Introduction

At the time of the 2010 census, there were over 74 million children living in the United States, an increase of nearly 2 million over a decade. By the year 2030, this number is expected to exceed 87 million. While the proportion of children in the population has been decreasing dramatically (from 36% in 1964 to 24% in 2010), the number of children affected by poverty, living in unstable households, and suffering from chronic diseases has been steadily increasing.

These demographic trends have a significant impact on both healthcare delivery to pediatric patients and risk management in pediatric practice (Greve, 2011). This monograph will provide an overview of pediatric risk and claims and relate those findings to a pertinent case study, suggesting risk management strategies for pediatricians.

How Often are Pediatricians Sued?

A snapshot survey published by the American Medical Association reported that 27% of pediatricians had been sued once, 5% had been sued 2 or more times, and the percent sued in the previous 12 months was near zero (AMA, Physician Practice Information Survey 2007-2008).
Pediatrics currently ranks 10th out of 28 medical specialties in the frequency or number of professional liability claims. The graph shown below is based on 25 years of claims data collected by the Physician Insurance Association of America (PIAA) in the Data Sharing Project, the world’s largest database of medical professional liability claims. The PIAA is a trade association of over 50 physician owned medical mutual companies.
Fewer Claims, But More Costly

While pediatricians ranked 10\textsuperscript{th} in frequency or number of claims, they ranked 8\textsuperscript{th} among 28 specialties for severity, or cost of claims. Claim costs consist of indemnity (damages paid to plaintiff for harm from medical treatment) plus legal expenses. According to the PIAA Data Sharing Project (1985-2010), the average indemnity paid for pediatricians was 27\% higher than the average for all specialties ($275,906 vs. $216,842). In the past decade, some of the largest settlements nationally have been paid out in non-obstetric pediatric cases, some exceeding $5 million (Greve, 2011).

Pediatricians rank 4\textsuperscript{th} of 28 specialties in defense costs. While only about a quarter of cases against pediatricians resulted in any indemnity (damages paid to plaintiffs), the legal defense costs in those cases averaged $28,000. Legal costs when indemnity was paid averaged $67,000 (Carroll and Buddenbaum, 2007).

What Do Pediatricians Get Sued For?

Claims of professional liability or medical malpractice are closely tied to adverse events (Greenberg MD et al., RAND Corporation study, 2010). Adverse events in this context are defined as harm from medical care. A 2005 study of pediatric adverse events found that approximately 70,000 hospitalized children in the US experience an adverse event each year, and that about 60\% of these events are deemed preventable (Woods et al., 2005). In addition, adverse events are more likely to occur in children than in adults (Slonim et al., 2003).

According to the PIAA Data Sharing Project (1985-2010), the top 10 allegations in pediatric claims involving medical misadventure are:

<table>
<thead>
<tr>
<th>Allegation</th>
<th>Number of Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Errors in diagnosis</td>
<td>2,421</td>
</tr>
<tr>
<td>2. No medical misadventure alleged*</td>
<td>1,575</td>
</tr>
<tr>
<td>3. Improper performance</td>
<td>947</td>
</tr>
<tr>
<td>4. Failure to supervise or monitor case</td>
<td>682</td>
</tr>
<tr>
<td>5. Medication errors</td>
<td>351</td>
</tr>
<tr>
<td>6. Failure/delay in referral or consultation</td>
<td>225</td>
</tr>
<tr>
<td>7. Not performed</td>
<td>203</td>
</tr>
<tr>
<td>8. Failure to recognize a complication of treatment</td>
<td>195</td>
</tr>
<tr>
<td>9. Delay in performance</td>
<td>187</td>
</tr>
<tr>
<td>10. Failure to instruct or communicate with patient</td>
<td>113</td>
</tr>
<tr>
<td>Total</td>
<td>6,899</td>
</tr>
</tbody>
</table>

*No medical misadventure is reported when there is no allegation of any inappropriate medical conduct on the part of the pediatrician.

Note that allegation of diagnostic error was the largest cause, comprising 35\% of the claims.

The rate of diagnostic error is even higher in claims involving the death of a child. In those claims involving patient death, 36.8\% involved diagnostic error.
What Conditions Are Misdiagnosed?

