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**Diagnosis & Management
of Infantile Meningitis:
*A Risk Management Perspective***

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Meningitis accounts for one of five Pediatric claims. Over a third of these involve children under a year old. Preventable errors compromise patient care and cause many of these claims. And the financial costs are staggering: over half of the total paid losses for all meningitis claims involve children under a year old.

This program reviews how to properly diagnose infantile meningitis, and offers ways to overcome some common pitfalls that lead to bad outcomes.

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•MagMutual designates this continuing medical education program for a maximum of 1 hour of category 1 credit toward the AMA Physician's Recognition Award.

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- Reid Pearlman is an employee of MagMutual Insurance Company which is sponsoring this continuing medical education program.
- I declare that neither I nor any member of my family has a financial arrangement or affiliation with any other corporate organization offering financial support or grant monies for this activity or with any corporate organization that might have an interest in the subject matter being presented.





We will review:

- Why we must effectively diagnose and treat infantile meningitis
- How to properly diagnose infantile meningitis
- How to overcome some common pitfalls that lead to bad outcomes



Specialty Update: *Pediatrics*

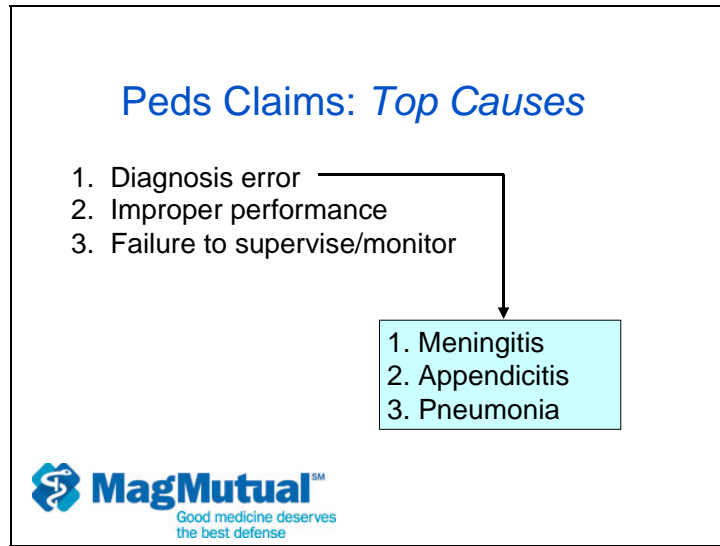
- Low frequency - 2.6% clms
- Less than 1/2 expected number
- Moderate severity - \$362K/clm avg
- 12% higher - all specialties



We begin with an overview of what's happening in Pediatrics. In 2004, only 2.6% of MagMutual's claims arose from the specialty, fewer than half of what one would expect from our insured pediatricians.

As for the cost of these claims, where losses are actually paid out (from lump sum settlements or jury verdicts), the average cost is \$362,000 per claim. This is 12% higher than the average across all 27 specialties that we insure.

In short, while Pediatric claim frequency is relatively low, the cost of those claims is significantly higher than average.





What causes these Pediatrics claims? 40% of the time, it's diagnostic error. Interestingly, in those claims, meningitis is missed as a diagnosis 37% of the time, more than double any other condition. Appendicitis is the condition next most frequently missed as a pediatric diagnosis: about 20% of the time that diagnoses are missed.

Improper performance of a procedure and failure to supervise or monitor a case represent the second and third most frequent causes of claims.

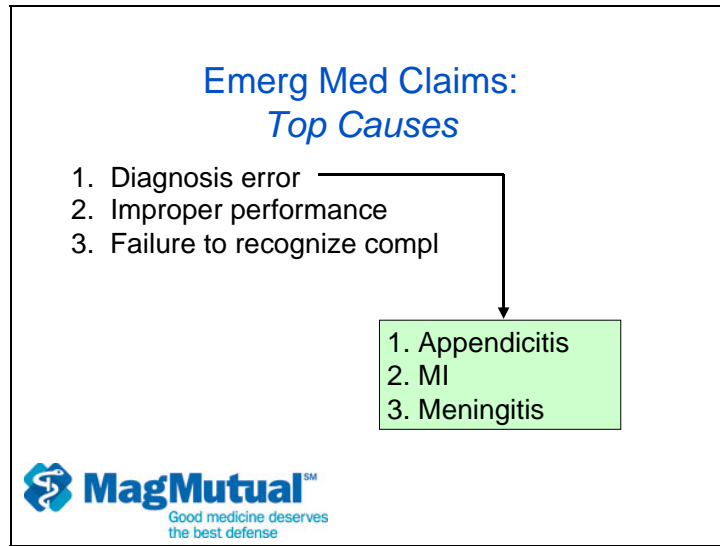
Specialty Update:
Emergency Medicine

- Low frequency - 3.5% clms
- Less than 1/2 expected number
- Moderate severity - \$323K/clm avg
- Same as - all specialties



