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Pediatric ED: Avoiding Malpractice and Improving Risk Management

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Liability from claims of medical malpractice is a real and present danger for the pediatric emergency medicine physician. The key to effective risk management is to prevent (via good clinical care and interpersonal relations) a patient care issue from ever reaching a legal evaluation. This issue of *ED Legal Letter* will increase familiarity with legal components of medical malpractice due to negligence as well as classic legal defenses.

Selected Risk Management Areas

There are several areas in pediatric emergency medicine that are a frequent source of successful malpractice claims. Recognition of these will alert the physician to exercise due care and documentation to avoid liability. (See Table 1)

Testicular Torsion

A 13-year-old male presented to an emergency room complaining of swelling and pain in his right testicle. He had one episode of emesis in the department. No imaging studies were performed. The patient was discharged on pain medication and antibiotics with a diagnosis of epididymitis. He was instructed to follow-up the next day but was scheduled by the office to come in one week later. Five days

later, he reported worsening pain and was told to wait two days for the appointment. Following that visit, the patient received an explorative operation which revealed a necrotic testis secondary to intermittent torsion. A \$2 million jury verdict was returned.¹

Testicular torsion is not a difficult diagnosis to make but may be obscured by the challenge of obtaining important history, and the wide variety of diseases with similar presenting complaints. The correct and timely diagnosis of testicular torsion is crucial in this entity, however, because of the severe consequences of testicular loss and sterility. Testicular torsion should be considered as the primary diagnosis to rule out in all patients with a chief complaint of acute scrotal pain. It is the most common cause of acute scrotum in boys younger than age 15 (in up to 74% of cases).² Thought to be a disease of adolescents, with a peak age of 14, a recent study showed an even distribution in age of presentation from age 1-14 years.³

There are several aspects that make the diagnosis difficult. Testicular torsion may be associated with trauma in 4-8% of cases.⁴ Patients may have fever (16%), nausea and vomiting (up to 50%), or pyuria (27%) that leads to the false diagnosis of epididymitis.^{4,5} Torsion most classically presents with

sudden acute testicular pain. Careful and sensitive history taking in this often shy patient population will frequently discover the true complaint and a previous history of similar episodes. Using pain relief with elevation of the testicle (Prehn's maneuver) diagnostically is an unreliable method of differentiating torsion from other possible diagnoses.⁶ The amount of testicular swelling will vary depending on the degree of ischemia and the delay in presentation. The most important physical exam finding to evaluate is the cremasteric reflex. Normally, stroking of the inner thigh causes reflex contraction of the cremasteric muscle and resultant elevation of the testis on that side. Absence of this reflex is significantly associated with testicular torsion, and a normal reflex makes torsion very unlikely. Testicular necrosis ischemia and infarction are likely if the diagnosis is not made within 6-8 hours. For this reason, if torsion is likely, immediate surgical exploration is mandatory. In the remainder of cases, a doppler ultrasound of the testicle can be a very useful test that is usually readily available and has results approaching both 100% with respect to both sensitivity and specificity.³ It is most accurate in a patient with an uninflamed scrotum, lacking edema, and symptoms less than 12 hours duration.⁷ Testicular nuclear scans are accurate but have disadvantages of an 8% false-negative rate, expense, and unavailability.⁸

An understanding of these key features of diagnosis should lead to a reduction in misdiagnosis. In addition, the physician should carefully document pertinent negatives, positives, diagnostic tests performed, and scheduled follow-up.

Procedures/Supervision of Housestaff

An 8-month-old male underwent lumbar puncture and suffered cardiac arrest during the procedure, resulting in severe brain damage, blindness, and quadriplegia. The lumbar puncture was performed by an intern while the nurse held the baby. The plaintiff's contention was that the nurse held the child improperly, causing hyperflexion of the neck, thus, leading to airway obstruction and cardiac arrest. The plaintiff also claimed the intern failed to properly monitor and resuscitate the infant, and that the hospital was negligent for failing to have a more experienced physician present to supervise. A \$27.3 million verdict was reached for the plaintiff.⁹

Appropriate monitoring of patients during procedures is one of the key issues in this case. In addition, the need for adequate supervision of housestaff by

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Questions & Comments

Please call **David Davenport**, Managing Editor, at (404) 262-5475 between 8:30 a.m. and 4:30 p.m. ET, Monday-Friday.

