



Crowding in the Emergency Department: Challenges and Best Practices for the Care of Children

Toni K. Gross, MD, MPH, FAAP,^a Natalie E. Lane, MD, FAAP,^b Nathan L. Timm, MD, FAAP,^c
THE COMMITTEE ON PEDIATRIC EMERGENCY MEDICINE

Emergency department (ED) crowding has been and continues to be a national concern. ED crowding is defined as a situation in which the identified need for emergency services outstrips available resources in the ED. Crowding is associated with higher morbidity and mortality, delayed pain control, delayed time to administration of antibiotics, increased medical errors, and less-than-optimal health care. ED crowding impedes a hospital's ability to achieve national quality and patient safety goals, diminishes the effectiveness of the health care safety net, and limits the capacity of hospitals to respond to a disaster and/or sudden surge in disease. Both children and adults seeking care in emergency settings are placed at risk. Crowding negatively influences the experience for patients, families, and providers, and can impact employee turnover and well-being. No single factor is implicated in creating the issue of crowding, but elements that influence crowding can be divided into those that affect input (prehospital and outpatient care), throughput (ED), and output (hospital and outpatient care). The degree of ED crowding is difficult to quantify but has been linked to markers such as hours on ambulance diversion, hours of inpatient boarding in the emergency setting, increasing wait times, and patients who leave without being seen. A number of organizations, including the American College of Emergency Physicians, the Emergency Nurses Association, and the National Quality Forum, have convened to better define emergency metrics and definitions that help provide data for benchmarks for patient throughput performance. The Joint Commission has acknowledged that patient safety is tied to patient throughput and has developed guidance for hospitals to ensure that hospital leadership engages in the process of safe egress of the patient out of the ED and, most recently, to address efficient disposition of patients with mental health emergencies. It is important that the American Academy of Pediatrics acknowledges the potential impact on access to optimal

abstract

^aDivision of Emergency Medicine, Departments of Pediatrics, Children's Hospital New Orleans, Tulane University and LSU Health New Orleans, New Orleans, Louisiana; ^bDepartment of Emergency Medicine and Department of Pediatrics, Medical College of Georgia, Augusta University, Augusta, Georgia; and ^cDivision of Emergency Medicine, Department of Pediatrics, Cincinnati Children's Hospital Medical Center, University of Cincinnati College of Medicine, Cincinnati, Ohio

Drs Gross and Lane collaborated on the draft statement; Dr Timm contributed to subsequent revisions, as did the original statement author, Dr Steve Krug; members of the Committee on Pediatric Emergency Medicine provided guidance on content and key edits; and all authors reviewed and approved the final statement as submitted, and agree to be accountable for all aspects of the work.

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DOI: <https://doi.org/10.1542/peds.2022-060972>

To cite: Gross TK, Lane NE, Timm NL, et al; AAP Committee on Pediatric Emergency Medicine. Crowding in the Emergency Department: Challenges and Best Practices for the Care of Children. *Pediatrics*. 2023;151(3):e2022060972

emergency care for children in the face of ED crowding and helps guide health policy decision-makers toward effective solutions that promote the medical home and timely access to emergency care.

INTRODUCTION

Emergency department (ED) crowding is defined simply as a situation in which the identified need for emergency services outstrips available resources in the ED.¹ ED crowding threatens patient safety when patients experience long waits to see a physician. It leads to poor patient experience and diminishes staff engagement, which can lead to health care worker burnout. Hospital payment and fiscal stability, as well as community access to health care, are also affected by ED crowding. The Agency for Healthcare Research and Quality provides a guide for hospitals that states that ED crowding compromises care quality and community trust and is costly, but can be mitigated by improving patient flow across hospital systems.²

ED crowding is multifactorial and complex, stemming from a combination of health care system issues that cannot be solved solely by those who manage and provide care in general or pediatric EDs (PEDs). EDs offer comprehensive care, are open at all hours every day of the year, and do not require previous authorization to visit. These conveniences may be cause for families to choose to seek care in an ED over alternative settings.³ Those who work in EDs may realize which factors associated with crowding are within their scope of control, but they will also need to engage with stakeholders throughout the health care system when seeking solutions to the problem.

Measuring the degree of ED crowding is challenging. There are

several scales and measurements that indirectly attempt to quantify crowding. The National ED Overcrowding Scale has become a national standard for measuring the degree of general ED crowding. The calculation of the score serves to prove how many factors trickle down to ED crowding: elements of the score include number of hospital beds, number of ED beds, total patients in the ED, number of admitted patients in the ED, longest wait time to see a provider, longest wait for an inpatient bed, and number of ED patients on ventilators.⁴

EDs are often the safety net for health care services in a community. The enactment of the Emergency Medical Treatment and Labor Act of 1986, which requires nearly all EDs to provide a medical screening examination and provide stabilization for any patient who presents to the setting regardless of their ability to pay or their legal or citizenship status, produced a much-needed resource and prevented “patient dumping.” Alternative payment models and federal subsidies look to offset uncompensated care costs and counteract the strain felt by EDs remaining committed to providing around-the-clock health care. The economic and ED utilization effects of these payment models remain to be seen. Costs borne by hospital EDs that are associated with planning for disasters and pandemics are also largely unpaid.

