



## POLICY STATEMENT

# Patient Safety in the Pediatric Emergency Care Setting

Committee on Pediatric Emergency Medicine

Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of All Children

## ABSTRACT

Patient safety is a priority for all health care professionals, including those who work in emergency care. Unique aspects of pediatric care may increase the risk of medical error and harm to patients, especially in the emergency care setting. Although errors can happen despite the best human efforts, given the right set of circumstances, health care professionals must work proactively to improve safety in the pediatric emergency care system. Specific recommendations to improve pediatric patient safety in the emergency department are provided in this policy statement.

## BACKGROUND

Since the release of 2 landmark reports by the Institute of Medicine (IOM) Committee on Quality of Health Care in America in 1999 and 2001,<sup>1,2</sup> patient safety has become a priority issue and area of focus for health care professionals and researchers, hospital administrators, policy makers, accrediting agencies, health care purchasers, and patients and families. The US Department of Health and Human Services, through the Agency for Healthcare Research and Quality, launched a \$50 million initiative in 2001 to increase and improve research in patient safety.

Despite an increased focus on patient safety at a national level, leaders in patient safety and quality improvement have reported little progress in reduction of harm since the release of the IOM reports.<sup>3</sup> Professional societies, national health care agencies, individual health care systems, and hospitals have demonstrated some successes such as a reduction in serious infections or fewer patients dying from accidental injections of concentrated potassium chloride. Overall, however, there is still much room for improvement in delivering safe, high-quality health care in America.

Health care can be risky and highly complex. Thousands of patients still die or suffer harm from medical errors while receiving health care services despite the dedication and hard work of well-trained health care professionals who seek to provide good care. Leape, in a seminal article published in 1994,<sup>4</sup> sought to explain the epidemic of medical errors by comparing the American health care system to other highly complex, high-risk industries such as nuclear power and aviation. Researchers in these industries found that mishaps and accidents were often caused by poorly designed systems rather than by mistakes of irresponsible or ill-prepared individuals. Leape further noted that skilled people predictably make some mistakes, especially when distracted or fatigued, so the complex systems in which they function must be designed in a way to defend against human error.

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### Key Words

patient safety, pediatric patient safety, clinical quality, quality improvement, performance improvement, culture of safety, medication safety, pediatric emergency care, emergency medical services for children, teamwork training, family-centered care, safety event reporting system

### Abbreviations

IOM—Institute of Medicine  
EMS—emergency medical services  
ED—emergency department  
AAP—American Academy of Pediatrics  
HRO—high-reliability organization  
ATLS—Advanced Trauma Life Support  
CPOE—computerized physician order entry  
CRM—crew resource management  
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Reason, a noted psychologist and expert in human performance, described numerous human factors that predictably lead to errors when humans work in complex systems.<sup>5</sup> For example, memory, vigilance, and attention to detail often decrease when people are fatigued or stressed. Errors occur more readily when people are required to perform multiple complex cognitive tasks simultaneously, such as calculating a dose of medicine for a child while performing clinical tasks such as airway maneuvers or establishing intravascular access, as might be the case in the out-of-hospital emergency medical services (EMS) or emergency department (ED) setting.

A limited number of studies have been published describing problems related to pediatric patient safety; however, the body of literature is growing.<sup>6–9</sup> Unique aspects of pediatric care that may increase the risk of medical error include lack of standardized dosing because of size variation in the pediatric age range; inability of young children to provide a medical history or clearly communicate complaints; and the unique physical and developmental characteristics of children that may affect treatment strategies and medication regimens. The American Academy of Pediatrics (AAP) has published 2 policy statements on patient safety that describe these risks in more detail and provide useful recommendations for all pediatric health care professionals.<sup>10,11</sup>