Table 1

Key Risk Management Pearls in Selected Diagnoses

TESTICULAR TORSION

- Age of the patient is not a reliable predictor of testicular torsion
- Testicular torsion may include fever, vomiting, and pyuria suggestive of infection
- Presence of a cremasteric reflex almost completely rules out testicular torsion
- If testicular torsion is fairly certain, immediate operative exploration is indicated
- If time allows and the diagnosis is uncertain, doppler ultrasound is the most readily helpful test to diagnose testicular torsion

PROCEDURES/SUPERVISION OF HOUSESTAFF

- Interns and residents should be closely supervised, particularly when performing procedures
- Physicians may be accountable for those that they supervise regardless of whether they are disobeyed

MEDICATION ERRORS/AIRWAY MANAGEMENT

- Adhere to the institution's written policies regarding rapid sequence intubation
- Familiarity with time to onset and duration of effects of drugs used for sedation and neuromuscular blockade is imperative
- Verify and document correct endotracheal tube placement
- Write orders legibly and without abbreviations
- Clearly identify patient weight and allergies
- Avoid use of a terminal zero (use 1 instead of 1.0)
- A zero to the left of a dose less than 1 should be used (0.1 instead of .1)

MENINGITIS

- When a child with non-specific symptoms and fever with no source is examined, document a thorough history and exam
- Have a low threshold for lumbar puncture in children with fever and no source, particularly if the child is ill-appearing, lethargic, or irritable
- When discharging febrile children from the emergency department, give caregivers clear instructions to have the child re-evaluated if his/her condition worsens in any way

APPENDICITIS

- Remember that appendicitis is more difficult to diagnose in younger children
- Do not rely entirely on a normal white blood cell count to rule out appendicitis
- Consider imaging studies such as CT or ultrasound when the diagnosis of appendicitis is not clear
- Have a low threshold for surgical consultation
- When appendicitis is suspected but not definite, consider observing the child in the ED or as an inpatient for serial abdominal exams

DEHYDRATION

- Document vital signs
- Have a low threshold for checking electrolytes
- Before discharging a child with gastroenteritis, make certain the child can tolerate oral fluids

attending physicians is a major aspect of this litigation. Physicians may be sued for malpractice under various legal doctrines when alleged acts of negligence are committed by residents whom they supervise. Under the doctrine of respondent superior, the employer is responsible for the employee's misconduct, as well as for the employee's failure to act.¹⁰ This applies even if the employee disobeys an employer's orders. The principle of vicarious liability, which means employers may be held liable for injuries caused by their employees, can be invoked. Based on this principle, it is clear that a hospital or

university that pays residents' salaries also assumes some legal responsibility for negligence committed by these employees. It is also apparent from a number of court decisions, that if it is determined by the court that an attending physician has any degree of control over the actions of a resident, the attending may be held liable for the resident's negligence.¹¹ Usually, residents in their first year of training are not yet licensed to practice medicine, and this fact, coupled with their relative lack of clinical experience, means close supervision is warranted. By co-signing the emergency department chart, the faculty physician

essentially approves the documented record as well as the evaluation and treatment that was given to the patient.¹⁰ Clearly, close supervision of interns performing procedures is always warranted.

Medication Errors/Airway Management

An 8-month-old infant, diagnosed with asthma and respiratory syncytial virus, was to be transferred to a children's hospital. The transport team made the decision to intubate the patient, who weighed 10 kg. The pediatric pulmonologist was called and gave orders to give 2.0 mg of midazolam, intubate, then give a 2.0 mg dose of vecuronium. The nurse instead gave the midazolam, followed by the vecuronium, then attempted to intubate the patient five minutes after the vecuronium was given. Despite documentation that the infant was hypoxic and that there was no chest rise, no attempt was made to extubate and reintubate the infant until 15 minutes later. The patient arrested and died. A settlement was reached in the amount of \$150,000, plus a \$145,977 annuity.¹²

In addition to the errors in airway management, incorrect medication doses were raised as another area of malpractice in this case. When given in intravenous doses of 0.1- 0.2 mg/kg, vecuronium produces paralysis appropriate for intubation in 1- 4 minutes.¹³ Higher doses shorten the onset to paralysis but prolong the duration. Since the dose of vecuronium used in this case was in the higher range of standard dosing, it could have been expected that paralysis would have occurred well before the time of five minutes when an attempt was first made to intubate the patient. The formal policy of the children's hospital involved was that vecuronium should not be given until after intubation. Although rapid sequence intubation protocols usually involve use of sedation and neuromuscular blockade prior to intubation, if the hospital's written policy, as in this case, states otherwise, deviation from this standard could place the physician at medicolegal risk. Verification and documentation of correct endotracheal tube placement is essential. After endotracheal tube placement, equal breath sounds, oxygen saturation, vital signs, colorimetric verification, and a chest x-ray should be checked and findings documented. If, as in this case, improper endotracheal tube placement is evident, immediate corrective action is mandatory.

