readiness score.

[a] The WPRS was adjusted for the points given for a nurse PECC, a physician PECC, or both.

[b] $P < .001$ for all comparisons between PECC levels, Kruskal-Wallis test.

medical software to ensure proper sizing of resuscitation equipment and dosing of medications. Most ED respondents (83.1%) reported a daily method was used to verify the proper location and function of pediatric equipment. Overall, EDs stock 91% (IQR, 81%-98%) of recommended pediatric equipment. Notable equipment reported as missing in more than 15% of EDs included laryngeal mask airways, umbilical vein catheters, central venous catheters, tracheostomy tubes, size 00 laryngoscope blades, continuous end-tidal carbon dioxide monitoring equipment, pediatric Magill forceps, and infant and child nasopharyngeal airways.

Quality Improvement and Performance Improvement in the ED

Only 45.1% of ED respondents reported having a quality improvement plan addressing the needs of children. Of those, 58.3% identified specific quality indicators for children; 88.1% collected and evaluated data, such as transfer, deaths, and return visits; 78.9% had a plan for addressing variances in care, such as the provision of education to staff; and 73.5% had evaluation and reevaluation processes for outcome-based measures such as the relief of pain.

Patient Safety in the ED

Important ED processes that have patient safety implications were assessed (eTable 2 in the Supplement). Two-thirds of ED respondents (66.7%) reported weighing children in kilograms only (ie, with no conversion from pounds to kilograms). Of those EDs that weighed children in kilograms, 75.3% also recorded weight in kilograms in the medical record.

Policies, Procedures, and Protocols

A number of policies, procedures, or protocols are reported as missing by approximately half of ED respondents. Most notably, only 46.8% of ED respondents reported having a disaster plan that addresses children. This number varied by pediatric volume, but even in high-volume hospitals, only 67.4% reported having a disaster plan that includes the specific needs of children. Most ED respondents reported that they have written transfer guidelines in place (70.6%) and have a child maltreatment policy (89.6%) (eTable 3 in the Supplement).

Effect of PECCs on Pediatric Readiness of EDs

After adjusting for the point values given for each of the PECCs, the presence of physician and nurse PECCs significantly increased the WPRS, regardless of pediatric volume (**Table 3**). Respondents were twice as likely to have important policies in place, and 4 times more likely to have a quality improvement plan that addressed the needs of children if there was at least 1 PECC identified (**Table 4**).

Table 4. Having All Responses of Yes in a Scored Section Given the Presence of at Least 1 PECC[a]

Section of Guidelines	ARR (95% CI)
Physicians, nurses, and other health care practitioners who staff the ED	1.54 (1.40-1.69)
Guidelines	
QI or PI in the ED	4.11 (3.37-5.02)
Improving pediatric patient safety in the ED	1.30 (1.18-1.45)
Policies, procedures, and protocols for the ED	2.33 (1.81-3.01)
Equipment, supplies, and medications for the care of pediatric patients in the ED	1.44 (1.23-1.69)

Abbreviations: ARR, adjusted relative risk; ED, emergency department; PECC, pediatric emergency care coordinator; PI, performance improvement; QI, quality improvement.

[a] Each ARR and 95% CI resulted from a separate model in which the outcome of having all responses of yes was regressed on PECC presence adjusted for pediatric patient volume, hospital configuration, and geographic location.

Barriers to Guidelines Implementation

Barriers to guidelines implementation were reported by 80.8% of ED respondents. The most frequent barriers reported were the cost of training (54.4%), and the lack of educational resources (49.0%) (**Table 5**). Few respondents (12.4%) reported a lack of interest in meeting the guidelines as a barrier.

Discussion

This study reports on a web-based assessment of all EDs in the United States for compliance with national guidelines for pediatric readiness, and the 82.5% response rate provides, to our knowledge, the most comprehensive evaluation of pediatric readiness of our nation's EDs to date. Based on previous reports by Gausche-Hill et al[7] and the Centers for Disease Control and Prevention (2003 survey period), as mentioned by Middleton and Burt,[8] we report improvement in the median WPRS from the reported 55 in 2003 to 68.9 in 2013. An increase in pediatric readiness holds true for all ED pediatric patient volume categories.

