EMERGENCY NURSES ASSOCIATION
WHITE PAPER

CARE OF THE PEDIATRIC PATIENT IN THE EMERGENCY SETTING

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Every health care provider knows that there are important anatomical, physiological, and psychological differences between the pediatric patient and the adult patient. "Children are not simply small adults…" is a phrase often used when discussing medical treatment for the pediatric patient. Since publication of the 1993 Institute of Medicine (IOM) report on emergency care for children,[1] there has been significant progress in improving pediatric emergency care. Programs to improve pediatric education and training for emergency health care providers has grown; multiple professional health care organizations have produced policies, position statements, and guidelines for care of the pediatric patient; and recommendations have been developed regarding the availability of appropriate equipment for the pediatric population.[2] In addition, the Pediatric Emergency Care Applied Research Network (PECARN), the first federally funded program focusing on research specific to pediatric emergency care, was established in 2001.[3] Despite all of these efforts to improve pediatric care, multiple barriers exist to children receiving optimal emergency treatment.

Of the more than 110 million annual visits to emergency departments (ED) in U.S. hospitals, children less than 19 years of age account for approximately 27%, or slightly more than 30 million visits.[4] Roughly, about 1% of all hospitals are freestanding children's hospitals and 2.5% are children's hospitals within larger hospitals.[5] Together, they account for only about 1.6 million of the 30 million pediatric emergency department visits annually.[5] Most pediatric emergency visits are to hospitals that do not have specialized pediatric emergency departments, yet health care for children requires specialized training and equipment.

According to a study by Athey and colleagues, only 7% of hospitals with emergency departments in the United States have a separate pediatric emergency department and approximately one third of hospitals have separate pediatric inpatient units.[6] The study further identified that access to pediatricians was available in 64% of hospitals with emergency departments but only 23% of hospital emergency departments had pediatric emergency physicians available.[6] Further, few of the hospitals with access to pediatricians had protocols indicating when to contact the pediatrician.[6] Consequently, children needing emergency treatment are not necessarily receiving appropriate care.

In a study of simulated pediatric trauma stabilization at 35 North Carolina emergency departments, researchers evaluated the performance of 44 stabilization tasks and identified deficiencies in at least 18% of tasks by all emergency departments.[7] Several of the emergency departments had deficiencies in as many as 73% of stabilization tasks. Some of these tasks included: estimating a child's weight; preparing for intraosseous needle placement; ordering

intravenous fluid boluses; applying warming measures; and ordering dextrose for hypoglycemia. Ongoing studies in other states have demonstrated a recurrent theme highlighting the need to improve emergency care for the pediatric patient.[7]

Providing appropriate pediatric care in the emergency setting has a number of challenges, not the least of which begins with acquiring and maintaining adequate education, training, and skills. Because of children's anatomical differences, equipment is not "one size fits most," and health care providers need to think in terms of calculating medications and fluids by weight. The physiological differences in children can cause them to deteriorate more quickly than adults.[8] Thus, long waits or delays in providing care may result in serious harm or death. [8] Preverbal children are unable to report their symptoms and many have multiple caregivers who may not give a complete or accurate history. Young children may not be capable of cooperating with health care providers leading to the use of alternative tactics that may include sedatives. [8] The process of improving pediatric emergency care is burdened by many other obstacles including: a lack of knowledge about the existence of resources and guidelines for pediatric emergency care, little interest in implementing these guidelines, and a lack of data on pediatric emergency care issues, resulting in little or no evidence-based clinical practice.[9]

Provider Competence

Someone seeking emergency care may encounter an extensive variety of emergency providers including: Emergency Medical Technicians (EMT), Registered Nurses (RN), Advanced Practice Nurses (APN), emergency physicians, specialty physicians, ED technicians with various levels of training, and if it is a teaching hospital, students and residents. Pediatric training for each group of health care providers varies according to type of provider, but also varies within each provider group. For example, there is a national standard curriculum for EMTs, but it is not mandatory for each state to follow the national standard.[10] Consequently, curriculum and training regarding the pediatric patient may be substantial in one program and minimal in another. There are several options for pediatric-specific continuing education for prehospital providers, such as Prehospital Trauma Life Support (PHTLS),[11] Emergency Pediatric Care (EPC),[11] Pediatric Education for Prehospital Providers (PEPP),[12] Pediatric Advanced Life Support (PALS),[13] Advanced Pediatric Life Support (APLS),[14] and a new course focusing on children with special needs known as Special Children's Outreach and Prehospital Education (SCOPE).[15] However, none of these courses incorporates all aspects of pediatric care and there is no mandate from each state to include each of these courses as part of prehospital training.[8]

There are between 75,000 and 100,000 registered nurses working in emergency departments nationwide.[8] Professional nursing education courses include a didactic and clinical component relating to general nursing care of children. However, specialty care of children, such as that found in intensive care units and emergency departments, is typically not a part of the nursing core curriculum. According to a position statement developed by the Society of Pediatric Nurses, pediatric content continues to decrease in nursing programs across the country.[16] In addition, many states do not require mandatory continuing education as a requisite for licensure renewal. As a result, additional training may occur only as the employer requires it or if the nurse chooses to participate in continuing education offerings. There are no national standards of educational requirements for nurses working in specialized settings; however, many hospitals have comprehensive orientation programs or provide internships for nurses who wish to work in a

specialty area. The type of program or internship developed by the institution can vary in length and content.

