High-risk Pediatric Emergencies

B. Lorrie Edwards, MD*, David Dorfman, MD

KEYWORDS

• Pediatric emergency medicine • Pediatric emergency malpractice • Medicolegal
• Risk management • Medical error

KEY POINTS

- Pediatric medical malpractice cases occur less commonly than adult cases but with potentially higher indemnity payments.
- The most common diagnoses associated with pediatric malpractice cases in the emergency department are cardiac/cardiopulmonary arrest, meningitis, pneumonia, appendicitis, testicular torsion, and fracture.
- The most common causes of pediatric malpractice litigation are missed diagnosis and delayed diagnosis.
- In cases of suspected child abuse, physicians have immunity against liability when reporting suspected abuse if reports are made in good faith, although details of that immunity vary by state.

Medical malpractice is a serious challenge for physicians who take care of children in the emergency department (ED). Although the frequency of medical malpractice claims against pediatricians is one of the lowest of all specialties, the payments made when awarded are among the highest,[1,2] perhaps due to the lifelong consequences that may result from an injury sustained at an early age. For emergency physicians who take care of children, the medicolegal risk is higher; more than half of pediatric malpractice suits arise from the ED.[3,4] The diagnoses associated with malpractice claims vary by age and have evolved over time, currently focused on the significant morbidity and mortality of cardiac and cardiorespiratory arrest.[5] Other diagnoses commonly associated with pediatric ED malpractice claims include meningitis, respiratory illness in infants, appendicitis, testicular torsion, and fracture.[3,5] **Table 1** lists these diagnoses according to the age of the patient and demonstrates the change in epidemiology over the past few decades. This review focuses on the management of these high-risk diagnoses, with emphasis on specific pitfalls that

Department of Pediatrics, Division of Pediatric Emergency Medicine, Boston University School of Medicine, 4th floor, 801 Albany Street, Boston, MA, 02119, USA
* Corresponding author.
E-mail address: lorrie.edwards@bmc.org

Emerg Med Clin N Am 38 (2020) 383–400
https://doi.org/10.1016/j.emc.2020.01.004
emed.theclinics.com

may contribute to increased medicolegal liability. Discussion of cardiac and cardiopulmonary arrest in children is deferred, because there are few data exploring the underlying cause of malpractice in these cases, and a full review of pediatric cardiopulmonary resuscitation is beyond the scope of this article.

MENINGITIS

Key Points

- Meningitis in children can progress rapidly and can lead to serious morbidity and mortality.
- Any child with suspected meningitis should have an urgent lumbar puncture, unless contraindicated by the severity of illness.
- Antibiotics should be administered as soon as is feasible after necessary testing but should not be delayed should complications with testing (such as difficulty with lumbar puncture) arise.
- Children, in particular infants, may present with nonspecific signs of infection prior to development of more classic signs of meningitis.
- Seizure outside the classic age for febrile seizure, irritability, bulging fontanelle, and neck stiffness are red flag symptoms and should raise concern for meningitis.
- Published low-risk decision rules can be a valuable evidence-based tool for the evaluation of fever in very young infants. Care should be taken to use them only in patients for whom they are designed.

Meningitis has been one of the most common diagnoses associated with pediatric malpractice cases over the past few decades.[3,5] In patients under the age of 2, it now falls behind only pulmonary illness and cardiac arrest.[5] Nonetheless, a majority of meningitis claims are in pediatric patients, with 60% of those cases involving patients under the age of 2 years.[2] This is likely because the incidence of meningitis is dramatically higher in this age group, with a peak incidence of 80.69 cases per 100,000 infants less than 2 months of age and 6.91 per 100,000 children 2 months to 23 months, compared with 0.56 cases per 100,000 children and 0.43 cases per 100,000 children in ages 2 years to 10 years and 11 years to 17 years, respectively.[6] Although it is rare, the high morbidity and mortality of meningitis in the youngest of children make it a diagnosis that cannot be missed.

Delayed and missed diagnosis of meningitis remain the most commonly cited causes of malpractice. In a review of pediatric meningitis malpractice, only 12.3% of suits had an initial diagnosis of meningitis.[2] The most common alternative diagnoses were viral infection or influenza, other, or otitis media. Correctly identifying patients at risk for meningitis, therefore, is critical on the initial presentation. It has been demonstrated that delay to antibiotics of greater than 24 hours from symptom onset in cases of bacterial meningitis is independently associated with adverse neurologic outcomes,[7] and death from meningococcal infection can occur within a few hours of symptom onset.[8]

Identifying patients at risk, especially in the very young, can be quite challenging. Patients with meningitis can present with nonspecific symptoms.[2] Among meningitis malpractice cases, 74% of children presented with fever, whereas 49% presented with nausea and vomiting.[2] In older children, the classic presentation of fever, photophobia, headache, and mental status change is seen more often, but these symptoms are by no means present in all patients with meningitis.[8,9] Infants often present with

Table 1
Most common diagnoses involved in pediatric emergency department malpractice claims

Patient Age: Years Studied	First	Second	Third
0-2 y: 1985–2000	Meningitis	Impaired neonate	Pneumonia
0-2 y: 2001–2015	Cardiac or cardiorespiratory arrest	Diseases of lung	Meningitis
3-5 y: 1985–2000	Fracture	Meningitis	Appendicitis
3-5 y: 2001–2015	Cardiac or cardiorespiratory arrest	Appendicitis	Fracture of the radius or ulna
6–11 y: 1985–2000	Fracture	Appendicitis	Meningitis
6–11 y: 2001–2015	Cardiac or cardiorespiratory arrest	Appendicitis	Malunion of fracture, meningitis, disorder of male genital organs, aseptic necrosis of bone
12–17 y: 1985–2000	Disorder of male genitalia	Cardiac or cardiorespiratory arrest	Encephalopathy (not further defined), appendicitis
12–17 y: 2001–2015	Fracture	Appendicitis	Testicular torsion

Data from Selbst SM, Friedman MJ, Singh SB. Epidemiology and etiology of malpractice lawsuits involving children in US emergency departments and urgent care centers. *Pediatric emergency care.* 2005;21(3):165-169. and Glerum KM, Selbst SM, Parikh PD, Zonfrillo MR. Pediatric Malpractice Claims in the Emergency Department and Urgent Care Settings From 2001 to 2015. *Pediatric emergency care.* 2018;00.