Medication error is defined as "any preventable event that may cause or lead to inappropriate medication use

or patient harm while the medication is in the control of the health care professional, patient, or consumer."¹⁴ It has been estimated that mortality from medication errors may exceed that caused by accidental poisoning in children.¹⁵ Medication errors may seriously harm patients, increase costs, and are a frequent basis for litigation. The American Academy of Pediatrics Committee on Drugs and Committee on Hospital Care recommends a number of steps that can be taken to reduce these errors. Orders should be legible, unambiguous, and written out without abbreviations. The patient's weight and medication allergies should be clearly identified. Use of a terminal zero should be avoided (e.g., use 1 instead of 1.0). A zero to the left of a dose less than 1 should be used (e.g., use 0.1 instead of .1).¹⁴ There is a particular risk of dosing errors in the pediatric patient population because of variability in weights of patients and the need to calculate individual doses.

Meningitis

An 18-month-old girl was evaluated for complaints of fever, lethargy, increased sleeping, and rash. She was diagnosed with a viral infection and sent home. That evening, at 7:00 p.m., the child's mother called the doctor because her daughter had slept all day and developed "pimples" on her chest. She was told to return the next day. At 8:00 p.m., the mother called again because the child had a fever of 106°F and "red blotches all over her body." She was again told to return the next day. When the mother called again at 3:30 a.m., she noted her daughter had developed vomiting and diarrhea. A "summer rash" was diagnosed over the phone. The next morning the plaintiff awoke to find her daughter dead. An autopsy showed meningococemia. A settlement was reached for \$300,000.¹⁶

This case illustrates the difficulties of phone triage. Apparently the severity of the child's illness was not clear to the physician taking the phone calls. One could speculate that the mother's multiple calls during the night, along with the information that the child had developed a very high fever and rash, should have raised enough concern to prompt referral to an emergency department for an immediate evaluation. The plaintiff in this case alleged that the child's symptoms were indicative of a bacterial infection and warranted a complete exam, labs, and antibiotics. The defendants contended that the symptoms were more indicative of a viral infection and claimed that nothing could have been done because the rash was a fatal

sign of meningococemia.

The allegation that physician negligence contributed to adverse outcome in patients with meningitis is a common claim in lawsuits against pediatricians and emergency medicine physicians. This claim often assumes a correlation between duration of patient symptoms and outcome of bacterial meningitis. The duration of symptoms may not be the same as the duration of meningitis. This is a particularly difficult distinction to make when meningitis begins as a non-specific illness. Bacterial infection of the meninges may occur at any point in the illness. For example, a physician sees a child with non-specific symptoms on Tuesday. Let's say that same child is diagnosed with meningitis on Friday. Was there a delay in diagnosis? Not necessarily. Expert witnesses are often asked to estimate when a bacterial infection invaded the central nervous system. Since the answer to this can only be speculated, studies instead address the duration of symptoms.¹⁷

In a review of the literature, Bonadio found that studies correlating symptom duration and outcome of bacterial meningitis do "not definitively determine whether and for what duration of time a delay in treating the infection affects patient outcome."¹⁸ The best approach for the individual physician is careful assessment and thorough documentation of history and exam findings. It is of utmost importance to give the caregiver clear instructions to bring the child back for re-evaluation if the condition worsens in any way.

In a review of existing data linking a delay in therapy to outcome in bacterial meningitis, Radetsky found that if the presentation was that of a non-specific illness, a short delay of less than 3-5 days in diagnosis and initiation of treatment does not alter the risk of sequelae or death.¹⁹ In addition, he noted that in the case of fulminant meningitis, antimicrobial treatment has minimal influence on outcome when these patients deteriorate early and rapidly in the course of their illness. However, Radetsky found that in patients with clinically obvious meningitis, an inappropriate delay in initiating treatment dramatically increases the risk of permanent injury.