The Data Sharing Project (PIAA, 1985-2010) lists the 5 most common patient conditions associated with claims against pediatricians involving diagnostic error:

1. Meningitis
2. Appendicitis
3. Specified nonteratogenic anomalies (includes developmental hip dysplasia)
4. Pneumonia
5. Brain-damaged infant

What is Diagnostic Error?

In the medical literature, diagnostic error is commonly defined as wrong, missed, or delayed diagnosis. For the purposes of studying claims, diagnostic error may be further defined as error causing harm to the patient and as occurring despite adequate information available to the physician at the time.

Causes of diagnostic error for all specialties have been shown to be most often related to a combination of two things:

1. **cognitive** factors such as locking on prematurely to one diagnosis and failing to pursue evidence to the contrary, and
2. **systems** factors such as failure in communication of test results.

Diagnostic errors are decidedly multifactorial, with an average of 6 factors per error (Graber 2005). They have been described as the perfect storm.

Singh et al. (*Pediatrics*, 2010) reported that 54% of pediatricians surveyed (N=726) stated that they made a diagnostic error once or twice a month. 77% of trainees reported the same frequency of diagnostic errors. 45% of respondents stated that they had made diagnostic errors that had resulted in patient harm at least once or twice a year.

The most commonly identified reasons that contributed to these errors in diagnosis were failure to collect enough information through patient history, physical examination, or chart review.

Anatomy of A Diagnostic Error

Sepsis is one of the great deceivers in diagnosis. It mimics many minor conditions, confounding early diagnosis. It progresses virtually overnight, often in a previously healthy adult or child, from sepsis to severe sepsis to septic shock, ending in multi-organ failure and death up to 40% of the time. From the time of the development of hypotension, there is an increase in mortality of 7.6% with every hour of delay to antibiotics (Kumar et al., *Crit Care Med*. 2006).

Sepsis is a relatively rare occurrence, but it is on the increase. Hospitalizations for this condition more than doubled between 2000 and 2008, according to the Centers for Disease Control and
Prevention. It's the tenth leading cause of death in the US, with an estimated 750,000 cases annually. Severe sepsis is also one of the most common causes of death in hospital critical care units. Gaieski et al. (May 2012 study presented to the Society for Academic Emergency Medicine), reported an increase of 13% for every year of the 6-year study.

In July of 2012, the New York Times, ABC News and many other news outlets covered the tragic death several months earlier of 12 year old Rory Staunton in New York City. Many public comments have been made about the emergency department handling of the case. Emergency physicians from other hospitals testified to the difficulty of making this diagnosis in time. It's entirely possible that it was too late to save Rory’s life even had the diagnosis been made when he first presented to the emergency department.

Based on news accounts and with full benefit of hindsight—but without the medical records or the treating physicians’ account—we will examine how multiple cognitive factors and systems/communication failures may have combined to create this perfect storm. This presentation is not criticism of the involved parties, nor is it a treatise on the recognition and management of sepsis. It is presented only as an educational tool, a study of how diagnostic error can come about. The following chronology is adapted from the New York Times, to whom the family released medical records, and other news coverage.

**Wednesday, 3/28/12**
Rory was a healthy active 12 year old who sustained a minor cut on his arm in a skidding fall playing basketball. His coach gave him a band-aid.

**Thursday, 3/29/12**
12:30 a.m. Just after midnight, Rory developed some vomiting, a fever of 104 degrees and severe leg pain.
5:00 p.m. The family pediatrician saw him. A temperature of 102, pulse 140, and respirations 36 were recorded. The parents said they reported the cut on his arm and the fact that the boy had severe leg pain and difficulty walking. They pointed out what appeared to be skin mottling. The pediatrician reportedly told them gastroenteritis was going around and sent him to the ER of a large New York hospital where she was affiliated.
7:00 p.m. The child arrived at the ER with respirations 20, and pulse 143. He was treated with IV fluids and an antiemetic.
9:00 p.m. Two hours later, his temperature was 102, pulse 131, and respirations 22. However by the time the medical assistant obtained those vital signs, the ER physician had already written Rory’s discharge orders and given them to his parents. They were told the flu was going around. The discharge note said, “Patient improved. Supportive home care.”
11:50 p.m. Three hours after discharge, a lab report was printed showing elevated neutrophils (13.5), bands (53%) and white blood cells (14.7).