fever but also may present with hypothermia.[9] Nonspecific symptoms, such as jaundice, poor feeding, vomiting, and irritability, also are common in infants.[9] Certain red flag features can be identified, including a bulging fontanelle or neck stiffness in an infant, seizure outside the typical age range for febrile seizure, irritability or toxic appearance, and any mental status change or sign of meningeal irritation.[8,9] For meningococcal infection in particular, symptoms of sepsis, such as fever, change in skin color, coolness in the hands and feet, leg pain, and irritability, have been noted as earlier signs of the disease than the more classic signs of neck stiffness or petechial rash.[8]

In the very youngest patients, in particular those under 2 months of age, in whom the risk of meningitis is highest, fever may be the only presenting sign within the first 24 hours of illness. Any febrile infant in this age group who is not well appearing to the examiner should have a full sepsis evaluation, including complete blood cell count, blood culture, urinalysis, urine culture, and lumbar puncture. In well-appearing young infants, the rate of serious bacterial infection is 8% to 13%,[10] and many studies have attempted to determine which of these infants may need invasive testing and antibiotic treatment. Several low-risk criteria have been developed, including the Rochester, Philadelphia, and Pediatric Emergency Care Applied Research Network (PECARN) low-risk rule, and the step-by-step rule,[10–12] which aim to identify febrile infants who can be discharged without lumbar puncture or antibiotic therapy. Proper use of low risk criteria can allow approximately 30% of febrile infants to avoid lumbar puncture and be treated with observation alone.[13] A comparison of these rules can be seen in **Table 2**. All of these low-risk rules have exclusion criteria, including infants with

prematurity, recent antibiotic use, infants with chronic underlying illness, and infants who are ill appearing on examination.[10,12,14] The step-by-step rule is designed to assess risk for patients with invasive bacterial infections, which includes bacteremia and meningitis but not urinary tract infections.[12] The PECARN low-risk rule was published in 2018 and has yet to be externally validated by additional studies.[10] It should be used with particular caution in infants less than 29 days old in whom the risk of meningitis is highest.

Low-risk decision rules for evaluation of febrile infants also have been cited in several published clinical practice guidelines (CPGs), which use the data to systematically evaluate young febrile infants.[15,16] CPGs have been shown to improve flow and reduce unnecessary testing[17] and may be useful references for emergency providers faced with these challenging patients. Citation of nationally published CPGs, such as those published by the American Heart Association, have been used successfully to defend against malpractice litigation,[18] although it has not yet been demonstrated that institutional CPGs carry similar legal protection. These clinical decisions should be discussed with families, who also may be able to share in decision making around comfort with testing versus risk.

Because no clinical rule or clinical evaluation can be perfect, it is essential that any patient presenting with signs or symptoms of infection, regardless of severity at the time of initial diagnosis, have a solid plan for follow-up. Signs and symptoms of worsening illness should be discussed in detail with the parent or guardian prior to discharge, and strict return precaution for worsening symptoms always should be clear.

PNEUMONIA

Key Points

Cough and fever are common in pediatric pneumonia, but chest pain, hypoxia, and increased work of breathing are more specific clinical signs of concern. Absence of tachypnea is associated with lower risk of pneumonia compared with other respiratory illness.

Identification of children with respiratory distress is critical. Symptoms include tachypnea, grunting, nasal flaring, apnea, cyanosis, altered mental status, and hypoxemia.

Any child with respiratory distress or severe disease should undergo chest radiograph (CXR) and be admitted to the hospital for close respiratory monitoring and therapy.

CXR is not required in children with suspected pneumonia who have mild disease and are deemed well enough for outpatient therapy.

Anticipatory guidance regarding the possibility progression of illness is important for any child who is discharged home with a diagnosis of pneumonia. Families should be given a clear and specific follow-up plan.

In infants presenting to the ED, pneumonia and lung disease remain among the top diagnoses involved in medical malpractice cases, likely because they can be associated with significant patient morbidity or mortality.[2,3,5] It is a common diagnosis, with an annual incidence of 3 to 4 cases per 100 children in the developed world.[19] Although pediatric pneumonia often can be managed in the outpatient setting, failure to identify severe disease can lead not only to respiratory failure but also to severe sequelae, including septic shock and even death. Although there have been no formal studies evaluating the specifics of pediatric pneumonia malpractice cases, selected

Table 2
Comparison of low-risk decision rules for febrile young infants

Rule	Modified Philadelphia Criteria	PECARN Low-risk Rule	Step-by-Step Rule
Age range (d)	29–56	≤60	22–90
Urinalysis	<10 WBC/HPF, -LE, -nitrite	≤5WBC/HPF, - LE, -nitrite	≤5WBC/ HPF, -LE, -nitrite
Blood testing	WBC ≥5 and ≤15 I:T ratio of <0.2	ANC ≤4090/μL Procalcitonin ≤1.71 ng/mL	ANC ≤10,000 Procalcitonin <0.5 CRP ≤20
Sensitivity	98.5%	97.7%	92.0%
NPV	97.1%	99.6%	99.3%

Abbreviations: ANC, absolute neutrophil count; CRP, C-reactive protein; HPF, high-power field; I:T,immature neutrophils:total neutrophils; LE, leukocyte esterase; NPV, negative predictive value; WBC, white blood cell count.

Data from Garra G, Cunningham SJ, Crain EF. Reappraisal of Criteria Used to Predict Serious Bacterial Illness in Febrile Infants Less than 8 Weeks of Age. *Acad Emerg Med.* 2005;12(10):921-925; Kuppermann N, Holmes JF, Dayan PS, et al. Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. *Lancet.* 2009;374:1160-1170; and Gomez B, Mintegi S, Bressan S, et al. Validation of the "Step-by-Step" Approach in the Management of Young Febrile Infants. *Pediatrics.* 2016;138(2).

case reviews note suits related primarily to missed diagnosis or failure to recognize severity of illness, including failure to hospitalize.[20–22]

Although cough and fever are seen in up to 80% of children with pneumonia, a systematic review of signs and symptoms of pneumonia in children found that chest pain, hypoxia, and increased work of breathing were the clinical observations which most successfully identified children with pneumonia compared with other respiratory illnesses.[23] The presence of tachypnea was not found to increase the likelihood of pneumonia, although the absence of tachypnea was found to be associated with a lower likelihood of pneumonia.[23] It is critical to remember that respiratory rate varies significantly by age, and recognition of respiratory distress is dependent on knowing these values. World Health Organization criteria for tachypnea are noted in **Table 3**. Other signs of respiratory distress at any age include dyspnea, retractions, grunting, nasal flaring, apnea, altered mental status, and hypoxemia (pulse oximetry <90% on room air).[19] Such patients should be admitted to the hospital for close monitoring and treatment.