The number of pediatric patients seeking care in EDs has been rising. The 2018 National Hospital Ambulatory Medical Care Survey data revealed that there were

130 million annual ED visits, of which 25.6 million were by children younger than 15 years.⁵ Substantial gains in health insurance coverage for children from 2010 to 2014 resulted in increased children’s access to health services.⁶ The number of primary care physicians, however, did not increase with the number of insured people during this time period. The child uninsured rate, which had increased during 2019–2020, was down from 6.4% in late 2020 to 3.7% in early 2022.⁷ The impact of these and other factors on ED usage is not well understood. Although ED visit rates for children 0–17 years old increased between 2014 and 2016, the rate of increase was independent of insurance coverage.⁸

Children seeking emergency care present unique challenges to discussions of ED crowding, especially when considering that over 80% of PED visits occur in nonchildren’s hospitals.⁹ In the literature, the unique needs of children may not be considered in retrospective evaluation of ED-presenting complaints, as in the complaint of “fever,” which carries a significantly higher risk in a neonate than it does in a young adult. Nonmedical urgency, as in the case of child protective service physical examinations or need for return-to-school documentation, may also be retrospectively classified as nonurgent visits while deemed urgent from a societal or socioeconomic perspective. A parent’s perception of an emergency on the basis of symptoms may differ from the definition used when retrospectively studying ED visits or the definition determined by payers.

This technical report supports the AAP policy, "Crowding in the Emergency Department: Challenges and Recommendations for the Care of Children," by describing the importance of ED crowding, a conceptual framework, and related existing literature. Evidence-based solutions for mitigating ED crowding presented in this technical report will be of interest to primary care providers, ED leaders, hospital administrators, health care system planners, and health care regulatory bodies.

DEFINING THE PROBLEM

At the heart of ED crowding is the concern for patient safety. Maintaining readiness to care for critical cases while also treating higher volumes of patients can be difficult. Even adherence to established quality metrics for routine ED complaints is challenged by the need for increased service delivery when EDs are crowded. Across all hospital EDs, the 2013 National Pediatric Readiness Project survey noted that there is an unevenness in capabilities regarding policy development, equipment, clinical resources, and disaster preparedness. Overall, categories involving quality metrics, disaster preparedness, and pediatric physician and nursing coordinators were lacking in almost 50% of participating institutions. Smaller EDs that see fewer children per day had lower readiness scores to care for children than did larger departments.⁹

Large general emergency centers where crowding is prominent risk missing an ill child among a large number of patients, including children with lower urgency visits, even when they have adequate pediatric readiness. Delays in treatment of children with moderate to severe asthma were noted in crowded EDs.¹⁰ Increased inpatient mortality for pediatric patients was seen in a mixed ED in Korea when

crowding was evident on the day of admission, with a hazard ratio of 1.230 (95% confidence interval, 1.019–1.558).¹¹

PEDs are not immune to the negative effects on patient care caused by ED crowding. ED crowding was noted to be a factor in failure to reassess children with abnormal vital signs¹² and was associated with increased admissions to inpatient and critical care units for pediatric patients seen in a PED.¹³ Delay of antibiotic administration to febrile neonates was found to be the result of all aspects of crowding, despite recognition of an at-risk population.¹⁴ Process-related flow issues in a large PED resulted in an increased left-without-being-seen rate, a potential safety and liability issue for the institution.¹⁵

Long wait times are a symptom of crowded general and PEDs and contribute to patient safety concerns. Monitoring in a waiting area may be less than what is available in the treatment area. Patients may suffer worsening of clinical status, delayed treatment, and delayed diagnosis while waiting to be seen. The percentage of patients who leave before being seen by a provider is positively correlated with ED crowding.^{16,17} Wait times are among the most common reason for patients and parents to leave without being seen.¹⁸ The literature has indicated that, among pediatric patients who leave the ED before being seen, it is uncommon that the concern was an emergency.¹⁹ Nevertheless, there is a patient safety risk that, as the number of visits increase, the potential for significantly ill children leaving without being treated becomes greater.

Another metric that reflects degree of ED crowding is hours on ambulance diversion. Annually,

more than 500 000 ambulances are diverted from the closest ED because of crowding,²⁰ potentially denying optimal and time-sensitive care. Some municipalities have abolished diversion status because it is too frequently used or abused.

