

BRIEF RESEARCH REPORT

Pediatrics

Optimizing the workforce: a proposal to improve regionalization of care and emergency preparedness by broader integration of pediatric emergency physicians certified by the American Board of Pediatrics

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Abstract

Background: Emergency care in the United States faces notable challenges with regard to children. In some jurisdictions, available resources are not sufficient to meet local needs. Physicians with specialty training in pediatric emergency care are largely concentrated in children's medical centers within larger urban areas. Rural emergency

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facilities, which are more likely to face ongoing staffing shortages in all specialties, are particularly deficient in pediatric emergency medicine (PEM) physicians. This paper addresses challenges in distribution of pediatric emergency care specialists into suburban and rural health care facilities, and proposes potential local and regional solutions to improve pediatric emergency care capabilities as well as to enhance disaster response in children.

Objectives: The American College of Emergency Physicians (ACEP) committee on PEM generated the objective to study and explore methods and strategies to address current challenges and shortcomings in the distribution of pediatric emergency physicians and to develop recommendations to improve access to emergency pediatric expertise in all care settings. A sub-committee was formed to generate a written report followed by full committee input. The content was reviewed by the ACEP Board of Directors.

Discussion: Pediatric emergency physicians are certified either by the American Board of Emergency Medicine or the American Board of Pediatrics (ABP) depending on whether their training occurred through the emergency medicine or a pediatric residency program. ABP-certified PEM that account for the majority of PEM physicians, remain largely concentrated in urban tertiary pediatric care centers, primarily children's hospitals. By contrast to the resources, the majority of pediatric patients receive emergency care in emergency departments (EDs) outside this setting. The goal of our recommendations is to help regionalize PEM expertise, allowing sharing of such resources with facilities that have traditionally not had access to PEM expertise. Financial or low number of pediatric cases likely contributed to lack of PEM resources in suburban and rural EDs, although a significant factor for lack of access to ABP-certified PEM physicians may be local privilege and practice restrictions. Expanding the scope of practice for ABP-certified PEM physicians beyond traditionally assigned arbitrary age limits to include selective adult patients has the potential to alleviate credentialing barriers and offset the financial and volume concerns while enhancing preparedness efforts, resource utilization, and access to specialized pediatric emergency care.

Conclusion: Recognition that the training of ABP-certified PEM physicians allows for these individuals to safely care for selective adult patients with common disease patterns that extend beyond traditionally assigned arbitrary pediatric age limits has the potential to improve resource dissemination and utilization, allowing for greater access to pediatric emergency physicians in currently underserved settings.

KEYWORDS

community, pediatric care, pediatric emergency medicine, pediatric preparedness, regionalization, rural health care, specialty care, underserved populations

1 | INTRODUCTION

Emergency care in the United States faces notable shortcomings and challenges with regard to pediatric care.¹ Pediatric emergency care services in the United States are inconsistent, and, in some jurisdictions, available resources are not sufficient to meet local needs for both routine care and crisis response. Specialty training directed toward pediatric sub-populations in emergency services improves outcomes

and resource allocation.² Region-specific patient needs, presentation patterns, and required resources in disaster situations often do not match local capability and capacity.³ Compounding factors inherent to emergency services are inconsistencies in patient volume, disease process, and patient age. Commonality exists in which emergency personnel of varying training backgrounds can assist each other in delivery of services when faced with inconsistent levels of demand in local and regional emergency services. Resource allocation and delivery of

services must remain flexible and adapt to meet the needs of local and regional events whether they are routine or disaster-related. Motives are directed toward identifying service gaps and therefore not to detract from the importance of individual specialty training obtained through certification through the American Board of Medical Specialties. Rather, the specialty focuses for both board-certified emergency physicians and American Board of Pediatrics (ABP)-certified pediatric emergency medicine (PEM) physicians have the capacity to aid in the distribution of services throughout the United States.