When clinical concern is high enough, the diagnosis can be confirmed with CXR. Routine CXR is not required, however, for children suspected of mild disease who

Table 3
World Health Organization criteria for tachypnea

Age	Respiratory Rate (Breaths/min)
0–2 mo	>60
2–12 mo	>50
1–5 y	>40
>5 y	>20

Adapted from Bradley JS, Byington CL, Shah SS, et al. The management of community-acquired pneumonia in infants and children older than 3 months of age: clinical practice guidelines by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of America. *Clinical Infectious Diseases.* 2011;53(7):e25-e76.

are well enough to be treated as outpatients. Children with severe disease, however, defined as fever greater than or equal to 38.5°C, moderate to severe respiratory distress, cyanosis, altered mental status, dehydration or poor feeding, or other signs of sepsis,[19] should have a CXR performed to evaluate for complications of pneumonia, such as pleural effusion, empyema, pneumothorax, and abscess. Children with diagnosed community-acquired pneumonia should be admitted to the hospital for any of the following criteria: respiratory distress, hypoxemia, age less than 6 months, suspected pathogen with increased virulence such as methicillin-resistant *Staphylococcus aureus* (MRSA), and concern about adequate follow-up and home observation.[19] Anticipatory guidance regarding the potential for worsening of respiratory symptoms is critical in patients who are deemed well enough to be discharged home.

First-line treatment of pediatric pneumonia suspected to be of bacterial origin is with oral amoxicillin, 90 mg/kg/day, divided twice a day in infants, preschool-aged children, and school-aged children. Consideration also can be given to macrolide therapy for school-aged patients with a more indolent clinical course suspected of atypical infection, such as *Mycoplasma pneumoniae*. The child in need of hospitalization should be treated with intravenous ampicillin or penicillin G, if immunized against *Streptococcus pneumoniae*, or with a third-generation cephalosporin, such as ceftriaxone, if not fully immunized against pneumococcal strains (usually completed at approximately age 6 months).

Coinfection with influenza should prompt additional scrutiny; 30% to 40% of patients hospitalized with influenza are found to have pneumonia,[24] and although any child with influenza may develop bacterial pneumonia, the highest risk of coinfection is found in children under age 5.[24] Children with pneumonia who are coinfected with influenza have an increased risk of requiring intensive care admissions and have longer hospital lengths of stay.[25] Whereas children without influenza coinfection are most likely to have *S pneumoniae,* children with influenza coinfection are more likely to be infected with *S aureus,* with a high prevalence of MRSA.[25] Therefore, in children with pneumonia and influenza, empirical therapy should always include coverage for MRSA, with a low threshold for hospitalization in any child who is not well appearing. Additional antimicrobial therapy should be directed at specific pathogens based on local susceptibility data.

APPENDICITIS

Key Points

Children with appendicitis commonly present with atypical features, particularly in younger ages. Consider the diagnosis in children with nonspecific complaints, such as generalized abdominal pain, fever, or vomiting, and, if unsure, consider supplementing the clinical history and examination with additional laboratory or imaging studies.

Pediatric appendicitis is most likely to be missed in the first 24 hours of presentation, and extra attention should be paid to this patient population.

Clinical prediction rules can aid in diagnosis but lack the sensitivity to make a definitive diagnosis of appendicitis. They may be used in the context of a broader clinical care pathway.

Ultrasound is the imaging modality of choice for pediatric appendicitis. If ultrasound is not available, other alternatives include magnetic resonance imaging (MRI) or surgical consultation. Computed tomography (CT) should be avoided if possible, to reduce exposure to ionizing radiation.

Acute appendicitis occurs in approximately 70,000 pediatric patients every year.[26] For several reasons, including its high incidence, the potential for significant morbidity and mortality, and multiple clinical factors relating to its presentation, acute appendicitis is the second most common diagnosis associated with malpractice suits in school-aged children.[3,5,26]

A review of pediatric appendicitis malpractice claims from 1984 to 2013 notes that more than 75% of claims cite delay to diagnosis or misdiagnosis as the breach of care, with the remainder of claims citing operative/perioperative issues.[26] Emergency physicians were named in 20.2% of cases, hospital groups in 38.3%, and pediatricians in 29%.[26] Consequences of missed appendicitis can include perforation, abscess formation, obstruction, sepsis, and death.[27] Importantly, the cases of delayed or missed diagnosis in this case series had a 19.9% mortality rate,[26] and although selection bias certainly plays a role in which cases proceed to lawsuits, this fact highlights the importance of making this diagnosis at the first presentation.

Unfortunately, children with acute appendicitis present unique clinical challenges, increasing the risk of missed diagnosis. Although practitioners may be on the lookout for the textbook signs and symptoms of periumbilical pain followed by development of nausea, right lower quadrant pain, fever, and finally peritoneal signs, this classic progression is seen only in up to 50% of adults and even less often in children.[28] Fever is absent in up to 83% of patients, Rovsing sign is absent in 68%, 52% have absence of rebound pain, and 32% have absence of pain in the right lower quadrant.[28]

Not surprisingly, patients who present with nonspecific chief complaints less suggestive of appendicitis, such as fever, vomiting, and dehydration, have an increased rate of missed diagnosis compared with children presenting with a chief complaint of generalized abdominal pain or right lower quadrant pain,[29] leading to a delayed/missed diagnosis rate of 7.5% to 37% in pediatric patients.[30] The most common incorrect diagnosis in these cases is acute gastroenteritis.[26,30]

Overall, the perforation rate in cases of missed pediatric appendicitis is more than 70%.[30] Younger patients are especially vulnerable. Patients ages 5 years to 12 years have a perforation rate of 7% at less than 24 hours after symptom onset and 38% at 24 hours to 48 hours, and at greater than 48 hours the rate climbs to greater than 98%.[31] Patients under 3 years of age have a 70% rate of perforation at less than 48 hours.[31]

The fact that children frequently have atypical presentations of appendicitis makes it difficult for the emergency practitioner to recognize and diagnose. The extensive literature on diagnosis of pediatric appendicitis is constantly evolving, but consensus often relies on the use of clinical prediction rules, such as the Pediatric Appendicitis Score (PAS) or the refined Low-Risk Appendicitis Rule, to assess patients with symptoms concerning for appendicitis. Pertinent positive and negative findings on these scoring systems should be documented thoroughly if utilized.