To develop consensus-based definitions and metrics intended to influence timely, efficient, and safe care, Welch et al and the American College of Emergency Physicians (ACEP) developed the first set of definitions and quality metrics for emergency care in 2006.²¹ In 2010, the group reconvened and clarified definitions and time metrics. Time stamps and time intervals were further refined in accordance with similar metrics developed by the Emergency Nurses Association and the National Quality Forum (see Fig 1).²¹ Consistency in definition and metrics was meant to help guide research and influence policy. Organizational oversight of these metrics was intended to improve the overall issue of ED crowding.

Length of stay (LOS), arrival-to-provider time interval, and left-without-being-seen rate have been endorsed by the National Quality Forum as quality measures.²² In 2013, Centers for Medicare and Medicaid Services (CMS) began requiring that hospitals report these same crowding measures.²³ CMS and The Joint Commission include median LOS and decision-to-departure (dwell) time for admitted patients in the ED in national hospital inpatient quality measures, putting hospital flow into focus.²⁴ The Agency for Healthcare Research and Quality has encouraged hospital leadership to ensure oversight of these performance metrics because of the downstream effect on safety, community support, cost, and hospital throughput.²⁵

Boarding is the process of holding a patient in the ED because of

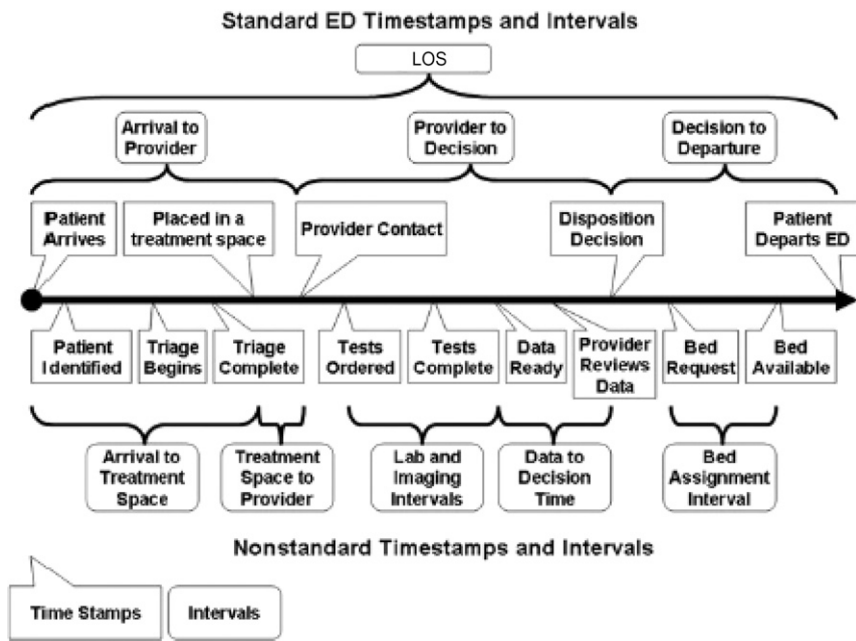


FIGURE 1
Timeline of ED timestamps and intervals.²⁶ Reprinted from Welch SJ, Asplin BR, Stone-Griffith S, et al. Emergency department operational metrics, measures and definitions: results of the Second Performance Measures and Benchmarking Summit. *Ann Emerg Med.* 2011;58(1):33–40, with permission from Elsevier, copyright © 2011.

delays in egress of the patient to a definitive inpatient bed,²⁶ and is typically the result of a lack of available staffed inpatient beds. Boarding is believed to be one of the primary reasons for ED crowding. Boarding affects the care of all patients in the ED, because an ED filled with boarding patients has fewer open care areas in which to evaluate new patients who are presenting to the ED. General and PEDs are not designed to provide the ongoing care needed by admitted patients, such as scheduled medications, regular meals, and bathing. Neither is the ED staffed or resourced to provide ongoing critical care, and patients requiring one-on-one critical care by nursing staff pull needed resources from other patients who continue to arrive for care in the ED.

Numerous studies have identified the deleterious clinical outcomes

for patients who are boarded in the ED.^{27–29} These patients wait because emergency providers have to care for other patients; there are treatment delays, increased medication errors, and ultimately longer lengths of hospital stay and increased morbidity and mortality.^{11,14,30} ACEP supports monitoring metrics that help establish benchmarks for rapid transport of admitted pediatric patients to inpatient beds and instituting processes to improve flow.³¹

Patient and family and provider experience are greatly affected by ED crowding.^{32,33} As consumers of health care, patients and families develop impressions on the basis of their expectation of care, as well as their perception of wait times.³⁴ Longer wait times are associated with decreased patient experience scores.³⁵ Patients and families who choose to leave before seeing a provider are likely to report a less favorable patient experience.