2 | PREMISE STATEMENT

Each day, over 80,000 children visit emergency departments in the United States. In fact, 20% of all children will experience an ED visit each year.^{4,5} Over 85% of these children presenting for emergency care are seen in non-pediatric EDs.⁶ EDs are often staffed by emergency physicians, pediatricians, family medicine physicians, physician assistants, or nurse practitioners.^{3,7} Despite the lack of availability of emergency physicians with extended pediatric training beyond residency, EDs are expected to provide high quality pediatric care for the initial evaluation and stabilization of the ill pediatric patient. The congregation of advanced trained pediatric specialists, including ABP-certified PEM physicians, within tertiary care centers creates a misalignment of pediatric expertise and regional care demands. It is therefore not surprising to note that the single most important factor in improving pediatric readiness for an ED is the identification of a pediatric emergency care coordinator (physician and/or nurse) to provide pediatric leadership within the organization.³

“Compartmentalization” results largely from the fact that the vast majority of the pediatric emergency physicians received board certification through the ABP have historically occupied positions in academic children’s hospitals. In addition, challenges to hiring ABP-certified PEM physicians in an ED include the following: low pediatric volumes, lack of funding for additional personnel with specific pediatric experience, and a perceived limited scope of practice of ABP-certified PEMs to support credentialing at non-pediatric EDs.^{3,8} Theoretical modeling has shown that the greatest impact on overall pediatric care occurs when physicians with pediatric expertise were distributed throughout the community rather than in isolated pediatric practices.⁹ This discussion is directed toward identifying service gaps and not meant to detract from the importance of individual specialty training and certification from an American Board of Medical Specialty. Rather, the focus is on distribution of ABP-certified PEM physicians and their capacity to aid in better distribution of services throughout the United States.

3 | THE STATE OF EMERGENCY CARE

The emergency care environment in the United States is a system under strain. In 2014, the American College of Emergency Physicians (ACEP) gave the United States emergency care system a grade of “D+,”

The Bottom Line

This paper discusses possible solutions toward an improved utilization of physician resources in an effort to promote pediatric emergency readiness and disaster preparedness. In such circumstances, hospital-defined privileges may be expanded to better align with clinical training and practice capabilities.

based on access to emergency care, the quality and patient safety environment, the medical liability environment, public health and injury prevention, and disaster preparedness.¹⁰ Unfortunately, this reflects a negative trend, as ACEP had previously given the emergency care environment a grade of “C–” in 2009.¹¹

The increase in demand for emergency services is compounded by a shortage of board-certified emergency physicians.^{12,13} Estimates of the number of practicing emergency physicians vary from 40,000 to 48,000 in 2016.^{14,15} Of these emergency physicians, 38,052 are certified in emergency medicine (EM) by American Board of Emergency Medicine and 3871 through the American Osteopathic Board of Emergency Medicine.¹⁶ The 2006 Institute of Medicine report stated that “although ideally all EDs would be staffed by residency-trained, board-certified emergency physicians, this is highly unlikely to occur in the near to mid-term, if ever.” This statement was opined to largely be due to a propensity of physicians to practice in urban environments, leading to a lack of board-certified emergency physicians in rural areas.^{1,10,17}

4 | GAPS IN PEDIATRIC EMERGENCY SERVICES—SUMMARY OF CURRENT STATE OF ED READINESS

Government organizations and innovation centers, including the federal Emergency Medical Services for Children program under the Health Resources and Services Administration, have made a call to accelerate quality initiatives, and to improve infrastructure and health care outcomes in the pediatric patient.^{18,19} The 2006 Institute of Medicine report on *Emergency Care for Children: Growing Pains*, further outlines specific recommendations to increase pediatric knowledge and skills and improve quality of pediatric emergency care, emergency preparedness, and emergency response.¹ However, this requires recognition of the notable gaps that still exist in providing even basic, much less emergency, pediatric care across all geographic spectrums.

The great majority of pediatric patients are cared for in non-pediatric-dedicated EDs.³ In a 2003 readiness survey, only 6% of responding EDs had all of the recommended pediatric supplies and equipment, frequently lacking even basic pediatric/neonatal airway supplies or a coordinator of pediatric care.⁶ Other studies have also noted similar inconsistencies in pediatric care.^{20,21} After 10 years, a follow-up 2013 survey showed improvement in readiness, noting that

such advancements were associated frequently with pediatric emergency care coordinators.³ Lower pediatric volume EDs achieved lower readiness scores. Finally, a survey conducted in 2016 in California also demonstrated improved pediatric readiness after implementation of state guidelines for ED pediatric verification.²²

There is still substantial need for improved pediatric emergency readiness given such disparity of care across geographic settings. Emergency physicians and pediatricians can gain advanced pediatric emergency training through a subspecialty fellowship, either provided through EM or pediatric programs, or through training in both specialties. At this time, the majority of training programs are through the pediatric route. Such advanced trained physicians bring a unique skillset and expertise that can help overcome this overwhelming gap of care in non-children's hospital EDs. To address these gaps, prior calls to include a pediatrician in a supportive role within the emergency care infrastructure have been made.²³ Similarly, it stands to reason that ABP pediatric emergency physicians would serve as a quality contributor in general ED settings.