The PAS is a scoring system that assigns points to historical, examination, and laboratory variables (**Table 4**).[32] A score of less than or equal to 3 suggests a low risk of appendicitis, whereas a score of greater than or equal to 7 indicates a 78% to 96% risk of appendicitis. This suggests that patients with a score of 7 or higher on the PAS warrant additional work-up with either imaging or surgical consultation. Patients with PAS scores of 4 to 6, however, are of indeterminate risk, and further evaluation with imaging is indicated. Although a high score is not sufficient to rule in appendicitis completely, clinical pathways that make use of the PAS have been reported to have sensitivity and specificity of 92.3% and 94.7%, respectively.[33]

The refined Low-Risk Appendicitis Rule defines patients as low risk for appendicitis if they meet 1 of 2 criteria: (1) absolute neutrophil count of $6.75 \times 10^3/\mu L$ or less without maximal tenderness in the right lower quadrant or (2) absolute neutrophil count of

$6.75 \times 10^3/\mu L$ or less with maximal tenderness in the right lower quadrant and without abdominal pain with walking/jumping or coughing.[34] This score has been validated with a sensitivity of 98.1% and specificity of 23.7%, with a negative predictive value of 95.3% in identifying children without appendicitis.[34] This rule is not designed to identify children who do have appendicitis.

Neither of these clinical prediction rules makes use of imaging studies. Although CT is both sensitive and specific for pediatric appendicitis, exposure to ionizing radiation makes its use less desirable than other modalities. Sensitivity of ultrasound for pediatric appendicitis is as high as 92% to 94%, with sensitivity of 93.76% to 91.2%,[35] making it the first choice for evaluation of pediatric appendicitis. Availability of ultrasound, however, may be limited at certain institutions, and the study has been shown to be highly operator dependent.[35] MRI also has been demonstrated to have a 96% sensitivity and 96% specificity for pediatric appendicitis, but, again, MRI availability may be limited. When optimal imaging is unavailable and patients are clinically equivocal for appendicitis, surgical consultation or transfer to a facility with pediatric radiology and pediatric surgical availability may be warranted.

Despite use of clinical decision rules and imaging, missing a diagnosis of appendicitis in a child remains a risk, especially at the early stages of presentation, when historical and examination findings can be nonspecific. It is, therefore, critical for a provider to establish a clear plan for follow-up to ensure that the examination findings have not substantially worsened or changed. There is no evidence-based timeline for when follow-up should occur for discharged patients, but, given the high morbidity and mortality of perforated appendicitis, follow-up within 24 hours is appropriate. Proper anticipatory guidance also should include detailed instructions for ED reevaluation for all red flag symptoms that were not present on initial evaluation, including fever, vomiting, migration of pain to the right lower quadrant, or significant worsening of pain. These conversations should be thorough and well-documented in a patient's medical record.

TESTICULAR TORSION

Key Points

Boys and men of any age presenting to the ED with a chief complaint of genital and/or abdominal pain always should have a full testicular examination performed.

A combination approach using history, physical examination findings, and ultrasound should be used when determining risk for testicular torsion.

Scrotal ultrasound with doppler has a sensitivity of up to 96% for testicular torsion, but this test is not perfect, and results should not be used as the sole factor in diagnosis.

When high clinical suspicion for testicular torsion exists based on any of these criteria, urologic consultation is warranted, regardless of specific examination findings or ultrasound results.

Testicular torsion has been cited as the third most common diagnosis involved in cases of medical malpractice in adolescent patients.[5] Although relatively rare, occurring in 4.5 per every 100,000 male patients under age 25,[36] the frequency of its appearance in medical malpractice suits underscores the significant morbidity of infarction of the testicle and emphasizes the need for specific attention to this diagnosis.

Table 4
Pediatric appendicitis score

Variable	Points
Nausea/vomiting	1
Anorexia	1
Migration of pain to the right lower quadrant	1
Fever ≥38°C	1
Right lower quadrant tenderness	2
Tenderness with cough/percussion/hopping	2
Leukocytosis (>10,000)	1
Left shift (>75% neutrophilia)	1
Total possible score	10

Adapted from Samuel, M. Pediatric appendicitis score. *J Pediatr Surg* 2002; 37:877.

Testicular torsion in male adolescents most often is due to twisting of the spermatic cord within the tunica vaginalis, leading to increased venous pressure and decreased arterial flow, ultimately resulting in testicular ischemia if not corrected. The classic patient with testicular torsion is a male adolescent with acute onset of severe, unilateral testicular pain of less than 6 hours duration prior to presentation, often with associated nausea and vomiting. His testicular examination reveals a tender and edematous testicle, which may be high-riding with horizontal orientation within the scrotum and absence of a cremasteric reflex.[37]

Unfortunately, although this classic presentation remains the most common, atypical presentations can lead to missed or delayed diagnosis, with significant risk of morbidity. Case series reviews have found that 5% to 12.5% of patients who ultimately were diagnosed with testicular torsion by surgical exploration did not present with a chief complaint of testicular pain.[38] In a review of medical malpractice appellant cases for testicular torsion, 31% of cases listed a chief complaint of abdominal pain alone.[39] Importantly, the lack of testicular examination in such cases commonly is cited as the breach of standard of care.[39,40] Other classic historical features, such as the acute onset of pain for a short period of time, also have been refuted. Testicular torsion has been shown to present with gradual onset of pain in multiple cases, whereas alternative diagnoses for acute scrotum, such as epididymitis, which classically has a more insidious onset, can present relatively acutely.[38]

On examination, patients may present with a vertical lie to the affected testicle, even in cases of torsion, as often as 17% to 54% of the time.[38] Scrotal edema and testicular swelling are not unique to torsion and may be confused with other causes of acute scrotum, such as epididymo-orchitis or torsion of the appendix testis.[38] Even the absence of the cremasteric reflex, long touted as the pathognomonic sign of testicular torsion,[41] has been found to be both absent in cases of normal testes, and present in cases of confirmed testicular torsion.[38] In short, reliance on the clinical history or the physical examination alone may result in missed or delayed diagnosis.

It also is critical to remember that testicular torsion also can present in younger children, with 10% of cases occurring in the neonatal period.[42] In neonates, patients initially may present with painless scrotal swelling or with nonspecific signs of discomfort, such as irritability or poor feeding. Findings on testicular examination in neonates may include scrotal swelling with or without signs of inflammation.[37] Keeping testicular

torsion on the differential diagnosis of the fussy neonate and performing a thorough testicular examination for any infant boy with nonspecific symptoms may help catch these especially challenging cases.