In the face of ED crowding, provider and staff engagement and its impact on patient safety cannot be ignored. The ED is already a high-stress, high-risk area. The addition of boarded patients, unsatisfied patients, and inadequate equipment and human resources for the volume of patients adds to the risk of medical errors, reduction in educational time in academic centers, and ultimately detriments in job satisfaction and well-being for all.³⁶

COMPONENTS OF ED CROWDING

Asplin et al provide a conceptual model of ED crowding (Fig 2) that illustrates key components relatable to all EDs.³⁷ The following discussion of contributing factors and potential solutions to ED crowding will follow that model, focusing on input, throughput, and output elements.

Input

The input element of ED crowding is the number of patients choosing or being referred to the ED for their care. Drivers for ED utilization are multifactorial, including previously mentioned patient-centric choices, as well as social determinants of health, health literacy, access to primary and specialty care services, and medical complexity.^{19,38–41} Lack of accessible primary and subspecialty care providers is geographically variable. More physicians are choosing to work part time, which exacerbates the physician shortage.⁴² Inability to access providers because of parental work or school hours may also drive patients to EDs for care.³ Within pediatrics, there are critical shortages of both medical and surgical subspecialties, and subspecialty providers are often concentrated in larger metropolitan areas. The subspecialties of neurology, behavior and development, and psychiatry are

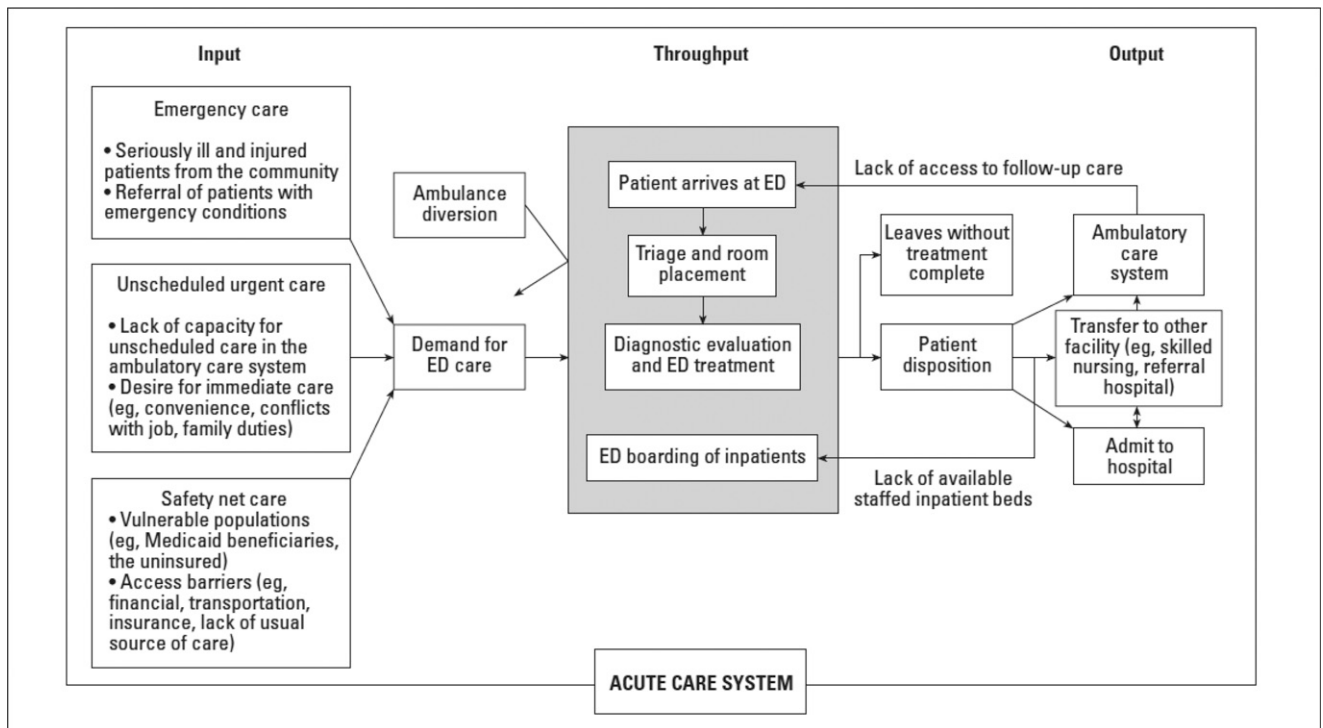


FIGURE 2 Conceptual model of ED crowding.⁴⁷ Reprinted from Asplin BR, Magid DJ, Rhodes KV, Solberg LI, Lurie N, Camargo CA Jr. A conceptual model of emergency department crowding. *Ann Emerg Med.* 2003;42(2):173–180, with permission from Elsevier, copyright © 2003.

particularly in short supply.⁴² With lack of accessible primary or subspecialty care, the ED has become a default location for care and for the workup or management of complex patient complaints when the primary care provider has limited ways of accessing a subspecialist for patients.