Another possible issue raised by this case is adverse outcome as a result of managed care gatekeeping. A review published in *Academic Emergency Medicine* suggests that "gatekeeping as currently practiced by telephone may be associated with adverse outcomes."²⁰ Emergency physicians are required by EMTALA to provide a screening exam and initiate

stabilizing treatment provided even if the patient has been "denied" emergency department referral or payment by the managed care organization. It is prudent for a referring physician to have a low threshold for advising patients to seek timely evaluation in an emergency department. This is especially true when the patient has a potentially high-risk complaint (such as fever, abdominal or chest pain), the severity of which cannot easily be judged over the phone.

Appendicitis

An 11-year-old female was diagnosed with viral gastroenteritis by her pediatrician. She continued to have symptoms and was re-evaluated by her doctor the next day, at which time labs were checked and the patient was sent home. That evening, the girl's symptoms became more severe and she presented to a hospital emergency department where she was diagnosed with acute appendicitis. She was taken to the operating room and found to have a gangrenous appendix. After a nine day hospitalization, she fully recovered. It was the plaintiff's contention that treatment was delayed because her doctor did not check labs on the first visit and then incorrectly interpreted the labs done on the second visit. The defendant argued that there was no breach in the standard of care. A \$110,000 settlement was reached.²¹

Appendicitis is the most common condition requiring emergency abdominal surgery and has a peak childhood incidence of age 10-12 years.²² Diagnosis of appendicitis, especially in younger children, can be particularly difficult, as evidenced by the fact that the perforation rate in children younger than 8 years old is twice that in those older than 8 years.²² Although white blood cell (WBC) elevation is common in acute appendicitis, it is not a completely reliable parameter for definitive diagnosis. A normal WBC count does not consistently rule out the diagnosis of appendicitis either. Early diagnosis and prompt treatment of acute appendicitis decreases the perforation rate. Pediatric patients are less able to communicate a history consistent with appendicitis, and localized tenderness may be difficult to assess in an uncomfortable child. Given these limitations, imaging studies should be strongly considered when the diagnosis is less clear. Abdominal plain films are most often normal early in the course of appendicitis and, therefore, rarely add much to the evaluation. Barium enemas are occasionally used

to evaluate patients with possible appendicitis. Visualized filling of the appendix decreases likelihood of disease; however, in a significant proportion of barium enema examinations, the appendix cannot be visualized, making the study indeterminate.²³

Appendiceal computed tomography (CT) scan has been found to be highly accurate for diagnosing or excluding the diagnosis of appendicitis, with an accuracy of 93-98%.²³ CT diagnosis of appendicitis was most accurate when a combination of helical CT and colon contrast was used in one study.²³ CT also has the advantage of aiding in the diagnosis of conditions that may mimic appendicitis.

Findings on ultrasound that indicate appendicitis include an incompressible appendix, identification of an appendicolith, or a fluid collection or mass representing an abscess due to a perforated appendix.²⁴ The use of ultrasound for the diagnosis of appendicitis has a number of pitfalls, including difficulty visualizing the appendix, abnormal location of the appendix (retroceally), or a perforated appendix (unless a fluid collection or abscess is present).²⁴ In addition, this may be a very difficult test for a patient with severe abdominal pain to tolerate, because of the need to press firmly on abdomen to obtain adequate visualization. Ultrasound has the potential to be helpful when clinical findings are equivocal. In these instances, ultrasound may help to identify an alternative diagnosis, such as an ovarian cyst, and can sometimes make a definitive diagnosis of appendicitis. Unfortunately, ultrasound has not yet been shown to improve outcome in patients with appendicitis. A recent study in Academic Emergency Medicine evaluated the potential of ultrasonography to improve outcome of children with appendicitis. In this study, the use of ultrasound did not expedite the diagnosis of appendicitis and was not associated with a decrease in rates of perforation.²⁵

Acute appendicitis remains primarily a clinical diagnosis. History, physical exam, clinical suspicion, and lab data together can be used to facilitate a diagnosis. In some cases, imaging studies may aid in the diagnosis. When the diagnosis is uncertain, close observation with frequent repeat exams may be indicated. Careful education of patients and parents regarding signs and symptoms of appendicitis is important. In patients presenting with abdominal pain who are discharged, documentation of instructions to patients should include indications for return for re-evaluation if they develop increased pain, fever, or have no improvement within 12-24 hours.