Studies have suggested that medication dosing in children is a particularly high-risk activity, because it requires manual dosing.<sup>12</sup> Standardized unit doses are rarely used in children; rather, each dose of medicine is calculated by using a dosing equation based on the child's weight. The act of calculating dosing equations has been identified as a high-error activity, and several factors compound the risk of error when medications are given emergently.<sup>13</sup> For example, the child's weight is often not known and, therefore, must be approximated. There are limited opportunities for prescription monitoring or double checking, and in some cases, the inherent stress of managing a life-or-death situation can lead to errors. Indeed, a study that reviewed medical errors in academic medical centers found the pediatric service to be the most error-prone setting and the ED to be a close second.<sup>14</sup>

Three reports from the IOM Committee on the Future of Emergency Care in the United States Health System in 2006 identified patient safety as a significant concern.<sup>15–17</sup> The report dedicated to pediatric care, *Emergency Care for Children: Growing Pains*, noted that the state of pediatric emergency care in 2006 was best described as “uneven.” This assessment of the current performance of our nation's EMS system for ill and injured children offered specific observations and recommendations relating to pediatric patient safety, including that “hospitals and EMS systems should implement evidence-based

approaches to reduce errors in emergency and trauma care for children.”<sup>15</sup>

## STATEMENT OF THE PROBLEM

Caring for children in the emergency setting is especially prone to error because of a number of environmental and human factors. The ED environment is often hectic and chaotic, with frequent workflow interruptions. The out-of-hospital emergency care setting can be similarly chaotic. Wide fluctuations in patient volume, especially including large numbers of children who are not seriously ill or injured, require increased resources and attention from physicians and nurses, who then become distracted from caring for more critically ill or injured children.<sup>18</sup> Shift work, especially overnight shifts—although necessary for fulfilling the 24/7 mission of EDs—can lead to provider fatigue and increased risk for errors.<sup>19</sup>

There are many opportunities for communication errors in the ED because of numerous hand-offs of care, decision-making by multiple health care professionals and consultants, and frequent verbal orders during emergency events, which preclude the opportunity for redundancy and “double checks.”<sup>20</sup> In addition, a growing number of children and families who present to an ED do not speak English. Studies have shown that these patients may represent a group that is at high risk for medical errors.<sup>21</sup>

Most children in this country are cared for in EDs that are located in general hospitals rather than in hospitals dedicated to the care of children. Because a minority of patients in general hospitals are in the pediatric age group, many ED staff may lack familiarity with pediatric emergencies and sufficient opportunities to regularly practice the cognitive and technical skills necessary for providing emergent pediatric care.

Finally, there is great opportunity for improvement during the process of ordering and administering medications to children in the emergency setting. Observational studies of simulated pediatric emergency events have identified problems with dosing of medications<sup>22</sup> and conversion of medication doses ordered in units by weight (eg, milligrams) to the appropriate number of units by volume (eg, milliliters), depending on the formulation of the drug.<sup>23</sup> These studies have also described a prolonged period of time required to calculate doses and administer certain critical medications.<sup>22,23</sup>

## STRATEGIES FOR IMPROVEMENT

### High-Reliability Organizations

A key concept in the development of a safer environment in the ED is that of a high-reliability organization (HRO). HROs are those that operate in a high-risk environment but maintain very low rates of injury or

harm.<sup>24</sup> In these organizations, there is a general acknowledgment among all members that a mishap can happen at any time, given the right set of circumstances, and that only through a constant mindfulness that no person or organization is perfect can the risk of mishap be minimized. It is this desire to achieve perfection, while at the same time recognizing that mishaps can occur, that allows HROs to achieve such impressive safety records.

### **Systems-Based Approach to Patient Safety**

A preoccupation with the potential for harm manifests itself in a systems-based approach to patient safety, an approach that acknowledges that human beings and their limitations must be accounted for in the design of the system.<sup>24</sup> By proactively designing a system that takes into account the strengths and limitations of individual health care professionals, the ED team can improve the safety of patients and minimize the risk of harm.