A subpopulation worth special mention is children and youth with special health care needs (CYSHCN). There are 13 million children with special health care needs in the United States.⁴³ CYSHCN disproportionately incur significant health care costs because of their complexity of disease. Acute exacerbations of underlying conditions can be expected to increase the need for emergency care visits. Care of CYSHCN can be a challenge for EDs in which there are no readily available subspecialty resources.⁴⁴

Mental-behavioral health emergencies for children are increasing in frequency, and the American Academy of Pediatrics (AAP) has declared a National State of Emergency in Children’s Mental Health.⁴⁵ The National Center for Mental Health indicates that approximately 20% of children have some form of behavioral or psychiatric illness,⁴⁶ and there is a shortage of child and adolescent mental-behavioral health providers. Rates of suicide in adolescent patients increased nearly 60% between 2007 and 2018.⁴⁷ There is a high rate of recurring need for emergency services in this population that waits for appropriate mental-behavioral health treatment,⁴⁸ indicating failures throughout the system to adequately prevent, intervene, manage, and treat mental-behavioral health conditions in the community.

Throughput

Key throughput factors of general and PED crowding are well defined in the AAP technical report, “Best Practices for Improving Flow and Care of Pediatric Patients in the Emergency Department.”⁴⁹ Delays in care can occur from ED space limitations, ED staffing limitations or staffing misalignment, seasonal variations resulting in sudden surges of patients, or complex cases that require extensive evaluation and consultation. Lack of clinical care guidelines and failure to use lean methodology can negatively affect timely disposition of patients and add to crowding. Lean methodology, originating in the automotive industry, focuses on systems and processes, rather than individuals. It is the pursuit of perfecting a process by eliminating waste, meaning eliminating any step in the process that does not add value for the patient. In the ED,

examples include using parallel processes to register and triage a patient simultaneously rather than having a patient move back-and-forth between areas for triage and registration, or stocking and tracking supplies to ensure that they are easy to find and always replenished. Additional factors affecting efficient disposition from the ED include variable provider skills in managing children, language and cultural barriers, electronic medical documentation, ancillary service delays, medical liability issues, and multilevel trainee involvement in patient care.^{50,51}

Inability to obtain rapid subspecialty consults leads to delays in throughput or ultimately adds to the input at tertiary pediatric facilities when transfer of a patient is required to see a subspecialist. Patients requiring psychiatric inpatient admission have longer average LOS in the ED.⁵² Additional public safety resources because of suicidality, homicidality, and violent behavior intensifies the longer that patients with behavioral health complaints must wait for mental health evaluation and inpatient placement,⁵³ highlighting the need for timely child and adolescent mental-behavioral health consultation in EDs.

Output

The key output factor related to crowding at the end of ED evaluation is boarding, primarily because of the lack of staffed inpatient beds.^{20,54–56} Inpatient delays may relate to complexity of care for inpatients, lack of health care worker staffing, delays in inpatient care prolonging LOS, lack of adequate follow-up with primary or subspecialty care, social reasons (such as availability of caregivers or forensic investigations), or lack of system coordination. An often-unanticipated factor in the competition for inpatient

beds is operating room scheduling and efficiency.

The hours in the decision-to-departure time interval for patients admitted from the ED appear to be intimately tied to ED crowding. In EDs where boarding occurs, average wait time to see an ED provider is 61 minutes, as opposed to 44 minutes in EDs where boarding does not occur.²⁰ Pediatric patients with mental-behavioral health emergencies awaiting bed placement are among some of the longest-boarded patients.^{57,58}

As mentioned previously, access to primary and specialty care affects ED crowding. In addition to adding to ED input, lack of access to primary and specialty care providers also affects ED output when ED and inpatient providers are unable to efficiently arrange adequate follow-up for patients being discharged.³⁶

EVIDENCE-BASED SOLUTIONS TO ED CROWDING

Proposed solutions to the far-reaching and complex problem of ED crowding can be found in the medical, nursing, information technology, and health care administration literature. ED crowding is not unique to the United States, with many studies on the topic published from Australia, Asia, Europe, and Canada. It is worth noting that generalizable solutions may be difficult to find, because of differences in key factors contributing to crowding between types of EDs and between geographic areas with varying local constraints and regional resources. In addition, there are few evidence-based solutions yet to demonstrate sustainable results.

The COVID-19 pandemic beginning in 2020 highlighted the complex

impact of emerging infectious diseases on pediatric emergency care. Many EDs noted a drastic reduction in pediatric patient census⁵⁹ accompanied by a higher admission rate for PED patients and a smaller proportion of visits triaged as low acuity.⁶⁰ At the same time, there was a spike in child and adolescent behavioral health emergencies.^{61,62} Many general EDs found themselves at the breaking point of crowding because of critically ill adult patients filling the ICUs and medical wards. Recurrent surges of patient volume created staffing misalignment and shortages without immediate solutions.