Even when health care providers have obtained the appropriate education and training, there is no guarantee that the health care provider is competent. A majority of children needing emergency care are not treated in emergency departments specializing in pediatrics.[17] Therefore, most of the health care providers that children encounter may have very little experience dealing with pediatric emergencies. Competency develops when adequate education and training are combined with regular exposure and practice. Infrequent contact with actual pediatric emergencies reduces the opportunities to "practice" these skills. Langhan and colleagues surveyed 459 emergency physicians on the topic of training, curricula, and experience with treating pediatric patients.[18] A majority of physicians felt they were not as well prepared to care for the pediatric patient as they were for the adult patient because in part, there was much less exposure to pediatric illnesses, interventions, and treatments.[18] A similar survey conducted with EMTs in the state of Maine produced comparable results.[19] Experience in caring for the pediatric patient cannot be "created" but continuing education that incorporates case studies greatly improves the ability to apply these principles to practice.

There are a number of pediatric continuing education courses available to nurses that integrate theoretical content with case studies and include opportunities to practice skills on mannequins or simulators. These include the Emergency Nursing Pediatric Course (ENPC)[20] offered by the Emergency Nurses Association, Pediatric Advanced Life Support (PALS)[13] developed by the American Heart Association, and Advanced Pediatric Life Support (APLS)[14] developed by the American Academy of Pediatrics.

Many nursing organizations offer certifications for nurses in their area of expertise. Certification is a way in which a nurse is recognized for having a certain level of proficiency in a defined area of nursing, such as emergency nursing, pediatrics, surgery, etc. A number of certifications are available to registered nurses who choose a specialty. The Pediatric Nursing Certification Board (www.pncb.org) and the American Nurses Credentialing Center (www.nursingworld.org/ancc/) offer certification in pediatric nursing and the Board of Certification for Emergency Nursing (www.ena.org/bcen) offers the Certified Emergency Nurse credential, but there is currently no certification specific for pediatric emergency nursing.

Addressing Safety

Not surprisingly, the emergency department is a high-risk area for patient errors. There are somewhere between 44,000 and 98,000 patient deaths each year attributable to medical errors.[21,22,23] Fordyce and colleagues conducted a study of adverse events in an emergency department with greater than 100,000 visits annually.[24] For every 100 patients treated in the emergency department, 18 errors occurred of which 2% produced adverse events. Given that more than 100 million visits to emergency departments occur annually, they extrapolated that more than 18 million errors and 360,000 adverse events occur annually in emergency departments across the United States.[24] Crowding, a fluctuating census, chaos, and stress all contribute to the higher incidence of medical errors in the emergency department for both children and adults.[25] However, children are at a higher risk for medical errors due to a number of unique factors, such as issues relating to their size; multiple caregivers; a lack of pediatric

experience by providers; and medication, technology, and equipment designed and tested primarily on the adult population.[26,27] The greatest number of medical errors in all settings results from medication errors [28] and children are particularly vulnerable to medication errors. An analysis done in 2003 of data obtained from United States Pharmacopeia's (USP) MEDMARX program, an anonymous national medication error reporting database, indicated that patient harm occurred in 3.6% of medication errors affecting children.[29]

The most common causes of medication errors in the pediatric population occur because of calculation mistakes.[30] Dosages must be calculated according to weight and age, but may need to be adjusted to body surface as well.[31] In addition, many drug formulations are available in adult concentrations only or labeled as a specific percent in a solution, requiring the solution to be converted to number of grams per milliliter. In the chaotic emergency department where time is often critical, calculation errors are common.[27] Ten-fold errors, which occur when a decimal point is misplaced, are especially dangerous because the child can potentially receive a lethal dose of medication or conversely, not enough to treat the condition.[32] A review of 17 case reports of dosing errors in children by Wong and colleagues found that eight of the 17 errors were ten-fold errors causing death in five cases and severe reactions in the other three cases.[30] Errors in dosing are the most common type of errors found in emergency departments according to MEDMARX of USP.[33] Prescribing errors and omission errors are the next most common errors.[33]

The nursing shortage plays an important role in whether patients receive quality care. The ENA 2005 National Emergency Department Benchmark Guide[34] reports that 26% of emergency departments surveyed had an RN vacancy rate of more than 10%. Approximately 12% of nursing positions that hospitals are recruiting for are in the emergency department, making the emergency department the third most common source of vacancies in hospitals.[8] Only the medical/surgical and critical care units have greater shortages.[8] With staffing shortages throughout the hospital, emergency patients needing admission often end up "boarding" in the emergency department leading to an increased patient load on emergency nurses who are already overwhelmed by a lack of staff and an ever-increasing ED census.[35] This has an even greater impact on the pediatric patient because procedures performed on children often require two or more staff to perform the procedure safely, resulting in a potential delay as the nurse waits for the availability of another caregiver.