Supplementing the history and the physical examination with high-resolution ultrasonography with color Doppler, therefore, often is recommended to evaluate both for sonographic features of testicular torsion–such as the spermatic whirlpool sign and redundant spermatic cord—and, particularly, for evidence of asymmetric perfusion to the affected testicle.[37,43] Doppler ultrasonography has an 88.9% to 96% sensitivity, with greater than 98% specificity.[40,44] False-negative ultrasound reports have been cited in multiple malpractice cases[39,40] as the proximal cause of morbidity. It, therefore, should be emphasized that when clinical suspicion is high enough, a urologist should be consulted. This is supported by review of litigated cases, noting that although ordering an ultrasound is not correlated with successful defense, consultation with urology has been shown to lead to more successful legal outcomes.[40]

Awaiting the ultrasound should never delay urologic consultation in cases of sufficiently high clinical suspicion of torsion, because delay in making this diagnosis can lead to significant morbidity for affected patients. Although missed diagnosis is the most common cause of malpractice litigation, delay to hospital admission and delay to urology consultation account for up to 35% of appellate cases.[39] Nor should providers slow their approach for patients complaining of prolonged testicular pain—the classic teaching that testicular ischemia is irreversible after 6 hours to 8 hours of torsion has been demonstrated to be quite untrue.[45] A systematic review by Mellick and colleagues[45] noted that although testicular survival does diminish significantly with increasing duration of pain, there is an up to 18.1% chance of testicular recovery even after 24 hours of torsion. The adage, "time is testicle," is a valid one, and a decision to act on the diagnosis, therefore, should be made as expeditiously as possible.

FRACTURES AND ORTHOPEDIC INJURIES

Key Points

Elbow fractures are common, but the findings can be subtle on radiography (look for posterior fat pad in lateral view)—have high suspicion for supracondylar, lateral condyle, and medial condyle fractures in patients presenting with focal elbow pain or tenderness.

Injury patterns differ depending on the age of the child, due to changes in activity with development as well as anatomic changes due to growth.

Children with growth plates can sustain Salter-Harris fractures. Management depends on grade and location. Salter-Harris types III and IV fractures should have orthopedic consultation.

Legg-Calvé-Perthes disease (LCP) and slipped capital femoral epiphysis (SCFE) are seen best in the anteroposterior (AP) and frog leg views of the pelvis. Early presentations may not be apparent on plain films.

Approximately half of all children will suffer at least 1 fracture during their childhood, with an annual incidence as high as 400 cases per 100,000 children per year.[46,47] Malpractice litigation for fracture is common, and a majority of cases are due to redisplacement of a previously reduced fracture, dissatisfaction in healing, and missed fracture diagnosis.[48] In 1 case series, the sites most commonly involved in litigation

were the elbow, the forearm, the humerus (transcondylar), the femur, and the hand.[49] With any fracture, neurovascular compromise is a potential complication, and a complete and thorough neurovascular examination always should be performed and well documented.

Elbow Fractures

The most difficult joint in which to diagnose a fracture in children is the elbow. It is a common site for fracture and when fractured can lead to long-term morbidity. The most common elbow fracture in the pediatric patient is the supracondylar fracture.[50] These can be subtle and often can only be seen in a lateral x-ray view—the sail sign, an overly large anterior fat pad, or the presence of the posterior fat pad, which is not normally seen. It is, therefore, essential to make sure the lateral view is taken correctly, determined by the presence of a figure 8 or teardrop shape,[51] with the upper extremity directed anteriorly rather than externally rotated.

Type I supracondylar fracture describes a nondisplaced fracture with radiographic evidence of elbow effusion (anterior sail and/or posterior fat pad signs). Type II supracondylar fracture refers to a displaced fracture with an intact posterior periosteum. Type III supracondylar fracture is a displaced fracture with disrupted anterior and posterior periosteum. Recognizing the degree of displacement is critical for the emergency physician, because a type I supracondylar fracture can be splinted and referred to orthopedics. Orthopedics should be consulted, however, immediately for type II and type III supracondylar fractures, because nerve and vascular damage is of concern with these fractures.

Lateral condyle fractures are the second most common elbow fracture in children[52] and have a worrisome risk of nonunion, malunion, and avascular necrosis.[53,54] Even nondisplaced lateral condyle fractures may be unstable despite casting or splinting. All children with this fracture should be seen within a few days by an orthopedist. Medial humeral condyle fractures also are of concern, because they require casting in flexion and the forearm in neutral position, even with no displacement. Slight displacement (>2 mm) is generally treated operatively.[55] Unfortunately, both lateral and medial condyle fractures can be missed on initial radiographs. Children with elbow swelling, limited range of motion, or point tenderness should be followed closely and referred to orthopedics if symptoms do not resolve in a timely fashion.

Forearm Fractures

The distal radius and ulnar frequently are broken. Some of these fractures are obvious, with marked angulation. Children, however, are prone to buckle fractures (torus fractures), which may have more subtle presentations. Such buckle fractures of the distal radius or ulna routinely heal well. A removable splint that a family can remove for bathing is the preferred treatment.[56]

Midshaft fractures of the radius and ulna, on the other hand, are more commonly involved in litigation, with most cases citing redisplacement of the fracture after reduction as the cause of complaint.[48] Although this can be a known complication of fracture reduction, anticipatory guidance for families regarding timely follow-up with orthopedics is key as are signs and symptoms of worsening pain, swelling, or deformity, which should prompt more urgent return to care.

Foot Fractures

The most commonly missed pediatric fractures involve the phalanges and metatarsals. The most commonly missed metatarsal fracture is at the base of the fifth

metatarsal, often caused by ankle inversion.[57] Children have an apophysis at the base of the fifth metatarsal, which lies along the long axis of the metatarsal. In some instances, it is mistaken for a fracture. In other instances, fractures of the fifth metatarsal are mistaken for the apophysis. Knowing the developmental anatomy of the metatarsal, and correlating radiographic findings with tenderness on examination protect against this error.

Salter-Harris Fractures

No review of pediatric fractures would be complete without a discussion of Salter-Harris fractures. In growing children, the physeal plates often are the weakest part of the bone and many pediatric fractures go completely or partially through the growth plate. Salter-Harris type I fractures involve only the physis. They may be radiologically obscure. A subtle sign may be widening of the affected growth plate. Salter-Harris type II fractures go through the physis and into the metaphysis. Salter-Harris type III fractures involve the physis and the epiphysis. Salter-Harris type IV fractures include the physis and both the epiphysis and metaphysis. Finally, Salter-Harris type V fractures are a crush injury with compression of the physis and involving both the epiphysis and metaphysis.