The 2006 Institute of Medicine report[10] recommended that all hospitals have 2 PECCs, one of whom is a physician. Gausche-Hill et al[7] reported that only 18% had a physician PECC

Table 5. Barriers by Pediatric Patient Volume

Barrier	Responding EDs, No. (%)				
		Pediatric ED Volume Category			
	All (N = 4137)	Low (n = 1626)	Medium (n = 1244)	Medium to High (n = 706)	High (n = 561)
Cost of training personnel	2250 (54.4)	999 (61.4)	684 (55.0)	355 (50.3)	212 (37.8)
Lack of educational resources	2026 (49.0)	989 (60.8)	609 (49.0)	286 (40.5)	142 (25.3)
Lack of a QI or PI plan for children	2005 (48.5)	927 (57.0)	636 (51.1)	306 (43.3)	136 (24.2)
Lack of policies for pediatric emergency care	1961 (47.4)	950 (58.4)	591 (47.5)	284 (40.2)	136 (24.2)
Unaware that national guidelines existed and/or unfamiliar with national guidelines	1766 (42.7)	895 (55.0)	540 (43.4)	226 (32.0)	105 (18.7)
Lack of a disaster plan for children	1723 (41.6)	790 (48.6)	540 (43.4)	248 (35.1)	145 (25.8)
Lack of appropriately trained nurses	1703 (41.2)	822 (50.6)	497 (40.0)	247 (35.0)	137 (24.4)
Lack of appropriately trained physicians	1657 (40.1)	810 (49.8)	500 (40.2)	225 (31.9)	122 (21.7)
Cost of personnel	1655 (40.0)	717 (44.1)	506 (40.7)	263 (37.3)	169 (30.1)
Lack of administrative support	847 (20.5)	382 (23.5)	247 (19.9)	128 (18.1)	90 (16.0)
Lack of interest in meeting the guidelines	513 (12.4)	264 (16.2)	143 (11.5)	67 (9.5)	39 (7.0)
None reported	795 (19.2)	200 (12.3)	211 (17.0)	161 (22.8)	223 (39.8)

Abbreviations: ED, emergency department; PI, performance improvement; QI, quality improvement.

and 12% had a nurse PECC. Sullivan and colleagues[28] subsequently reported 17% of EDs had a PECC in a telephone survey of a random sampling of 5% of US EDs in 2007. We report a significant increase in PECCs in the current assessment: 47.5% of EDs have physician PECCs and 59.3% have nurse PECCs. With a large number of EDs responding, our sample provides more complete data on the presence and impact of PECCs and quantifies efforts by national stakeholders to improve the presence of PECCs in EDs.

Important safety issues highlighted by the Institute of Medicine report include the need for physicians and other practitioners to weigh children and to record the weight in kilograms only, the need for pediatric quality improvement plans, and the importance of including pediatric issues in state and regional disaster plans.[10] In this assessment, approximately one-half of respondents reported that their ED practitioners do not weigh children and record the weight in kilograms only. This patient safely initiative has been recognized as one of the most important to prevent drug-dosing errors and is one of the top 15 national hospital-based performance measures (K.E.R., Amy H. Kaji, PhD, MD, L.M.O., et al; unpublished Pediatric Readiness and Facility Verification; April 2012).[10,21] In this assessment, less than half of the respondents include children in quality improvement processes or in disaster planning. Respondents were more than twice as likely to have important policies in place, and 4 times more likely to have a quality improvement plan that addressed the needs of children if at least 1 PECC was identified. Given the effect the PECCs have on pediatric ED readiness, creating the role of PECC is the single most important process change that hospital and ED administrators can implement to improve compliance with the national guidelines.

Costich and coauthors[29] reported that 52% of surveyed Kentucky hospitals had 82% of the listed equipment and supplies as outlined in the 2009 guidelines. In our national assessment, half of the ED respondents reported having more than 90% of the recommended equipment as specified in national guidelines. Although availability of equipment in EDs has improved, full implementation of these guidelines is required to ensure the availability of emergency equipment for children of all ages.

Researchers have revealed a number of barriers to guideline implementation at the physician and nursing levels.[30-34] Physician knowledge (awareness of guidelines), attitudes (guidelines importance), and behavior (willingness to implement guidelines) all play a role in guideline adherence.[32-34] Ploeg et al[31] have outlined barriers for nursing implementation of guidelines, including negative attitudes and beliefs, lack of leadership support and recognized champions, and an understanding of the real costs and complexity of guideline implementation. Knowledge of physicians and nurses extends to the capabilities of the workforce and the challenges in maintaining procedural competency when critical skills are rarely performed, especially in facilities with a low volume and no or few pediatric inpatient resources.[7]

Although barriers to guidelines implementation exist, few ED respondents lacked interest in implementing the guidelines within their facilities. Awareness of the guidelines has improved, with 54.0% of respondents stating they were aware of the published guidelines in this report, compared with 41% in 2003.[7] In fact, completion of the web-based pediatric readiness assessment is a unique way to improve awareness of the guidelines.