Coordinating a System

According to a study cited in the IOM report on pediatric emergency care,[8] only 6% of hospitals have all of the equipment and supplies needed to properly care for pediatric patients.[36] While several emergency care professionals find this information deceiving,[37] there remains a great deal of truth to the statement that many emergency departments are not adequately prepared to care for children. Only about half of emergency departments across the country have a minimum of at least 85% of the necessary supplies.[36] Obtaining all of the required supplies is only one step in assuring appropriate pediatric care and may not involve a huge investment for hospitals. Nevertheless, few hospitals within a community have, or can afford, all of the necessary equipment, personnel, and resources necessary to sustain care for the critically ill or injured child.

Despite the fact that more than 25% of all ED visits are pediatric patients,[4] it is not financially practical for every hospital to specialize in pediatric care. In 1993, the IOM report *Emergency Medical Services for Children* suggested that regionalization of pediatric emergency services could improve outcomes and reduce costs, resulting in higher quality care for children.[1] There are legitimate concerns regarding "regionalization," one of which deals with providing competent care. It is a widely held belief that experience is a major component of continued competence and expertise. Regionalizing pediatric care would limit the amount of exposure that community hospitals have to pediatric illness and injury potentially hindering the development of competence and expertise in pediatric emergency care.

Some states have implemented a form of regionalization by designating hospitals in their state or community as: emergency pediatric centers (EPCs), emergency departments approved for pediatrics (EDAPs), and stand-by emergency departments approved for pediatrics (SEDPs).[38] Hospitals seeking one of these designations must meet certain standards set forth by the department of public health (DPH) and Emergency Medical Services for Children (EMSC), including specialty training and equipment, protocols, and evidence of quality improvement activities.[39] This system works well when EMS is involved in the treatment and transport of the pediatric patient; however, a majority of children are brought to the emergency departments by their parents, who are most likely not aware of the hospital's pediatric designation. Therefore, every hospital must be prepared to handle at least the very basics of emergency stabilization for any pediatric patient that may present for treatment, and applicable institutions must have protocols for transfer and transfer agreements in place to assure appropriate ongoing treatment is continued.[38] Unfortunately, baseline data obtained from the 2003 National EMSC Grantee Assessment indicated that only 51% of hospitals with emergency departments had interfacility transfer agreements.[40]

Interfacility Transfer

With more and more hospitals participating in "regionalization" of services, such as that found in state-wide trauma systems, and the recommendation that pediatric services be regionalized, interfacility transfers have become more common.[41] Emergency departments with limited pediatric resources are encouraged to consider transferring the ill or injured child to a facility designated as a pediatric center. The Emergency Medical Treatment and Active Labor Act (EMTALA)[42] was created to guarantee stabilizing treatment to any person with an emergency medical condition. Part of that stabilizing treatment can include transfer to a facility that provides a higher level of care. EMTALA not only provides guidelines for determining what an appropriate transfer might be, but also identifies standards for evaluation and stabilization.[43]

Because of the risk involved in transferring patients from one facility to another, special consideration must be given to the process. Before the process is initiated, the transferring hospital must provide any and all stabilizing care that is within their capacity to provide.[44,45] In determining whether the transfer is appropriate, the referring physician must evaluate the risks versus the benefits of the transfer. [44,45] In the case of an unstable child, arranging a lateral transfer—transferring to a comparable facility—is not appropriate and increases the risk of morbidity and mortality.[44,45] Except in the case of a life-threatening emergency, informed consent should be obtained from the patient (as appropriate) and the legally authorized representative prior to transfer.[45,46] This requires the physician to discuss these issues with the

patient (as age allows) and family.[45,46]

Problems related to interfacility transfers of the ill or injured child are the same or similar as those experienced by hospital emergency departments attempting to provide pediatric care. These problems include a limited knowledge and/or lack of experience managing the pediatric patient, stabilizing the pediatric patient before transfer, preparing the patient for transfer, and providing appropriate care during transport. In addition, inadequate personnel, equipment, and resources at the referring institution and during transport can result in the delivery of sub-optimal care that may affect the patient's outcome. Safe and effective interfacility transfer of the pediatric patient requires properly equipped transport modalities and personnel with knowledge and expertise to anticipate and meet the needs of the ill or injured child.