Dehydration

A 3-year-old child presented with a two-day history of diarrhea, vomiting, inability to keep anything down, and decreased urine output. The parents described the child as lethargic with sunken eyes. The nurse described the child as listless, pale, and quiet and noted that the child did not react when she gave an injection of ampicillin as ordered by the physician. Blood pressure and pulse were not documented, electrolytes were not checked, and no intravenous or oral fluids were given in the office. The parents were told to take the child home and to continue to try to give oral liquids. That afternoon the child continued to have vomiting and diarrhea, and that evening suffered a cardiac arrest and died. An autopsy noted hypernatremic dehydration and listed the cause of death as a viral infection. The plaintiffs alleged that failure to diagnose dehydration and failure to give intravenous fluids caused shock and death. A \$300,000 settlement was reached.²⁶

When evaluating a child for dehydration, documentation of vitals is essential, and obviously neglected in this case. Also, if clinical evaluation suggests dehydration, a definite plan for rehydration should be documented. In this case, oral rehydration could have been attempted while the child was observed in the office. If the child continued to be unable to tolerate oral intake, intravenous fluids should have been initiated. Another noteworthy point in this case is the apparent difference between the nurse's findings and the physician's assessment of the child. This highlights the importance of reviewing the nurse's notes and, if the physician's findings differ, this should be explained and documented on the chart.

A recent study found that conventional clinical signs of dehydration are valid and reliable.²⁷ According to the findings in this study, diagnosis of clinically significant dehydration should be based on at least three clinical findings, including capillary refill of more than two seconds, decreased tears, dry mucous membranes, and ill general appearance.²⁷ Electrolyte values may be helpful in assessment of moderate to severe dehydration, both to establish a baseline for monitoring and treatment and to identify electrolyte abnormalities such as hyponatremia, hypernatremia, and hypoglycemia that may affect treatment.²⁸ A prospective study of children with gastroenteritis and dehydration found that although decreased serum bicarbonate concentration is more

common with increasing severity of dehydration, the magnitude of decreased bicarbonate was not significantly different with increasing degrees of dehydration.²⁹

An American Academy of Pediatrics practice parameter on management of acute gastroenteritis advocates the use of oral rehydration therapy (ORT) with a glucose-electrolyte solution. Contraindications to ORT include altered mental status, ileus, and intractable vomiting.³⁰ Even in the presence of some vomiting, frequent, small volumes of an oral rehydration solution may be useful. Solutions with 45-90 mmol/L sodium should be administered in a volume of 100 mL/kg for moderate dehydration and 50 mL/kg for a child with mild dehydration.³⁰

When considering the possibility of significant dehydration in a child, the clinician should strongly consider checking electrolytes. In addition, before releasing a child with acute gastroenteritis from the emergency department, it is essential that the physician makes certain that the child can tolerate oral liquids. If the child cannot tolerate oral rehydration, admission or further emergency department observation is advisable.

Summary

The key to effective risk management in the pediatric emergency department is the use of good interpersonal relations and clinical care to prevent a patient care issue from resulting in a legal evaluation. Areas that are high risk, such as testicular torsion, appendicitis, meningitis, procedures, medication administration, and dehydration, should be approached very carefully and methodically. Careful documentation, communication, and scheduled patient follow up can reduce a pediatric emergency department physician's risk of medical legal liability.

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Physician CME Questions

16. Which of the following physical exam findings is most diagnostic when evaluating a patient for testicular torsion?
 - a. Cremasteric reflex
 - b. Presence of fever
 - c. Relief of pain with testicle elevation
 - d. Testicle swelling
 - e. Vomiting
17. Which of the following is most likely to assist the physician with timely diagnosis of testicular torsion?
 - a. Age of patient
 - b. CBC
 - c. Doppler ultrasound
 - d. Testicular nuclear scan
 - e. Urinalysis
18. Methods to reduce medication errors include:
 - a. writing out orders without abbreviation.
 - b. identification of patient weight and allergies.
 - c. avoiding use of a terminal zero.
 - d. avoiding use of a zero to the left of a dose less than 1.
 - e. All of the above
19. Ultrasonographic findings consistent with appendicitis include:
 - a. an incompressible appendix.
 - b. identification of an appendicolith.
 - c. a compressible appendix.
 - d. both a & b
 - e. both b & c
20. Clinical signs of dehydration include:
 - a. capillary refill greater than 2 seconds.
 - b. decreased tears.
 - c. dry mucous membranes.
 - d. ill general appearance.
 - e. All of the above
21. In pediatric patients, meningitis:
 - a. Is an illness commonly involved in lawsuits against pediatricians and emergency medicine physicians
 - b. Infection correlates directly with the duration of symptoms
 - c. May present as a fulminant infection or with non-specific symptoms
 - d. a & c
 - e. All of the above

In Future Issues:

Asthma