Additional opportunities exist to improve pediatric readiness through verification of ED compliance with published guidelines, such as reported in Illinois, Tennessee, and California.[35-37] The report of the California Pediatric Readiness project, the pilot for the national project, found that WPRSs are significantly improved if a region uses a pediatric verification process (K.E.R., Amy H. Kaji, PhD, MD, L.M.O., et al; unpublished Pediatric Readiness and Facility Verification; April 2012), such as those who meet specific requirements to be an ED approved for pediatrics.[37]

Innovation, technical aspects, managing performance, communication, partnerships, and political commitment have been identified as 6 key components to successful and sustainable implementation of public health programs.[38] Through a coalition of national stakeholders, the NPRP provides the partnerships, communication, and commitment to make this public health initiative a success. Administration of the project by cohorts allows each state to compare their own completion rates with those of other states. The technical aspects of the http://www.pedsready.org site allow for immediate feedback to the respondents on their readiness score, benchmarking with similar hospitals, and a gap analysis that in all likelihood motivates nurse managers to participate. The availability of electronic resources through the http://www.pediatricreadiness.org site provides additional assistance to ED managers seeking to improve pediatric readiness.

Our study is limited by the lack of onsite verification of resources, which means that our estimates of readiness are likely overestimates. Although the ED nurse manager was asked to complete the assessment, we do not collect information on the role of the person completing the web-based assessment, which could lead to reporting bias. Finally, we do not have data on nonrespondents. Given the high response rate in this assessment of EDs, we believe our data provide a reliable snapshot of national pediatric ED readiness and afford stakeholders the information necessary to identify future quality initiatives. Of the 27 million annual ED visits by children in the United States, this study accounts for 24 million of them (88.9%).[38,39]

The process by which multiple professional organizations and federal agencies worked together exemplifies the power of engagement by a national coalition that has significant public health implications on the improvement of the day-to-day readiness of EDs to care for children. The assignment of a PECC is an intervention with a low cost (shared role) and a high impact (improved pediatric readiness) that can be implemented easily by ED managers.

Conclusions

These data demonstrate improvement in pediatric readiness of EDs compared with previous reports. The PECCs play an important role in ensuring pediatric readiness of EDs, and barriers may be targeted for future initiatives. We describe the successful implementation of a comprehensive assessment by a national coalition that achieved a high response rate and is poised for further engagement with the goal to ensure day-to-day pediatric readiness of our nation's EDs.

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Author Affiliations: Department of Emergency Medicine, Harbor–UCLA (University of California, Los Angeles) Medical Center, Torrance (Gausche-Hill); Los Angeles Biomedical Research Institute, Harbor–UCLA Medical Center, Torrance (Gausche-Hill); Department of Medicine, David Geffen School of Medicine, UCLA (Gausche-Hill); Department of Pediatrics, David Geffen School of Medicine, UCLA (Gausche-Hill); National Emergency Medical Services for Children Data Analysis Resource Center, Salt Lake City, Utah (Ely, Schmuhl, Telford, Olson); Department of Pediatrics, University of Utah, Salt Lake City (Ely, Schmuhl, Telford, Olson); Austin-Travis County Emergency Medical Services, Austin, Texas (Remick); Department of Pediatric Emergency Medicine, Dell Children's Medical Center, Austin, Texas (Remick); Emergency Medical Services for Children and Injury Prevention, Maternal and Child Health Bureau, Health Resources and Services Administration, Rockville, Maryland (Edgerton).

Author Contributions: Messrs Ely and Telford had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.
Study concept and design: Gausche-Hill, Ely, Schmuhl, Remick, Edgerton, Olson.
Acquisition, analysis, or interpretation of data: Ely, Schmuhl, Telford, Remick, Edgerton, Olson.
Drafting of the manuscript: Gausche-Hill, Ely, Telford, Remick, Olson.
Critical revision of the manuscript for important intellectual content: Ely, Schmuhl, Telford, Remick, Edgerton, Olson.
Statistical analysis: Telford.
Administrative, technical, or material support: Ely, Schmuhl, Remick, Edgerton, Olson.
Study supervision: Gausche-Hill, Remick, Edgerton, Olson.

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