Some Salter-Harris fractures are relatively trivial and heal well. Salter-Harris type I and small nondisplaced Salter-Harris type II fractures of the distal fibula are treated in the same manner as ankle sprains and are shown to heal without complication.[58] Salter-Harris type III fractures of the anterolateral distal tibia with avulsion of the lateral tibial epiphysis (Tillaux fracture) are the most common Salter-Harris type III fracture in children and typically occur in young teenagers but can be difficult fractures to recognize. The patient often has anterior ankle swelling. It is best seen in the AP view of the ankle and appears as a vertical line through the epiphysis. If there is displacement of the epiphyseal fragment, determined by CT, surgery may be needed. Close follow-up with orthopedics is required for patients with this injury.

Another, rather complicated fracture of the distal tibia seen in young adolescents prior to fusion is the triplane fracture or Salter-Harris type IV fracture. It involves 3 planes (hence its name) and incorporates Salter-Harris types I, II, and III that are joined together. This fracture generally is seen most clearly in the lateral view. CT and urgent orthopedic referral are required.

Hip Pathology

Limp is a common cause for ED visits by young children. The differential includes malignancy, Lyme disease, osteomyelitis, fracture, and abuse but also muscle strain and hand foot and mouth disease. Two entities deserve special mention from a medicolegal standpoint. Idiopathic avascular necrosis of the femoral head (LCP) generally presents with a subacute course, most frequently in school-aged children (range 3–12 years; peak 6 years).[59] The diagnosis may be made on plain radiographs (AP and frog leg radiographs of the pelvis, including both hips for comparison are the standard views) but early on in its course these films may be normal. If a child has persistent pain and LCP is suspected, bone scan or MRI can detect early changes that are not seen on radiographs. The treatment of LCP is controversial but this diagnosis may lead to legal risk if missed.

The other entity that is often missed, sometimes leading to increased morbidity, is SCFE. SCFE, separation of the capital femoral epiphysis from the femoral neck through the physis, most often presents in children in early adolescence, prior to closure of the femoral physis. It is one on the most common hip disorders among adolescents. It may present as an acute, acute on chronic, or chronic phase. Diagnosis is

suggested by limp, hip pain, or even medial thigh or knee pain in a child 10 years to 15 years of age and typically is associated with obesity. It may occur earlier in girls. A diagnosis generally is made by plain film, AP, and frog leg views of the pelvis and hips. Comparison of the 2 hips is helpful to detect subtle slippage. SCFE may occur in both hips. In very early cases, it even may present in a preslip phase, in which the only radiologic evidence of SCFE is relative physeal widening. Slippage also may worsen over time.[60] Thus, the treatment involves non–weight bearing and immediate orthopedic referral for surgical pinning.

CHILD ABUSE

Key Points

Physicians have a duty to report suspected cases of child abuse and should be aware of the specifics of reporting laws in the state in which they practice.

Physicians may be criminally or civilly liable for failure to report child mistreatment but have immunity, which limits liability for reporting in most states.

Patients presenting with frequent injuries or red flag historical or examination features should be evaluated for child abuse, and a report should be made to the appropriate child protective service.

Child abuse is a diagnosis that no physician wishes to make. More than 2 million reports of suspected child maltreatment are made each year, 650,000 of which ultimately are substantiated, leading to an estimated 1500 annual fatalities annually.[61] Adult reports of childhood abuse suggest that these data consistently underreport the problem.[61] Although child abuse cases are not among the more common diagnoses associated with medical malpractice cases, the anxiety associated with the potential legal ramifications of child abuse reporting merits inclusion of child abuse in this review. To prevent significant and potentially long-term morbidity or mortality, physicians are required by state and national laws to report suspected child abuse to the appropriate protective authorities. Nationally, the Federal Child Abuse Prevention and Treatment Act requires reporting of abuse by certain parties responsible for child welfare, including physicians.[62] All 50 states impose criminal penalties on physicians who fail to report child abuse, with some states providing additional civil liability in such cases,[62] although states differ in the exact definition of findings that require reporting.[63]

Although private malpractice suits regarding missed diagnoses of child abuse are not especially common, they do exist.[64,65] Cases generally stem from a failure to report suspected abuse in patients whose injuries might have otherwise raised red flags, as seen in the landmark case of *Landeros v Flood*, the case of an 11 month old whose initial ED visit for bruising and multiple fractures was not recognized as inflicted until she re-presented suffering from severe abusive head trauma at a later date.[63]

On the other end of the spectrum, physicians are relatively protected against liability in cases in which a report is made but ultimately unsubstantiated. Although every state is different, and physicians should be aware of the statutes of the states in which they practice, every state provides some degree of immunity to physician reporters. A few states provide absolute immunity for all reporters.[62] Others provide an immunity

defense only for reports made in good faith, sometimes including a presumption that physician reports are in good faith unless affirmatively proved otherwise.[62,63] In practice, it is rare that physicians are found liable for reporting suspected child abuse. In a survey of child abuse physicians, 16% reported having been sued for malpractice but none successfully.[66]

Injuries are one of the most commonly presenting pediatric complaints to EDs, and determining which injuries might be nonaccidental can be challenging. **Table 5** lists historical and examination features that may raise suspicions for child abuse in the pediatric patient. In particular, physicians should be wary of injuries in children with explanations that do not seem to be consistent with the injury or with the appropriate developmental stage of the child. A nonambulatory infant is unlikely to suffer fractures accidently, unless the history specifically addresses the injuries present. Once ambulatory, bruises in children are common but should be located on areas typical for simple falls and contusions. Bruising rarely includes the torso, neck, or abdomen, and those locations should prompt further evaluation. Red flags for pediatric fractures include multiple fractures, fractures in different stages of healing, rib fractures, infants or toddlers with midshaft humeral or femoral fractures, high-impact fractures such as the scapula or sternum, and classic metaphyseal lesions of the long bones.

Once child abuse is suspected, evaluation should include consultation with a child abuse specialist as early as possible to guide further management. In children under age 2 years, a skeletal survey should be obtained to evaluate for occult fracture, which is seen in up to 11% of studies.[61] Screening liver and pancreatic enzymes should be sent to evaluate for occult abdominal trauma. If severe trauma is suspected in an infant, head imaging also is recommended to evaluate for abusive head trauma.[61] Documentation should be clear and thorough and should include documentation of all findings as well as the likelihood of accidental versus nonaccidental injury. Disposition may be dependent on the response of local child protective services, but admission to the hospital may be warranted if there are safety concerns.