Examples of the systems-based approach include the standardization of processes or procedures as guided by evidence rather than by individual preference. A specific example provided by Pronovost et al<sup>25</sup> demonstrated how use of a standard approach to the insertion of central venous catheters could reduce the number of associated bloodstream infections.

A number of national organizations are beginning to identify evidence-based safe practices that can lead to improved patient safety. The National Quality Forum recently published its recommendations for 30 safe practices for better health care,<sup>26</sup> and the AAP Safer Health Care for Kids project, funded by a Physician's Foundation for Health Systems Excellence grant, is assembling various safe practices as part of a suite of Web offerings, including Web seminars and an unprecedented pediatric patient safety Web site, to improve the care of children.<sup>27</sup>

Hand-washing is a simple example of a safe practice for all clinicians, including pediatric emergency care professionals. Ample evidence suggests that hand-washing is an important component of infection-control practices,<sup>28</sup> and patients and families should be taught that the most important thing they can do to prevent the spread of infectious diseases is to wash their hands at home. Health care professionals have a great opportunity to provide an example and model behavior that will lead to improved patient safety by washing their hands before and after examining each patient in the ED.

### **Best Practice in Emergency Stabilization and Resuscitation**

Emergency care is most complex and risky in the setting of resuscitation, when assessment, information transfer, and treatment must occur simultaneously at the hands of a multidisciplinary team.<sup>15</sup> Many members of the ED

team maintain training in resuscitation techniques through life support courses such as Pediatric Advanced Life Support,<sup>29</sup> Advanced Pediatric Life Support,<sup>30</sup> and Advanced Trauma Life Support (ATLS).<sup>31</sup> These courses offer a well-structured "ABC" approach as a standard that should be used to direct patient assessment and potentially life-saving interventions. After addressing concerns related to airway, breathing, and circulation, the team must continue through the resuscitation protocol to identify signs of critical illness or injury that require prompt treatment. However, observational studies have demonstrated that health care professionals do not always adhere to ATLS guidelines.<sup>32</sup> A recent study described marked variation in the clinical performance of ED professionals in a simulated pediatric trauma event.<sup>32</sup> Resuscitation tasks associated with both the primary survey (a quick examination to identify life- or limb-threatening injuries) and the secondary survey (a complete head-to-toe examination to identify all signs of injury) were often skipped or performed incompletely by the ED team.

### **Evidence-Based Clinical Guidelines and Decision Support**

Researchers in many other areas of health care have described clinical practice variability, even in areas for which best practice has been defined on the basis of strong scientific evidence and a high degree of expert consensus.<sup>33</sup> In the past few years, there have been many efforts to increase the use of evidence-based care guidelines and therapies by health care professionals through regulatory mechanisms (such as the pay-for-performance initiative of the Centers for Medicare and Medicaid Services and the use of quality measures by the Joint Commission on Accreditation of Healthcare Organizations), provider organizations (AAP, American College of Emergency Physicians, American College of Surgeons), and individual health care institutions. A number of quality improvement initiatives have been implemented to improve compliance with clinical guidelines and evidence-based therapies. A recent review of 59 published evaluations of clinical guidelines showed that the most effective implementation strategies were those that provided patient-specific advice at the time of decision-making,<sup>34</sup> such as at the time of entering orders.

### **Information Technology**

Computerized physician order entry (CPOE, or clinical provider order entry) systems can provide a useful platform for integrating evidence-based guidelines into clinicians' workflow by providing "just-in-time" treatment advice or decision support tailored to the needs of the individual patient.<sup>35</sup> It is important to note, however, that unanticipated problems may result from implementation of a CPOE system that is not customized for children.<sup>36</sup> Although CPOE is not yet available in many EDs,

ED providers should advocate for pediatric-specific information technology tools and systems such as this, which can help improve the quality and safety of care provided to patients.