Family-Centered Care

In 1994, the Emergency Nurses Association developed its first position statement to support family presence during invasive procedures and cardiopulmonary resuscitation. It was most recently revised in 2005.[47] Since that time, many other organizations have adopted the same or similar views in their own position statements or in their organization's published recommendations.[48,49,50] But "Family Centered Care" is more than just allowing families to be present during life-saving procedures. In the case of young children, the family member may be the only one who can speak for them. For any patient presenting to the emergency department for care, providing an accurate medical history, current signs and symptoms, and any other pertinent information is essential to an accurate diagnosis and appropriate treatment. Young children are unable to provide this information. Because of the stress of the situation, even older children may have difficulty remembering important information about their health history. Relying on children for accurate information increases the risk of medical error.[51]

Family-centered care in pediatrics is not a new concept. More than 40 years ago, consumers and professionals alike recognized that children did better when parents were present and involved in all aspects of their child's health care. A great deal of research conducted in the past 20 years supports that family-centered care improves outcomes; increases satisfaction of patients, families, and providers; and decreases health care costs.[48] The Society of Pediatric Nurses and the American Nurses Association summarized eight key elements of family-centered care in the "Scope and Standards of Pediatric Nursing Practice."[52] Several elements include recognizing the family as the center of the child's world, acknowledging cultural diversity, and understanding that coping mechanisms may be different for each family.[52] Family centered care takes into account family strengths and values and shows respect for culture and traditions.

The often chaotic and noisy environment of the emergency department is frightening for children and the multiple unfamiliar caregivers adds to this fear. Frightened children can be uncooperative making assessment and treatment that much more difficult. Providing support and comfort during stressful and potentially painful situations can significantly reduce a child's fear. Part of successful parenting includes helping children develop coping methods during stressful events.[52] Health care providers are encouraged to collaborate with family and promote the family's efforts to be an integral part of their child's treatment. A review of the literature by Corlett and

Twycross revealed that "… nurses appear to manage the amount of parental participation allowed by controlling the information they give, the support they provide and the way in which they communicate with parents."[53] Eckle and MacLean surveyed nine emergency departments in an effort to evaluate the extent to which family-centered care is practiced.[54] They found that integration of family-centered care was done best by hospitals that developed competencies and incorporated educational programs.[54] Several studies have shown that when some type of medical intervention is performed, most children prefer to have their parents with them.[55,56,57] Eichorn and colleagues interviewed nine patients who had family members present during invasive procedures or cardiopulmonary resuscitation.[58] None of the patients were uncomfortable having family present and all reported feeling supported and less alone.[58] A fifteen-year-old patient stated: "I was very scared… I thought I might die… I looked over and saw my dad and my mother. They were there to help me, to hold my hand… If you're a younger kid… you should have your parents there."[58]

Pediatric Research

In 1993, the IOM Report, *Emergency Medical Services for Children*, identified a tremendous gap in research pertaining to children and treatment obtained in the emergency department setting.[1] Following the release of this report, several programs were established to address this issue, including the National EMS Data Analysis Resource Center (NEDARC),[39] the Pediatric Emergency Medicine Collaborative Research Committee (PEM CRC), and more recently, the Pediatric Emergency Care Applied Research Network (PECARN). PECARN is a group of 21 hospitals collaborating on research aimed at studying a number of issues related to pediatric emergency care.[3,8]

Some of the common limitations to conducting research related to emergency care for the adult population, such as funding, availability of principal investigators, and insufficient data, are the same issues that make it difficult to conduct research in the pediatric population.[8] MacLean and colleagues conducted a study in PECARN emergency departments to determine the research needs of pediatric emergency nurses.[59] The study revealed that limited knowledge, experience, and resources were among the primary barriers to nurses being involved in research.[59]

There are other issues however, that are specific to children. In general, children are excluded from many research studies, particularly those that study the effects and outcomes of medications and the impact of emergency treatments and interventions.[60] For the most part, children are not mature enough to understand the risks and benefits of a study and therefore are not capable of giving informed consent.[60] In addition, as children grow, their physiologic responses change. The effects of a specific drug or intervention on a toddler may be far different from the effects of that same drug or intervention on an adolescent or even a neonate.[31] Still, the risks associated with not conducting research on children are enormous. When drug trials are not conducted on children, valuable information about whether or not the drug is effective remains unknown. Research into the pharmacokinetic effects of medications on children is becoming more prevalent. In 2002, the "Best pharmaceuticals for children act" was passed to address the issue of labeling medications for use in the pediatric population.[3] Research also needs to be conducted in the area of pediatric interfacility transports. Few studies have been conducted on use of equipment and therapies utilized in pediatric transfers.[45] There are many other research issues related to pediatric emergency care that need to be addressed in order to have a positive impact

on safety, clinical outcomes, and best practice.

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