Table 5
Historical and examination features suggestive of child abuse

Historical Features	Physical Examination Findings
Significant injury with vague or no explanation	Any injury to a preambulatory infant
Denial of trauma in a child with obvious injury	Injuries to multiple organ systems
Details of explanation change in a substantial way	Multiple injuries in different stages of healing
Explanation of events is inconsistent with injury	Patterned injuries (eg, object-shaped bruises, object-shaped or immersion burns, bite marks)
Explanation of events is inconsistent with developmental capabilities of the child	Injuries to nonbony or unusual locations (eg, torso, ears, face, neck, upper arms)
Unexplained notable delay in seeking medical care	Significant unexplained injuries
Different witnesses provide substantially different explanations	Additional evidence of child neglect

Adapted from Christian CW, Committee on Child Abuse and Neglect, American Academy of Pediatrics. The evaluation of suspected child physical abuse. *Pediatrics.* 2015;135(5):e1337-1354.

SUMMARY

Children are not small adults. The diagnoses associated with malpractice are unique to the pediatric population and vary by age. All providers who take care of children in the emergency setting should be cognizant of the medicolegal risk associated with this population, not only to protect against liability but also to increase awareness of the pitfalls of these critical but complex diagnoses in order to improve outcomes for all pediatric patients.

DISCLOSURE

The authors have nothing to disclose.

REFERENCES

1. Jena AB, Chandra A, Seabury SA. Malpractice risk among US pediatricians. Pediatrics 2013;131(6):1148–54.
2. McAbee GN, Donn SM, Mendelson RA, et al. Medical diagnoses commonly associated with pediatric malpractice lawsuits in the United States. Pediatrics 2008; 122(6):e1282–6.
3. Selbst SM, Friedman MJ, Singh SB. Epidemiology and etiology of malpractice lawsuits involving children in US emergency departments and urgent care centers. Pediatr Emerg Care 2005;21(3):165–9.
4. Najaf-Zadeh A, Dubos F, Aurel M, et al. Epidemiology of malpractice lawsuits in paediatrics. Acta Paediatr 2008;97(11):1486–91.
5. Glerum KM, Selbst SM, Parikh PD, et al. Pediatric malpractice claims in the emergency department and urgent care settings from 2001 to 2015. Pediatr Emerg Care 2018. [Epub ahead of print].
6. Thigpen MC, Whitney CG, Messonnier NE, et al. Bacterial meningitis in the United States, 1998-2007. N Engl J Med 2011;364(21):2016–25.
7. Bargui F, D'Agostino I, Mariani-Kurkdjian P, et al. Factors influencing neurological outcome of children with bacterial meningitis at the emergency department. Eur J Pediatr 2012;171:1365–71.
8. Thompson MJ, Ninis N, Perera R, et al. Clinical recognition of meningococcal disease in children and adolescents. Lancet 2006;367(9508):397–403.
9. Curtis S, Stobart K, Vandermeer B, et al. Clinical features suggestive of meningitis in children: a systematic review of prospective data. Pediatrics 2010;126(5): 952–60.
10. Kuppermann N, Dayan PS, Levine DA, et al. A clinical prediction rule to identify febrile infants 60 days and younger at low risk for serious bacterial infections. JAMA Pediatr 2019;173(4):342–51.
11. Anbar RD, Richardson de Corral V, O'Malley PJ. Difficulties in universal application of criteria identifying infants at low risk for serious bacterial infection. J Pediatr 1986;109:483–5.
12. Gomez B, Mintegi S, Bressan S, et al. Validation of the "step-by-step" approach in the management of young febrile infants. Pediatrics 2016;138(2) [pii: e20154381].
13. Huppler AR, Eickhoff JC, Wald ER. Performance of low-risk criteria in the evaluation of young infants with fever: review of the literature. Pediatrics 2010;125(2): 228–33.

14. Garra G, Cunningham SJ, Crain EF. Reappraisal of criteria used to predict serious bacterial illness in febrile infants less than 8 weeks of age. Acad Emerg Med 2005;12(10):921–5.
15. Scarfone R, Gala R, Murray A, et al. ED pathway for evaluation/treatment of febrile young infants (0-56 days old). 2010. Available at: https://www.chop.edu/clinical-pathway/febrile-infant-emergent-evaluation-clinical-pathway. Accessed July 1, 2019.
16. Bishop J, Ackley H, Fenstermacher S, et al. Seattle children's hospital neonatal fever pathway. Available at: http://www.seattlechildrens.org/pdf/neonatal-fever-pathway.pdf. Accessed July 1, 2019.
17. Kuppermann N, Holmes JF, Dayan PS, et al. Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. Lancet 2009;374:1160–70.
18. Mackey TK, Liang BA. The role of practice guidelines in medical malpractice litigation. Virtual Mentor 2011;13(1):36–41.
19. Bradley JS, Byington CL, Shah SS, et al. The management of community-acquired pneumonia in infants and children older than 3 months of age: clinical practice guidelines by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of America. Clin Infect Dis 2011;53(7):e25–76.
20. Selbst SM. Legal briefs. Pediatr Emerg Care 2010;26(4):316–9.
21. Selbst SM. Legal briefs. Pediatr Emerg Care 2014;30(8):583–5.
22. Selbst SM. Legal briefs. Pediatr Emerg Care 2013;29(6):770–2.
23. Shah SS, Bachur RG, Simel DL, et al. Does this child have pneumonia? The rational clinical examination systematic review. JAMA 2017;318(5):462–71.
24. Kalil AC, Thomas PG. Influenza virus-related critical illness: pathophysiology and epidemiology. Crit Care 2019;23(1):258.
25. Williams DJ, Hall M, Brogan TV, et al. Influenza coinfection and outcomes in children with complicated pneumonia. Arch Pediatr Adolesc Med 2011;165(6):506–12.
26. Sullins VF, Rouch JD, Lee SL. Malpractice in cases of pediatric appendicitis. Clin Pediatr (Phila) 2017;56(3):226–30.
27. Hamid KA, Mohamed MA, Salih A. Acute appendicitis in young children: a persistent diagnostic challenge for clinicians. Cureus 2018;10(3):e2347.
28. Becker T, Kharbanda A, Bachur R. Atypical clinical features of pediatric appendicitis. Acad Emerg Med 2007;14(2):124–9.
29. Drapkin Z, Dunnick J, Madsen TE, et al. Pediatric appendicitis: association of chief complaint with missed appendicitis. Pediatr Emerg Care 2018. [Epub ahead of print].
30. Chang YJ, Chao HC, Kong MS, et al. Misdiagnosed acute appendicitis in children in the emergency department. Chang Gung Med J 2010;33(5):551–7.
31. Marzuillo P, Germani C, Krauss BS, et al. Appendicitis in children less than five years old: a challenge for the general practitioner. World J Clin Pediatr 2015;4(2):19–24.
32. Samuel M. Pediatric appendicitis score. J Pediatr Surg 2002;37(6):877–81.
33. Saucier A, Huang EY, Emeremni CA, et al. Prospective evaluation of a clinical pathway for suspected appendicitis. Pediatrics 2014;133(1):e88–95.
34. Kharbanda AB, Dudley NC, Bajaj L, et al. Validation and refinement of a prediction rule to identify children at low risk for acute appendicitis. Arch Pediatr Adolesc Med 2012;166(8):738–44.