### **Safety WalkRounds**

In HROs, the clear goal of every team member is to improve safety. This requires open lines of communication, such that any individual who has a critical piece of information is expected to communicate it to whomever needs to know, regardless of hierarchy, seniority, title, gender, pay grade, or ethnic background. ED leaders can initiate activities that will help create a culture in which every team member is comfortable to speak up about safety concerns. One such activity is Safety WalkRounds,<sup>37</sup> which was developed to help executives and leaders learn from front-line staff how to improve care and reduce the risk of error in clinical care areas. Hospital executives or clinical and operational leaders and managers walk around care units and talk directly with staff to identify “what will hurt the next patient here.” This experience helps to close the gap between leadership and front-line staff perspectives on safety. It allows physicians, nurses, and other staff members to express their safety concerns directly to hospital leaders and executives, and it allows executives an opportunity to model safety as a priority and provide appropriate resources to improve care.<sup>38</sup>

### **Safety Event Reporting Systems**

Another opportunity for staff to share concerns is through the use of a voluntary reporting system. Many institutions and states have implemented reporting systems in response to the recommendation of the IOM to expand reporting of serious adverse events and medical errors.

The primary purpose of reporting is to learn from experience, especially when near-misses are included in the reports. Ideally, when an adverse or near-miss event occurs, an analysis is completed and changes are made to prevent a recurrence of the event. When aggregate voluntary reporting-system data are reported to an external body, the lessons learned can be shared more broadly, which then can lead to improved safety throughout the organization through the identification of trends or recurrent hazards and development of best practices to reduce risk.<sup>10</sup>

A number of computerized reporting systems have been developed, but many hospitals and health care agencies still use hand-written reports. Whatever reporting method or system is used, it should be nonpunitive, readily accessible, and easy for staff to use. Feedback to the reporter is important for addressing the concerns raised, offering possible solutions, and encouraging future reporting. As the AAP recommended in “Principles

of Patient Safety in Pediatrics,”<sup>10</sup> reporting systems should require that information reported to internal and external review groups should not be discoverable in civil or legal actions.

### **Teamwork Training**

The ED environment is similar in many ways to other high-risk workplaces, such as in aviation settings, where behavioral principles known as crew resource management (CRM) were developed to improve safety.<sup>39</sup> Crew training led to reductions in aviation mishaps, beyond those eliminated by improvements in equipment and technology, by focusing on behaviors of the people (team members) who use the technology. The basic principle of CRM is that team communication and coordination behaviors are identifiable and teachable. Indeed, specific teamwork behaviors have been observed in high-reliability teams performing in very demanding, high-risk, time-stressed environments such as combat aviation.<sup>40</sup>

The IOM recommended in its 1999 report that organizations “establish interdisciplinary team training programs that incorporate proven methods for team management, such as CRM.”<sup>41</sup> A number of institutions are now providing teamwork training for physicians and staff members who work in high-acuity areas such as emergency medicine, critical care, perinatology, and surgery.

When the physician, as team leader, sets a tone of mutual respect and “psychological safety” by calling team members by name and inviting their input, staff satisfaction improves, staff turnover decreases, and team members report a safer environment for patients.<sup>41,42</sup> Too often, procedure-related errors occur when a member of the care team is aware of the error but is unable to communicate it to the physician. Staff can be taught communication skills, such as critical language skills, that will help avoid this type of situation. A consistent phrase can be used by all team members to signal an impending adverse event without disrupting the care environment. When such a phrase is used (such as “I need clarity”), the message communicated to the team leader is that he or she must stop and listen to the team member who has a concern about the patient’s safety. Additional communication techniques, such as SBAR (situation, background, assessment, recommendation),<sup>42</sup> provide staff with a tool for facilitating the exchange of pertinent and important clinical information by using a standard format. Communication techniques such as this are critically important at times of hand-off in care, such as at change-of-shift when patients are transferred from one care team to another.