Generally, there is a consensus that the solution to ED crowding cannot be solved within the ED alone. ED crowding at a local level is a hospital system issue, requiring hospital leadership to recognize the input, throughput, and output variables that may be adjustable outside of the ED. Cooperation within the health care system regionally or nationally has the potential to create opportunities for improvement. When examining solutions to ED crowding, two strategies could be considered: *reducing* the amount of ED crowding, as measured by metrics or a scale or tool, and *mitigating* the effect of ED crowding, as measured by metrics or clinical outcomes. Solutions presented here will address these strategies and will be described according to the conceptual model of ED crowding.

Input Solutions for Reducing Amount of ED Crowding

Solutions highlighted by the ACEP in its 2016 publication, “Emergency Department Crowding: High Impact Solutions,” include publicly posting waiting times and allowing patients to make ED appointments.⁶³ In addition to online wait clocks and

hotlines, the Milken Institute School of Public Health recommends increasing access to primary care.²⁰

General child health physicians and nurse practitioners may be able to assist with the ED crowding crisis. A prospective study of a network of 33 pediatric practices noted practice characteristics that were associated with use of the PED. These factors included whether the practice accepted all walk-in sick visits, total available sick visit slots per physician, closer distance to the PED, whether the nurse triage line notified on-call physicians of disposition to the PED, the percentage of patients with Medicaid, and availability of the practice to have same-day turnaround of laboratory tests.⁶⁴ Although not all of these factors may be modifiable by pediatric primary care practices, knowledge of these results may allow general child health practitioners to focus efforts on key predictors of ED use and reduce ED use in some circumstances.

It is well known that care from the medical home better manages chronic conditions (including behavioral health), decreasing the incidence of exacerbations of illness, thereby decreasing the need for emergency care. After-hours primary care options would provide additional opportunity for patients to receive care at the medical home, and pediatricians could receive incentivized payment for offering hours that allow families to receive care in a clinic setting and avoid missed school and work. In addition, addressing access to specialty care, including attention to disparities in access, will allow children to receive subspecialty care in a timely fashion, alleviating the practice of referring children to the ED because wait times for appointments are weeks to months.⁶⁵ Mental-behavioral health services are limited overall, but

increasing availability of outpatient services during the peak hours of ED presentation, namely weekday evenings, could decrease ED utilization for these patients.⁶⁵

Telehealth services show promise in reducing ED crowding by providing pediatric services to both the outpatient and the ED setting. An AAP technical report notes that telepractice, linking doctors and their patients who may be located in settings other than a clinic office, offers the potential for less crowding in EDs by reducing ED visits for nonurgent care.⁶⁶ The Patient Protection and Affordable Care Act provided states with an option for Medicaid to coordinate primary, acute, behavioral, and long-term needs for chronically ill patients using wireless patient technology. A telemedicine service composed of primary care practices and school and child care sites in Rochester, New York, demonstrated 22% fewer ED visits among children with access to telemedicine.⁶⁷ North Carolina and Texas have reported decreased health care costs, as well as initial emergency mental-behavioral health patient stabilization at mental-behavioral health emergency centers utilizing telepsychiatry services.⁶⁸ Telemedicine has the potential to decrease the challenges of access to subspecialists that account for some nonemergency visits to the ED.

An evolving emergency medical services (EMS) field of mobile integrated health shows promise in reducing ED crowding. Mobile integrated health and community paramedicine programs capitalize on the resources and capabilities of EMS systems to augment emergency and primary care in a community.⁶⁹ Pilot programs have been developed to target certain health diagnoses, mainly focused on adult Medicare patients, but pediatric applications deserve investigation. These

programs work by expanding the reach of primary care and public health services, and aiming to reduce unnecessary ambulance transports to the ED or hospital readmission for chronic conditions. A physician-led mobile integrated health team including emergency medical technicians, paramedics, nurses, social workers, and advanced practice providers achieved a decrease in ED utilization and an associated 19% decrease in ED visit-related costs by creating a care plan in collaboration with the primary care and/or specialist physicians for enrolled members.⁷⁰ A community paramedicine program designed to provide out-of-hospital asthma evaluations for children after hospital discharge was associated with a decrease in the 30-day hospital readmission rate from 6.5% to 1.7%.^{71,72} Expanding pediatric access to community-based response teams for behavioral health crises may show benefit, because one study demonstrated that specially trained paramedics can safely transport appropriately screened adult patients directly to psychiatric treatment facilities.⁷³