5 | PEM TRAINING REQUIREMENTS—INTEGRATED SKILLS FOR THE CARE OF ADULTS

The Accreditation Council for Graduate Medical Education (ACGME) establishes training requirements for all programs in the United States. Within the common program requirements for pediatric-based PEM programs, the ACGME mandates training for fellows in the care of pediatric patients “from infancy into young adulthood.” It also specifies training in the care of adult patients termed “reciprocal training.”²⁴ Reciprocal training is defined as “training in the specialty reciprocal to the fellow's prior residency.” Pediatric graduate training must include a minimum of “four months spent in an adult emergency department” that is part of an ACGME-accredited EM program. One block month of that experience must be spent caring for adults with traumatic injuries, ideally on a trauma service. During the time spent in the adult ED, there must be structured educational experiences in emergency medical services and toxicology.²⁴ In addition, significant overlap exists in the core competencies as well as the listed medical, diagnostic, and surgical procedures (Supporting Information Appendix S1) considered essential for practice between PEM fellowship programs and EM programs.^{24,25} Thus, these ACGME training requirements mandate a basic level of training in the care of adults recognizing the role that ABP-certified PEM physicians may play in caring for this patient population.

6 | THE BENEFIT TO COOPERATIVE RESOURCE ALLOCATION

It is extremely important that ABP-certified PEM physicians have training and feel comfortable in the emergency stabilization and care of adult patients, because adults will occasionally seek care in pediatric EDs.²⁶ One study noted that 1.1% of patients treated in an urban children's hospital emergency department (CHED) were adults.²⁷ The

authors further demonstrated that the number of adult patients being treated in CHEDs was increasing, thus demonstrating the importance of addressing adult training. In light of the legal mandate imparted by the Emergency Medical Treatment and Labor Act to care for all patients who present to an ED, it is therefore essential that physicians staffing CHEDs be properly trained in the stabilization of common adult medical emergencies. Training for ABP-certified PEM physicians in the emergency care of adults has as a result been mandated by the ACGME.²⁴

7 | PROMOTING ED RESILIENCY—RESPONDING TO COMMON CAUSE PATIENT VOLUME VARIATIONS, EPIDEMICS, AND DISASTER EVENTS

EDs are expected to be resilient to variations in demand for emergency services in the communities they serve. Failure to do so results in poor ED patient flow that is associated with less favorable outcomes, compromised quality of care, increased costs, elevated liability risk, and decreased patient and staff satisfaction.^{28–37} Efforts to enhance ED resiliency and surge capacity can be directed at either (or both) factors of the demand–supply relationship.³⁶ ED providers typically become among the most constrained resources when common (ie, usual hour to hour fluctuations) or special (ie, epidemic and disaster events) cause variations in demand.^{30,29,36} Emergency physicians represent critical enablers of ED resiliency because they are able to provide a broad portfolio of services which could not otherwise be provided without multiple other types of providers. ABP-certified PEM physicians can be an analogous resiliency resource focused more on pediatric emergency services but with significant utility for some non-pediatric cases.

Both emergency physicians and ABP-certified PEM physicians receive significant post-graduate training in providing pediatric emergency services and responding to disasters and mass casualty situations.²⁵ ABP-certified PEM physicians also receive training in providing adult emergency care during fellowship.²⁴ Additional *de facto* capabilities in common result because the evaluation and management of some conditions and the performance of some procedures are not materially affected by the age of the patient. In fact, some procedures such as suturing or incision and drainage of an abscess, for example, are often easier to perform in adults than young children. Further examples may be seen in Supporting Information Appendix SB.