### Patient- and Family-Centered Care

Patient- and family-centered care is an approach to health care that recognizes the integral role of the family and encourages mutually beneficial collaboration and partnership among the patient, family, and health care professionals.<sup>43</sup> Although there are many opportunities for providing patient- and family-centered care in the ED, there are also significant challenges to doing so. The lack of a previous relationship between patient/family and health care professionals, as well as the acute nature of many events prompting an ED visit, can limit efforts to create such a partnership and, likewise, may limit effective communication with the family. Situations particular to the ED, such as the arrival of a child by ambulance without his or her family, the unaccompanied minor who is seeking care without the knowledge of his or her family, or the day-to-day phenomena of overcrowding and high patient acuity in the ED, also pose significant challenges to patient- and family-centered care.

Family members and the medical home are both vital sources of information regarding the patient. The emergency care team should invite the family to be present during all phases of care, and the resources necessary to promote effective communication should be available. Timely identification of, and appropriate communication with, the child's medical home should also be considered in designing care processes. As mentioned previously, language and cultural barriers can present another challenge to successful communication and may increase the likelihood of medical errors when caring for non-English-speaking children and their families. This risk can be lessened by providing linguistically competent care through professional interpreters.<sup>21</sup>

### Shift Work and Fatigue

In HROs, systems are designed to take into account the limitations of human beings, yet limitations related to fatigue are often not acknowledged. Cognitive and psychomotor skills cannot be consistently maintained by individuals who are fatigued, and prolonged wakefulness of 18 hours has been shown to have a negative effect on human performance approximately equivalent to a blood alcohol concentration of 0.1%.<sup>44</sup> Fatigue can negatively affect a variety of abilities that are critical in the emergency setting, including reaction time, hand-eye coordination, clerical accuracy, memory, and reasoning.<sup>45</sup> Sleep-deprived surgeons have been reported to make 20% more errors and take 14% longer to complete a laparoscopic surgical procedure in virtual-reality exercises.<sup>45</sup> Studies linking fatigue with medical errors have been reported for anesthesiologists,<sup>46</sup> residents,<sup>47</sup> and nurses<sup>48</sup>; residents attribute their medical errors to fatigue in 41% of cases.<sup>47</sup>

Joffe<sup>19</sup> and others have described strategies that can be used to reduce fatigue of health care professionals in

the ED, and many of these strategies are related to shift work. The length of shifts should be carefully considered by those making the ED schedule. Although many workers prefer 12-hour shifts, a study that compared 8- and 12-hour shifts among nurses demonstrated increased fatigue and some safety concerns associated with the longer shift.<sup>49</sup> Another important consideration is shift sequence and rotation because of circadian rhythms. As human beings, we have an intrinsic biological clock, which cycles with an approximate period of 1 day. This cycle is not the result of cultural conditioning; rather, it is a property of neurons in the suprachiasmatic nucleus.<sup>50</sup> No amount of determination or professional commitment can fully override this fundamental biological function.<sup>19</sup>

Circadian rhythms can be altered over time, but this process transpires slowly. Generally, it takes at least 1 week to accomplish an 8-hour circadian phase change. Thus, ED providers who work a few consecutive overnight shifts usually are not able to accommodate to the schedule, and they are often significantly sleep deprived. If an ED group is large enough, it may be best to schedule single overnight shifts.<sup>50</sup>

Strategic napping is another fatigue countermeasure that might be considered by leaders of emergency medicine programs. After completion of an overnight shift, physicians can be encouraged to consider napping in a call room before driving home.<sup>19</sup> Strategies such as this can help ED providers meet the demands of the profession without compromising performance and without compromising their own health and safety or that of their patients.

### Pediatric-Specific Clinical Tools

When performing resuscitation tasks in children, opportunities for error are magnified by several unique aspects of pediatric emergency care. Medication dosing, choice of equipment size, and determination of fluid volume for resuscitation all depend on the size of the child; thus, each must be determined or calculated in a high-risk environment by using high-level cognitive skills. Studies have shown that simple tools, such as a length-based tape that provides precalculated medication doses in color-coded zones,<sup>51</sup> can reduce deviation from the recommended dose range (dosing error) by 25% in simulated resuscitation scenarios, compared with other traditional dosing references.<sup>22</sup> By providing a precalculated dose for a specific length or weight zone, the tool helps to simplify and standardize the complex task of pediatric resuscitation.