Throughput Solutions for Reducing Amount of ED Crowding

Staffing and room distribution can have an effect on patient flow by allowing increased turnover of low-acuity patients during peak patient arrival periods. Models such as fast track, rapid assessment zones, and placing a provider in triage have been studied. "Streaming" is a term used to describe the division of patient flow after triage, such as when patients are placed into a fast track or complaint-specific "stream." Advantages include matching resources to patients' needs, but disadvantages include the potential for one stream to be backed up while another is quiet. Fast-track areas have been noted to reduce the total number of patients staying in

the ED and improve patient satisfaction.⁷⁴

Adequate staffing levels are imperative, but significant increases in ED nurse and provider staffing are usually not an option because of financial constraints and may not be more effective than improving workflow processes. Evidence for staffing correlation to crowding includes one study demonstrating an association between longer wait times and lower staffing levels, and another study documenting a 35-minute reduction in ED LOS associated with a permanent increase in the number of physicians during a busy shift.⁷⁵⁻⁷⁷

Physician-nurse supplementary triage assistance team and triage liaison physician (TLP) concepts have been developed to expedite care of patients on the basis of needs determined by an ED provider medical screening exam.⁷⁴ "Provider in triage" commonly involves a physician or advanced practice provider performing an initial exam and possibly initiating diagnostic testing and treatment at triage.⁷⁸ One large randomized controlled trial comparing TLP rapid assessment to TLP rapid assessment plus initiation of diagnostic tests while waiting for ED room demonstrated a 32-minute reduction in time spent in an ED bed for adult patients presenting with abdominal pain.⁷⁹ A patient flow coordinator nurse, who facilitates the flow of patients in and out of the ED, was shown to significantly improve key ED crowding metrics, including LOS, patients leaving before treatment is complete, and hospital diversion hours, at one academic medical center.⁸⁰

Expediting the time to departure from the ED for admitted patients may be achieved by early identification of the need for admission and inpatient bed

assignment. One study developed a model for predicting hospital admission for PED patients within 60 minutes of arrival. The model was able to identify 73% of hospitalizations at 30 minutes after ED arrival, with a 10% false-positive rate. Applying the model to their patient population retrospectively, the authors demonstrated that almost 6000 hours of ED LOS could have been saved.⁸¹

Tackling delays caused by waiting for subspecialty consults, Children's Hospital Colorado's network of care demonstrated shorter median ED LOS for patients receiving telepsychiatry consultations.⁸² Following lean methodology of parallel processing, in-room registration was shown to decrease LOS in a PED.⁸³

Scribes have been used to assist provider efficiency in EDs. One study of scribes used in an academic ED showed no improvement in throughput metrics for pediatric patients one year after implementation.⁸⁴ A recent study from a PED, however, reveals increased efficiency with the use of scribes, most notable during the months of January through March, reflecting the time frame of seasonal increased burden of illness.⁸⁵ Scribes also have an impact on patient and physician satisfaction. A systematic review and meta-analysis of the effect of scribes found that scribes improved physician productivity, physician satisfaction, and patient satisfaction but did not improve ED LOS.⁸⁶

Using data from a children's hospital in Melbourne, Australia, researchers developed a forecasting model that is able to predict seasonal variances in ED volume.⁸⁷ Hospitals may use models such as this to mobilize health care professionals and resources to cope with predictable large volume seasons.

Additional solutions offered by ACEP include quick registration followed by beside full registration, registration kiosks, rotational assignment of providers to patients, improved turnaround times from the laboratory and radiology, and patient care coordinators or case managers.⁶³

Output Solutions for Reducing Amount of ED Crowding

Hospitalwide processes for streamlining admission to the hospital from all sources (ED, outpatient setting, and procedural suites) will improve hospital efficiency, opening up bed availability and decreasing boarding time in the ED. Distributing elective admissions either throughout the week, or correlated to the ED-predicted daily variability, can improve mean throughput time in the ED.⁸⁸

Capacity alert systems have been described that unify efforts to reduce ED crowding by enlisting increased resources from departments across the hospital. Daily safety updates keep hospital leadership and department managers abreast of crowding and throughput measures in the ED and other care areas.

Improving hospital bed capacity can be achieved by different means other than adding physical space to the hospital. Earlier inpatient discharges have been shown to decrease ED crowding and patient boarding hours.^{89,90} An analysis of the Pediatric Health Information System database demonstrated that hospitals with a dedicated observation unit that admitted unscheduled patients from the ED experienced a greater percentage of same-day discharges for observation status patients and a higher percentage of discharges occurring between midnight and 11:00 AM.⁹¹

Other innovative ideas for opening up hospital beds earlier in the day include play areas and child life-facilitated family or group waiting rooms for discharged children.

Some organizations have attempted to address the difficulty of finding inpatient mental health services by creating programs that support partial hospitalization or a “bridge clinic” for those patients who need intensive services or medication management but can be safely discharged from the ED. Evidence for the success of these programs related to opioid use disorders and heart failure has been noted.^{92,93}

It can be challenging to balance optimizing day-to-day capacity with ensuring the hospital’s and community’s ability to meet critical need during a surge, crisis, or disaster. ACEP recommends in a policy statement that hospital leadership address recurrent causes of ED crowding, that local and national health care systems address the more global and systemic causes of crowding, including hospital funding, and that emergency medicine leadership be actively involved at all levels.¹

Additional output solutions identified by ACEP include reverse triage to determine which inpatients can be discharged or transferred to a lower level of care with the least risk of consequential medical events, elective surgery schedule smoothing, modified admission processes, and legislation limiting the ED LOS.