Present restrictions that can interfere with realizing the full potential capabilities of willing ABP-certified PEM physicians to care for patients outside the typical pediatric age range may include local credentialing provisions, hospital privilege specifications, malpractice insurance contracts, organizational or regulatory policies, and traditional or even individual physician preferences. Additional training or clinical experience can expand the capabilities in common between ABP-certified PEM physicians and emergency physicians. Of note, in some ED practices where ABP-certified PEM physicians are hired under the auspices of an “all-ages” ED group, credentialing for performing life-saving procedures and common procedures performed in the ED are not defined by age. This practice is based on the

Optimizing the Workforce

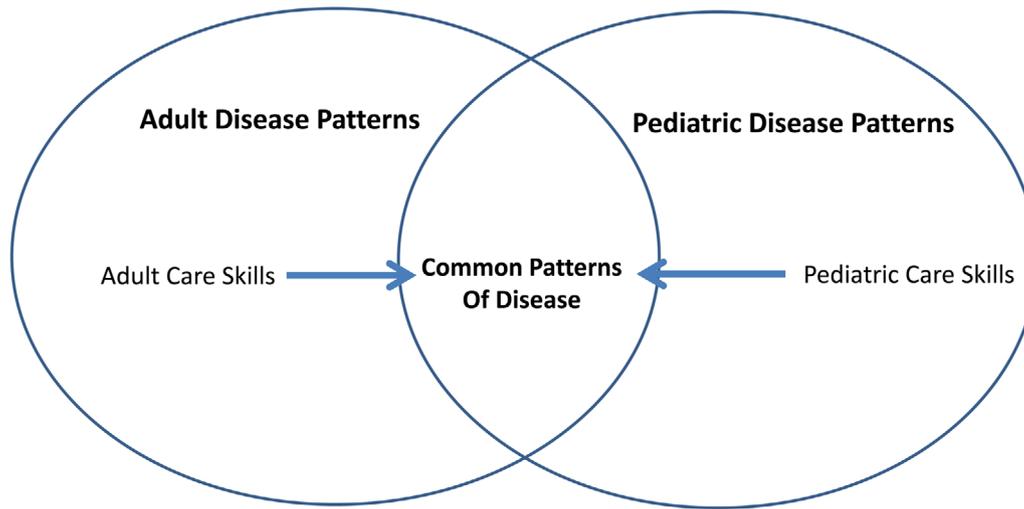


FIGURE 1 Optimizing the workforce: overlapping skills between emergency physicians and pediatric emergency medicine. Physicians can contribute to the management of disease patterns that are consistent across the age spectrum

scope of training of physicians in EM, or PEM.³⁸ Therefore, in such settings, ABP-certified PEM physicians are able to provide care for patients with certain disease patterns regardless of age. For example, ABP-certified PEM physicians will be credentialed to perform suturing, lumbar puncture, abscess incision and drainage, or treatment of pharyngitis or other common conditions. In addition, they may run resuscitative efforts or perform life-saving procedures.

ABP-certified PEM physicians and emergency physicians can substitute for each other when both possess all of the capabilities needed for the care of an individual patient (Figure 1). Such situations allow either the ABP-certified PEM physician or emergency physician to independently manage the patient, balancing patient loads across on-duty physicians and optimizing patient flow. Engaging other types of physicians may become necessary when an ABP-certified PEM physician does not possess sufficient capability to care for a patient alone. When an ABP-certified PEM physician assumes responsibility for an adult patient that may ultimately exceed their skill set, capacity, or comfort level, they could partner with an emergency physician-trained colleague or other consultative service to deliver optimal patient-centered care. Relocating ABP-certified PEM providers to another site and allowing emergency privileges during a disaster may be another mutual support option.

8 | DISCUSSION

The educational benefits of a mixed physician staffing group are many. Rural and community EDs may not be able to avail themselves of using an ABP-certified PEM physician. Often, lower volumes of pediatric patients, costs of staffing, and a small pool of available physicians of any specialty leads to fewer centers considering adding ABP-certified PEM providers to their staffing models. Although most ABP-

certified PEM physician are located in urban and academic centers, they could provide a unique service to the rural and community ED through part time work, consultation, or telemedicine for example. These physicians may also assist emergency physicians and advanced practice providers in pediatric care issues, address pediatric quality improvement, and improve overall care to the center/region with this more integrated and mixed role. Overlapping service roles allows for improvement of staffing coverage and the ability to cross cover with the varying nature of patient volume characteristics, mass casualty, and disaster preparedness. Quality assurance roles or the creation of pathways/guidelines may also improve pediatric care in the non-pediatric or rural ED, and reciprocally, the creation of pathways/guidelines to help ABP-certified PEM physicians in this newer role of cross covering care for adult patients may also evolve. The emergence of increased pediatric telemedicine services has allowed for an expanded PEM outreach to under-resourced areas;³⁹ however, these resources have primarily been housed and isolated in tertiary or academic facilities and do not necessarily promote in-house institutional preparedness or expertise. Dissemination of ABP-certified PEM-trained physicians into the more suburban or rural community provides opportunities for the development of timelier, organized, and optimized regional care.