Although helpful, the Broselow length-based tape is not ideal. Medication doses are listed on the tape in milligrams, yet nurses must draw up medications by volume. Although this tape provides precalculated medication doses for physicians to order, it does not provide the nurse with a precalculated volume (mil-

liliters) of medication to administer. There is currently no clinical tool universally available to ED nurses that provides them with this critical information, and a recent study of a simulated pediatric emergency event suggests that errors may occur at this point in the process of emergent medication administration.<sup>23</sup>

Many hospitals and health care systems are developing and/or implementing CPOE systems. Currently, few systems are available that provide precalculated doses of medications based on a weight that is entered into the system. Even fewer systems provide a precalculated dose in both milligrams and milliliters; without this capability, nurses and pharmacists will still be left to perform conversion calculations. Pediatric emergency health care professionals should advocate for a computerized dosing system to help reduce one of the greatest risks in pediatric care: that of medication dosing within the ED and hospital and at the time of discharge.

#### **TRANSPARENCY AND DISCLOSURE: WORKING WITH PATIENTS AND FAMILIES**

Physicians historically have been trained to be autonomous and ultimately responsible for the care of patients, including any errors that may occur. In the traditional “blame and shame” culture of medicine, errors were attributed to incompetent, lazy, or irresponsible people, so physicians and other health care professionals are often devastated when errors occur. Physicians feel guilty, frustrated, and often fearful of legal consequences. Most want to talk to patients and families about what happened, but few have been trained how to disclose unanticipated outcomes or medical errors appropriately. Worse yet, some health care professionals continue to be trained to avoid talking about adverse events.

Studies have clearly shown that patients and families want to know what happened at the time of an adverse event or unexpected outcome.<sup>52,53</sup> Sorrel King, as the mother of a young child who died after a medical error, has become a spokesperson for disclosure and patient safety and relates very clearly what she believes parents and families want: an honest explanation about what happened, a sincere apology, and to know what will be done to prevent a recurrence of the error in the future so that no one else will be hurt.<sup>53</sup> Consumer- and parent-driven groups have emerged that are aggressively demanding a change in culture on how health care organizations report errors to guarantee patient safety. One such organization worked with the Joint Commission on Accreditation of Healthcare Organizations to include kernicterus as a sentinel event alert for all hospitals, and the Agency for Healthcare Research and Quality has sponsored consumer-led workshops to advance patient safety.

Many institutions have implemented educational programs to teach physicians and other health care pro-

professionals how to appropriately disclose information to patients and families at the time of a medical error or unexpected outcome. Risk managers and hospital attorneys are most often supportive of such efforts, and many are willing to participate in educational sessions. In addition, instruction in disclosure and transparency is now being introduced in medical schools and nursing schools, and some institutions have implemented an educational experience on disclosure into the core competencies of residency training.

#### **SUMMARY AND RECOMMENDATIONS**

The ED is a stressful, risky, highly complex environment in which dedicated, hard-working professionals strive to provide safe, high-quality care to children and families. Over the past decade, a great deal has been learned about medical errors and patient harm, and there is a much better understanding of the environmental and human factors that can lead to adverse events. Health care professionals need first to acknowledge that mishaps can happen any time, given the right set of circumstances, and then must understand how critically important it is to proactively integrate safety into the pediatric emergency care system. Through collective efforts, a system can be designed that takes into account the strengths and limitations of health care professionals, and a culture can be established in which every team member understands how important it is to speak up and actively participate in initiatives to improve patient safety.