Mitigating Deleterious Effects of ED Crowding

The use of clinical practice pathways is supported by CMS as a method that may improve not only efficiency but also quality of patient care.⁴⁹ The development of clinical pathways that address pediatric issues is especially important in general EDs, including pathways for

triage and reassessment of pediatric patients alongside adult patients, to ensure that children receive appropriate prioritization of care.^{49,94} Financially incentivized pathways, including pay-for-performance pediatric-specific metrics, may have a positive effect on prioritizing the triage and reassessment of children, as well as ensuring standardized quality care for children.

Efforts directed at patient-centered care, such as respectful behavior and explanation for wait times, can improve patient experience.⁷⁵

Evidence for What May *Not* Work

Although it seems logical that decreasing total input should decrease crowding, evidence is conflicting. One children’s hospital ED found that higher acuity had strong correlations to measures of throughput or crowding; although, the total census showed little correlation to the same throughput metrics.⁹⁵ However, another children’s hospital ED found that the total census, as well as boarding hours, showed incremental negative effects on wait times, as well as other throughput metrics.¹⁷

Ambulance diversion has been cited as a crowding metric, yet the practice to divert ambulances away from a crowded ED appears to be a tempting tactic for hospitals to employ to reduce crowding. In fact, practices that affect EMS and trauma systems have not been shown to improve ambulance diversion rates.⁷⁵ From the perspective of the health care system, diverting ambulances merely shifts the problem from one location to another and does not solve the overarching problem of ED crowding. From the perspective of EMS systems, EDs are meant to be available at all times. Systems of care that monitor regional hospital and ED capacity or employ a hospital rotation for ambulance destination are better suited for

ensuring hospital collaboration to prevent overburdening one hospital or ED in the system.

Data on diverting patients from the ED to alternate sites that are not the primary care provider has been analyzed from the perspective of throughput metrics such as LOS and patients leaving before completing treatment, which may not fully capture the deleterious effects of ED crowding. The diversion strategies studied did not attempt to quantify reduction in ED recidivism rates and would not be expected to be as effective as improved access to a medical home. In a general ED, performing a medical screening exam to determine whether an emergency condition is present in a child, thereby satisfying Emergency Medical Treatment and Labor Act requirements, could require a complete history and examination and possibly a period of observation. The process of triaging away from the ED, thus, becomes an entire ED visit.

Although counterintuitive, expanding ED space has not been shown to improve throughput metrics of ED LOS or ambulance diversion. Adequate and functional space, however, is important for other reasons, including patient and staff satisfaction.^{75,96}

CONCLUSIONS

ED crowding is a complex problem, and necessarily, solutions will require coordinated efforts across the health care delivery system. At the heart of reducing ED crowding are the common aims of improving the quality of care and patient experience, improving the health of populations, and reducing the per-capita cost of health care.

There is no single approach that can principally affect the issue of

crowding in the ED. Assessing the potential factors that could be contributing to the issue and addressing these will be important to improve the care of children and the effects of crowding on patients and care providers. For the pediatrician, actively engaging with health care systems and policymakers, and patient education are important contributions to helping solve the problem of crowding in EDs.

LEAD AUTHORS

Toni K. Gross, MD, MPH, FAAP
Natalie E. Lane, MD, FAAP
Nathan L. Timm, MD, FAAP

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Brian Moore, MD, FAAP, National Association of EMS Physicians
Diane Pilkey, RN, MPH, Maternal and Child Health Bureau
Mohsen Saidinejad, MD, MBA, FAAP, FACEP, American College of Emergency Physicians
Sally Snow, RN, BSN, CPEN, FAEN, Emergency Nurses Association

STAFF

Sue Tellez

ABBREVIATIONS

AAP: American Academy of Pediatrics
ACEP: American College of Emergency Physicians
CMS: Centers for Medicare and Medicaid Services
CYSHCN: children and youth with special health care needs
ED: emergency department
EMS: emergency medical services
LOS: length of stay
PED: pediatric emergency department
TLP: triage liaison physician

Please address correspondence to Toni K. Gross, MD, MPH, FAAP, FAEMS. E-mail: toni.gross@lcmchealth.org.

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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FUNDING: No external funding.

FINANCIAL/POTENTIAL CONFLICT OF INTEREST DISCLOSURE: The authors have indicated they have no potential conflicts of interest to disclose.

COMPANION PAPER: A companion to this article can be found online at www.pediatrics.org/cgi/doi/10.1542/peds.2022-060971.

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