9 | CONCLUSION

Recognition that the training of the ABP-certified PEM physician allows for these individuals to safely care for patients with common disease patterns that extend beyond traditionally assigned arbitrary age limits, and has the potential to improve staffing constraints and disaster preparedness improving resource dissemination and utilization and allowing for greater access to high quality pediatric emergency care to currently underserved settings.

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AUTHOR CONTRIBUTORS

DW served as a contributing author, coordinated additional author contributions, drafted the manuscript, and critically reviewed and revised the manuscript. JH, CSA, DP, ER, JV, PI, PF, SB, MJ, and MS contributed text sections, approved the final manuscript as submitted, and agree to be accountable for all aspects of the work. DP and JMG served as the American College of Emergency Physician's committee liaisons and critically reviewed the manuscript. DW takes full responsibility for the content of this manuscript.

CONFLICT OF INTEREST

The authors have no conflict of interest.

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REFERENCES

- Institute of Medicine. *Emergency Care for Children: Growing Pains*. Washington, DC: The National Academies Press; 2007.
- Macias CG. Quality improvement in pediatric emergency medicine. *Acad Pediatr*. 2013;13(6 suppl):S61-S68.
- Gausche-Hill M, Ely M, Schmuhl P, et al. A national assessment of pediatric readiness of emergency departments. *JAMA Pediatr*. 2015;169(6):527-534.
- National Center for Health S. *Health, United States. Health, United States, 2005: With Chartbook on Trends in the Health of Americans*. Hyattsville, MD: National Center for Health Statistics (US); 2005.
- National Center for Health S. *Health, United States. Health, United States, 2009: With Special Feature on Medical Technology*. Hyattsville, MD: National Center for Health Statistics (US); 2010.
- Gausche-Hill M, Schmitz C, Lewis RJ. Pediatric preparedness of US emergency departments: a 2003 survey. *Pediatrics*. 2007;120(6):1229-1237.
- Gausche-Hill M. Integrating children into our emergency care system: achieving the vision. *Ann Emerg Med*. 2006;48(2):131-134.
- Murray ML, Woolridge DP, Colletti JE. Pediatric emergency medicine fellowships: faculty and resident training profiles. *J Emerg Med*. 2009;37(4):425-429.
- Sacchetti A, Benjamin L, Soriano AR, Ponce MG, Baren J. Should pediatric emergency physicians be decentralized in the medical community? *Pediatr Emerg Care*. 2014;30(8):521-524.
- America's emergency care environment, a state-by-state Report Card: 2014 edition. *Ann Emerg Med*. 2014;63(2):97-242.
- America's emergency care environment, a state-by-state Report Card: 2009 edition. American College of Emergency Physicians. https://r.search.yahoo.com/_ylt=Awr9Jh2NGfVe_cYAPmxXNyoA;_ylu=X3oDMTEydHY2N3Y1BGNvbG8DZ3ExBHBvcwMxBH0aWQDQzAONjlfMQRzZWMDc3I-/RV=2/RE=1593149966/RO=10/RU=http%3a%2f%2fwww.emreportcard.org%2f/RK=2/RS=Ps4hPfrgZoLoNerR_yb5F9B2osw-
- Ginde AA, Rao M, Simon EL, et al. Regionalization of emergency care future directions and research: workforce issues. *Acad Emerg Med*. 2010;17(12):1286-1296.
- Reiter M, Wen LS, Allen BW. The emergency medicine workforce: profile and projections. *J Emerg Med*. 2016;50(4):690-693.
- Professionally Active Specialist Physicians by Field; Henry J. Kaiser Family Foundation. 2019. <http://kff.org/other/state-indicator/physicians-by-specialty;area/?currentTimeframe=0>. Accessed December 2019.
- 2016 Physician Specialty Data Report. Association of American Medical Colleges. 2016. <https://www.aamc.org/data-reports/workforce/interactive-data/2016-physician-specialty-report-data-highlights>; Accessed November 2019.