The following are recommendations to improve pediatric patient safety in the ED:

1. Raise awareness of safety as everyone’s highest priority.
  - a. Provide education on core patient safety concepts and topics at orientation for all ED staff and trainees and provide ongoing, regularly scheduled, multidisciplinary patient safety conferences and grand rounds.
  - b. Include a discussion of patient safety issues and concerns as the first agenda item at health care organization governance (board of directors) meetings, medical and nursing department leadership meetings, performance improvement meetings, and operational meetings.
  - c. Provide performance metrics and incentives related to patient safety for all clinical and administrative leaders.
2. Participate in, and model, important safety practices, including:
  - a. hand-washing;
  - b. time-outs before procedures;
  - c. structured communication during hand-offs (ie,

- times when patient care is transferred from one provider to another);
- d. teamwork training; and
  - e. mock codes or simulated patient scenarios to rehearse the use of clinical guidelines (eg, ATLS, Advanced Pediatric Life Support, Pediatric Advanced Life Support).
3. Implement Safety WalkRounds.
    - a. Encourage active and regular participation by hospital and department leaders and managers.
    - b. Keep a log of risks and concerns that are identified and addressed, and document feedback to clinicians.
    - c. Include front-line staff in the process.
  4. Encourage nonpunitive voluntary reporting of medical errors and near-misses, and provide a convenient, user-friendly mechanism for filing the report.
    - a. Promote use of a voluntary reporting system.
    - b. Advocate that reported information not be discoverable, and design a system that allows individuals to maintain anonymity.
    - c. Develop a clearly stated and timely process for addressing reports and tracking trends.
    - d. Provide feedback to event reporters regarding resolution of the reported concern.
  5. Provide training in teamwork and communication to include information on:
    - a. CRM and psychological safety;
    - b. the SBAR (situation, background, assessment, recommendation) technique;
    - c. critical language; and
    - d. briefing and debriefing.
  6. Recognize fatigue as an important safety risk, and implement strategies for reducing fatigue in health care professionals.
    - a. Consider the impact of length of shift on staff performance.
    - b. Recognize effects of shift sequence and rotation on provider fatigue.
    - c. Consider strategic napping to decrease fatigue.
  7. Develop, implement, evaluate, and update multidisciplinary evidence-based clinical practice guidelines for pediatric emergency care.
  8. Encourage the use of clinical tools to aid medication dosing and administration.
    - a. Educate ED staff on the correct use of length-based tape.
      - b. Promote development of CPOE systems with dosing parameters or other clinical tools.
  9. Establish a link between efforts to improve care quality and safety within the ED to those in other units or departments that care for children.
  10. Build a partnership between ED- or hospital-based safety improvement and efforts to improve the quality and safety of care provided by prehospital and intrahospital care providers.
    - a. Work with EMS professionals to develop evidence-based prehospital care protocols for the treatment, triage, and transport of children.
  11. Define pediatric emergency care competencies for all disciplines (physicians, nurses, paramedics, emergency medical technicians), and require health care professionals to receive the appropriate level of initial and continuing education necessary to achieve and maintain those competencies.
    - a. Require regular training for key cognitive and technical skills and updates on resuscitation guidelines.
  12. Integrate patient- and family-centered care into all aspects of pediatric care and in all settings.
    - a. Provide timely access for emergency care providers to qualified language-translation support.
    - b. Institute a system for timely identification of, and appropriate communication with, the child's medical home.
  13. Advocate for formal training in transparency and disclosure of medical errors.
    - a. Engage parents and families in training to convey the patient/family perspective to staff.
    - b. Invite risk management and legal staff to participate.
    - c. Include medical students, residents, and fellows in training.
    - d. Revise morbidity and mortality conferences to include a discussion of system-based problems and error-reduction strategies.
  14. Support the IOM recommendation that federal agencies and private industry should fund research on pediatric-specific technologies, equipment, and medications used by emergency care providers to improve patient safety.
    - a. Implement CPOE and decision-support systems to aid in pediatric dosing.
    - b. Use standard dosing guidelines and formulations for pediatric medications.
    - c. Include focus on the prescribing of discharge medications.

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