35. Mangona KLM, Guillerman RP, Mangona VS, et al. Diagnostic performance of ultrasonography for pediatric appendicitis: a night and day difference? Acad Radiol 2017;24(12):1616–20.
36. Bass JB, Couperus KS, Pfaff JL, et al. A pair of testicular torsion medicolegal cases with caveats: the Ball's in your court. Clin Pract Cases Emerg Med 2018; 2(4):283–5.
37. Sharp VJ, Kieran K, Arlen AM. Testicular torsion: diagnosis, evaluation, and management. Am Fam Physician 2013;88(12):835–40.
38. Mellick LB. Torsion of the Testicle: It is time to stop tossing the dice. Pediatr Emerg Care 2012;28:80–6.
39. Gaither TW, Copp HL. State appellant cases for testicular torsion: Case review from 1985 to 2015. J Pediatr Urol 2016;12(5):291.e1-5.
40. Colaco M, Heavner M, Sunaryo P, et al. malpractice litigation and testicular torsion: a legal database review. J Emerg Med 2015;49(6):849–54.
41. Kadish HA, Bolte RG. A retrospective review of pediatric patients with epididymitis, testicular torsion, and torsion of testicular appendages. Pediatrics 1998; 102(1 Pt 1):73–6.
42. Kaye JD, Levitt SB, Friedman SC, et al. Neonatal torsion: a 14-year experience and proposed algorithm for management. J Urol 2008;179(6):2377–83.
43. Bandarkar AN, Blask AR. Testicular torsion with preserved flow: key sonographic features and value-added approach to diagnosis. Pediatr Radiol 2018;48(5): 735–44.
44. Baker LA, Sigman D, Mathews RI, et al. An analysis of clinical outcomes using color doppler testicular ultrasound for testicular torsion. Pediatrics 2000;105: 604–7.
45. Mellick LB, Sinex JE, Gibson RW, et al. A systematic review of testicle survival time after a torsion event. Pediatr Emerg Care 2019;35(12):821–5.
46. Jones IE, Williams SM, Dow N, et al. How many children remain fracture-free during growth? A longitudinal study of children and adolescents participating in the Dunedin Multidisciplinary Health and Development Study. Osteoporos Int 2002; 13(12):990–5.
47. Khosla S, Melton LJ 3rd, Dekutoski MB, et al. Incidence of childhood distal forearm fractures over 30 years: a population-based study. JAMA 2003;290(11): 1479–85.
48. Wong C, Bodtker S, Buxbom P, et al. A closed-claim analysis of complaints after paediatric antebrachial fractures. Dan Med J 2017;64(12) [pii:A5430].
49. Vinz H, Neu J. Out of court settlement of malpractice claims relating to the treatment of fractures in children: experience of the arbitration board of the North German Medical Associations. Dtsch Arztebl Int 2009;106(30):491–8.
50. Lins RE, Simovitch RW, Waters PM. Pediatric elbow trauma. Orthop Clin North Am 1999;30(1):119–32.
51. Grayson DE. The elbow: radiologic imaging pearls and pitfalls. Semin Roentgenol 2005;40(3):223–47.
52. Della-Giustina K, Della-Giustina DA. Emergency department evaluation and treatment of pediatric orthopedic injuries. Emerg Med Clin North Am 1999;17(4): 895–922, vii.
53. Gogola GR. Pediatric humeral condyle fractures. Hand Clin 2006;22(1):77–85.
54. Flynn JC. Nonunion of slightly displaced fractures of the lateral humeral condyle in children: an update. J Pediatr Orthop 1989;9(6):691–6.
55. Goodwin RC, Kuivila TE. Pediatric elbow and forearm fractures requiring surgical treatment. Hand Clin 2002;18(1):135–48.

56. Plint AC, Perry JJ, Correll R, et al. A randomized, controlled trial of removable splinting versus casting for wrist buckle fractures in children. Pediatrics 2006; 117(3):691–7.
57. Singer G, Cichocki M, Schalamon J, et al. A study of metatarsal fractures in children. J Bone Joint Surg Am 2008;90(4):772–6.
58. Boutis K, Willan AR, Babyn P, et al. A randomized, controlled trial of a removable brace versus casting in children with low-risk ankle fractures. Pediatrics 2007; 119(6):e1256–63.
59. Perry DC, Skellorn PJ, Bruce CE. The lognormal age of onset distribution in Perthes' disease: an analysis from a large well-defined cohort. Bone Joint J 2016;98-B(5):710–4.
60. Kocher MS, Bishop JA, Weed B, et al. Delay in diagnosis of slipped capital femoral epiphysis. Pediatrics 2004;113(4):e322–5.
61. Christian CW, Committee on Child Abuse and Neglect, American Academy of Pediatrics. The evaluation of suspected child physical abuse. Pediatrics 2015; 135(5):e1337-54.
62. Richardson C. Physician/hospital liability for negligently reporting child abuse. J Leg Med 2002;23:131–50.
63. Clayton EW. Potential liability in cases of child abuse and neglect. Pediatr Ann 1997;26(3):173–7.
64. Selbst SM. Legal briefs. Pediatr Emerg Care 2006;22(7):533–6.
65. Selbst SM. Legal briefs. Pediatr Emerg Care 2011;27(8):784–6.
66. Flaherty EG, Schwartz K, Jones RD, et al. Child abuse physicians: coping with challenges. Eval Health Prof 2013;36(2):163–73.