- Exam & Certification Statistics. American Board of Emergency Medicine; 2019. <https://www.abem.org/public/resources/exam-certification-statistics>. Accessed December 2019.
- Peterson LE, Dodoo M, Bennett KJ, Bazemore A, Phillips RL Jr. None-emergency medicine-trained physician coverage in rural emergency departments. *J Rural Health*. 2008;24(2):183-188.
- Health Resources and Services Administration. <http://www.hrsa.gov>. Accessed December 2016.
- Emergency Medical Services for Children. Innovation and Improvement Center; Houston TX. <https://emscimprovement.center/>. Accessed December 2019.
- Middleton KR, Burt CW. Availability of pediatric services and equipment in emergency departments: United States, 2002-2003. *Adv Data*. 2006(367):1-16.
- Sullivan AF, Rudders SA, Gonsalves AL, Steptoe AP, Espinola JA, Camargo CA, Jr. National survey of pediatric services available in US emergency departments. *Int J Emerg Med*. 2013;6(1):13.
- Remick K, Kaji AH, Olson L, et al. Pediatric Readiness and Facility Verification. *Ann Emerg Med*. 2016;67(3):320-8.e1.
- Moore B, Sapien R. The role of the pediatrician in rural emergency medical services for children. *Pediatrics*. 2012;130(5):978-982.
- ACGME program requirements for graduate medical education in pediatric emergency medicine. Accreditation Council for Graduate Medical Education.
- ACGME Program requirements for graduate medical education in emergency medicine. Accreditation Council for Graduate Medical Education
- Bourgeois FT, Shannon MW. Adult patient visits to children's hospital emergency departments. *Pediatrics*. 2003;111(6 Pt 1):1268-1272.
- Baker MD, Schwartz GR, Ludwig S. The adult patient in the pediatric emergency department. *Ann Emerg Med*. 1993;22(7):1136-9.
- Bernstein SL, Aronsky D, Duseja R, et al. The effect of emergency department crowding on clinically oriented outcomes. *Acad Emerg Med*. 2009;16(1):1-10.
- Crane JT, Noon CE. *The Definitive Guide to Emergency Department Operational Improvement: Employing Lean Principles With Current ED Best Practices to Create the "no wait" Department*. New York: Productivity Press; 2011.
- Mayer T, Jensen K. *HARDWIRING FLOW: Systems and Processes for Seamless Patient Care*. Gulf Breeze, FL: Fire Starter Publishing; 2009.
- Mullins PM, Pines JM. National ED crowding and hospital quality: results from the 2013 Hospital Compare data. *Am J Emerg Med*. 2014;32(6):634-639.
- Pines JM. Emergency department crowding in California: a silent killer? *Ann Emerg Med*. 2013;61(6):612-614.
- Pines JM, Iyer S, Disbot M, Hollander JE, Shofer FS, ;. The effect of emergency department crowding on patient satisfaction for admitted patients. *Acad Emerg Med*. 2008;15(9):825-831.
- Pines JM, Prabhu A, Hilton JA, Hollander JE, Datner EM. The effect of emergency department crowding on length of stay and medication treatment times in discharged patients with acute asthma. *Acad Emerg Med*. 2010;17(8):834-839.

35. Stang AS, Crotts J, Johnson DW, Hartling L, Guttman A. Crowding measures associated with the quality of emergency department care: a systematic review. *Acad Emerg Med*. 2015;22(6):643-656.
36. Strauss RW, Mayer TA. *Strauss and Mayer's Emergency Department Management*. New York: McGraw-Hill; 2014.
37. Sun BC, Hsia RY, Weiss RE, et al. Effect of emergency department crowding on outcomes of admitted patients. *Ann Emerg Med*. 2013;61(6):605-11.e6.
38. Physician credentialing and delineation of clinical privileges in emergency medicine. *Ann Emerg Med*. 2017;70(3):446.
39. Marcin JP, Shaikh U, Steinhorn RH. Addressing health disparities in rural communities using telehealth. *Pediatr Res*. 2016;79(1-2):169-176.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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