**Friday, 3/30/12**
The parents later said the child continued hot and feverish throughout the night.
10:00 a.m. The parents reportedly telephoned the pediatrician to report the continued fevers and lethargy. The pediatrician reportedly recommended NSAIDS, fluids and crackers. The father recalled telling the pediatrician, “I can't even get him to sit up, let alone get food into him.”
3:00 p.m. The parents said they called the pediatrician to report that the slightest touch made him scream. He turned blue around his nose and torso. The pediatrician then advised taking the child back to the ER. From there, he was admitted to the ICU and soon placed on a ventilator.
Saturday, 3/31/12
Multiple organ failure ensued; resuscitation efforts were made.

Sunday, 4/1/12
Rory died of streptococcal toxic shock syndrome.

What Can Be Learned? Cognitive Factors

The pediatrician and the emergency department physician on the first visit both reportedly told the parents they had seen a lot of gastroenteritis going around, reflecting the cognitive effect of availability bias. Gastroenteritis came readily to mind from recent experience, and they may have been comfortable in assuming this was another case of it. Indeed, childhood flu symptoms are common and severe sepsis/septic shock is rare.

The emergency department physician may have fallen into the cognitive pitfall of relying on the “received diagnosis” from the referring pediatrician. There might also have been premature closure, defined as locking on prematurely to one diagnosis and failing to pursue evidence to the contrary. The initial vital signs did not include a temperature, yet none was apparently pursued. The discharge vital signs were obtained routinely by a medical assistant and allegedly not reviewed by the physician. Labs were ordered but apparently not reviewed.

The next day when the parents called the pediatrician to report high fevers and lethargy, the physician reportedly stuck by her original diagnosis of gastroenteritis, recommending NSAIDs, fluids and crackers. It appeared that her thinking was not changed by the new information, including the father’s response that he couldn’t get food or fluids into the child because he couldn’t get him to sit up. This could be evidence of the pediatrician’s anchoring bias. As one physician commented online about this case, “The big questions are about how to integrate new information that doesn’t fit with the perception you have formed. How to listen to the patient when they are telling you something that doesn’t fit with your internal narrative of the case. These are the hardest things to do in medicine and yet the most important.”

A classic resource for further study on this subject is Croskerry P. The importance of cognitive errors in diagnosis and strategies for minimizing them. *Acad Med.* 2003.

Cognitive bias is natural, human, and unavoidable. Some options for countering it include:

- Meta-cognition, or “thinking about your thinking.” Being deliberately conscious of what these biases are and when they are likely to occur can help to de-bias the physician.
- Clinical algorithms and screening tools. These can alert the physician to consider additional diagnoses and trigger further testing. An example is the Severe Sepsis Triage Screening Tool developed and launched by the New York Hospital Association STOP Sepsis Collaborative in 2010.
- Clinical decision support (CDS) tools such as Isabel, DXPlain, and VisualDx. These permit entry of the patient’s symptoms and data, and in turn provide a list of alternative diagnoses to consider, highlighting dangerous ones to be ruled out.

These tools can be of great assistance, but even the best of them cannot make up for omitted or ignored information. The Severe Sepsis Screening Tool failed to pick up Rory’s case because no initial
temperature was recorded—thus, he only appeared to meet two of the three criteria. With the temperature, a Nursing Sepsis Panel would have been automatically triggered, and as part of a protocol, follow-up would have been more likely.

The CDS tool Isabel would have alerted the user that fever, localized swelling or erythema, hypotension and diffuse rash are key symptoms in toxic shock syndrome—and that the single most common presenting symptom in streptococcal disease is severe pain in an extremity. However, the pediatrician was said to have verbally discounted the child’s severe leg pain and skin mottling as unrelated to the presumed diagnosis of gastroenteritis.

Crowded pediatric offices and chaotic emergency departments promote what Daniel Kahneman calls “Fast Thinking” in diagnosis, which is immediate and intuitive. Slow Thinking is deliberate, methodical, painstaking, step-by-step. There is a definite place for Fast Thinking in medicine. Physicians make good use of both types of thinking in diagnosis.

The deliberate addition of Slow Thinking in Rory’s case might have led the physicians to reflect further on the information at hand and ask more questions that in turn might have raised alternate diagnoses in their minds. Recall that Singh et al. (Pediatrics, 2010) found the most commonly identified things contributing to errors in diagnosis were failure to collect enough information through patient history, physical examination, or chart review.

**What Can Be Learned? Trouble Spots for Systems/Communications Failures**

**Telephone Communications.** Pediatric malpractice claims are frequently associated with problems in telephone communications. Risk management recommendations for pediatric office practices include:

- Record in the patient’s chart all telephone communications with the parents, including time, date, identity of the caller, information received, and advice given.
- Ensure and document that phone calls from parents are returned in a specified time.
- Have triage protocols that ensure information received by the nurse is delivered to the physician in a timely manner.

**Communication of Test Results.** Claims against pediatricians often include failures in communication of test results. Office practices are recommended to implement a system to notify the physician of test results in a timely manner and prior to filing results in the chart. The physician should initial and date the reviewed results. A tracking system is necessary in order to alert the physician and prompt follow-up when an anticipated test result is not received.

**Handoffs Between Physicians/Providers.** A frequent factor in pediatric claims and adverse events is the failure of communication during handoffs of care. The Joint Commission and 10 hospitals collaborated on a study and found that handoffs were defective in the information communicated 37% of the time (Wall Street Journal, 2010). The Joint Commission is requiring hospitals to develop systematized communications and specified information to be conveyed when physicians and nurses transfer care of a patient from one to another.

**Discharges.** Another transition point fraught with risk for communication failures is when a pediatric patient is discharged to home. Emergency departments and hospitalists are especially exposed to liability if they fail to communicate with the primary care physician.
**Systems Solutions: Necessary But Not Sufficient**

The New York hospital changed its procedures after Rory’s death to ensure that vital signs and lab results are reviewed by the ED physician and nurse prior to discharge and that when lab results arrive after discharge, they are conveyed to the referring physician and the family. Those changes are perhaps necessary but not sufficient. As this case shows, achieving earlier diagnosis and reducing mortality in severe sepsis requires both cognitive and system-based improvements.

Progress in the recognition and early diagnosis of sepsis has been reported in these adult initiatives, but the preponderance of evidence concerns management of known sepsis. More work is needed specific to early diagnosis and specific to the pediatric population.

- The international Surviving Sepsis Campaign, a collaborative effort of dozens of international organizations, published guidelines for the management of severe sepsis and septic shock and reported improved mortality (Levy MM et al., *Crit Care Med* 2010). This campaign recommends the pediatric sepsis management guidelines from the American College of Critical Care (2007 Update).
- The STOP Sepsis collaborative of 50 hospitals reported driving down the mortality rate in severe sepsis/septic shock to 18%. (STOP Sepsis Campaign Resource Center). The STOP Sepsis Campaign is developing a separate pediatric protocol.
- A study by Gaieski and colleagues implemented an updated clinical management of sepsis, Early Goal-Directed Therapy (EGDT), and reported a reduction in mortality from 35% to 26% (May 2012, study presented to the Society for Academic Emergency Medicine).

**Summary**

1. Pediatric malpractice claims are not especially numerous relative to other specialties, but they are particularly costly to defend and costly to settle.
2. Diagnostic error is far and away the top factor associated with medical misadventure claims in pediatrics.
3. Diagnostic errors are most often associated with a combination of cognitive factors and systems/communications failures. One study identified an average of 6 factors per error.
4. Cognitive errors such as availability bias, premature closure, and anchoring can be countered with meta-cognition (de-biasing by deliberate awareness of conditions favoring bias), the development and implementation of clinical algorithms/screening tools, and electronic clinical decision support (CDS) tools.
5. The areas most prone to systems/communications errors in pediatrics are telephone communications, delivery of test results, handoffs between providers, and discharges.
6. One pediatric study identified the most common contributor to diagnostic error: failure to collect enough information through patient history, physical examination, or chart review (Slow Thinking).
7. Time is of the essence in sepsis, but sepsis is a great confounder of early diagnosis. There have been recent advances in the management of severe sepsis, especially in the adult population, but more resources are needed specific to early diagnosis in the pediatric population.


10. Gaeiski DF, Pines JM, Band RA, Mikkelson ME et al. Impact of time to antibiotics on survival of patients with severe sepsis or septic shock in whom early goal-directed treatment was initiated in the emergency department. *Crit Care Med*. 2010; 38(3).