Emergency Medicine physicians also routinely see infantile meningitis cases. Claim frequency in the specialty compares favorably with the average of all our insured specialties. In fact, just 3.5% of MagMutual claims arise from our Emergency Medicine insureds, fewer than half of what one would expect their numbers to generate.

At \$322,000, the average paid loss cost of these claims is nearly identical to the \$323,000 cost across claims of all specialties.



As in Pediatrics, diagnostic error is by far (nearly half the time) the leading cause of Emergency Medicine claims. A missed diagnosis of appendicitis accounts for about one-third of these claims, just slightly more than for myocardial infarction. Meningitis (both adult and child) accounts for about 15% of Emergency Medicine's diagnostic error claims.

Why Meningitis?

- Costly - both adult & ped clms
- High severity - \$516K/clm
- Twice expected losses
- Highest 'paid-to-close' ratio



Meningitis, both in children and adults, is the fourth most expensive condition in terms of MagMutual claims, after cases arising from breast cancer, brain-damaged babies and child delivery complications. At an average cost of \$516,000, meningitis claims cost nearly 30% more than the \$371,000 average for the top 40 conditions.

In addition, we pay losses (either through jury verdicts or lump sum settlements) more often in meningitis claims than any other condition. One-third more often than the average frequency of the top 40 conditions we track. This disparity suggests that meningitis claims may have significant defensibility problems. The objective of this program is to address those very problems.

Why *Infantile* Meningitis?

- Most Peds “diagnosis error” clms
- Most “meningitis” clms - under 1 yr old
- Highest total losses - under 1 yr old



Meningitis accounts for 1 in 5 of MagMutual’s Pediatric claims. Of these claims, over one-third involve children under a year old. This frequency is more than twice that of the next highest group, 2-year olds. Moreover, the “under one” category accounts for nearly half of the paid losses for all meningitis claims.

What is “Infantile Meningitis”?

“The inflammation of an infant’s meninges, caused by viral or bacterial infectious pathogens in the cerebral spinal fluid.”



Case Study #1

- 1st visit: Dx pneumonia
- 2nd visit: repeated Dx
- 3rd visit: “baby’s fine”
- Dx: meningitis, pneumonia & sepsis
- Lesson: listen to Mom



A six-month old girl’s mother noted that she was running a fever one Sunday. Mom phoned the child’s pediatrician; the answering service paged the doctor, who then called Mom back. The doctor advised Mom to bring the child in to the office on Monday, if her condition didn’t improve.

By Monday, Mom said the girl started “grunting” and brought her in to be seen. The doctor examined her and ordered chest x-rays. He diagnosed pneumonia and ordered breathing treatments and an injection of Claforan. When the x-rays showed only minimal pneumonia, the doctor noted his surprise in his notes.

On Tuesday, Mom brought her daughter back in on follow up. She reported that the child wasn’t drinking her bottles, was inactive and was still running a fever. After examining the child, the doctor said her symptoms were consistent with pneumonia.

On Wednesday morning, Mom left a message for the doctor, who was out of the office. He called her when he arrived at noon. Mom reported that the child still wasn’t drinking her bottle. The doctor suggested the child be brought back in immediately; she was seen about 4 PM. A nurse saw the girl first. She claimed she didn’t have a fever because she wasn’t “warm to the touch”. She also concluded the child wasn’t dehydrated and suggested to Mom that she feed the child by syringe rather than bottle. The nurse then attempted to send the mother and patient back home.

Mom was rightly uncomfortable with events and insisted that the doctor see her daughter. He held the patient for a minute and said she appeared to be fine. He ended by telling Mom to call back if the problems continued. Mom reported that, in the same encounter, her daughter was “limp” and didn’t open her eyes unless moved.

By 5 PM on Wednesday afternoon, when Mom arrived back home, she phoned a nurse friend out of concern and frustration. The nurse told Mom to go to the hospital

immediately. At 5:30 PM, when Dad arrived home from work, he was unable to arouse the girl. The two took the child to the Pediatric Urgent Care Center; she had labored breathing en route.

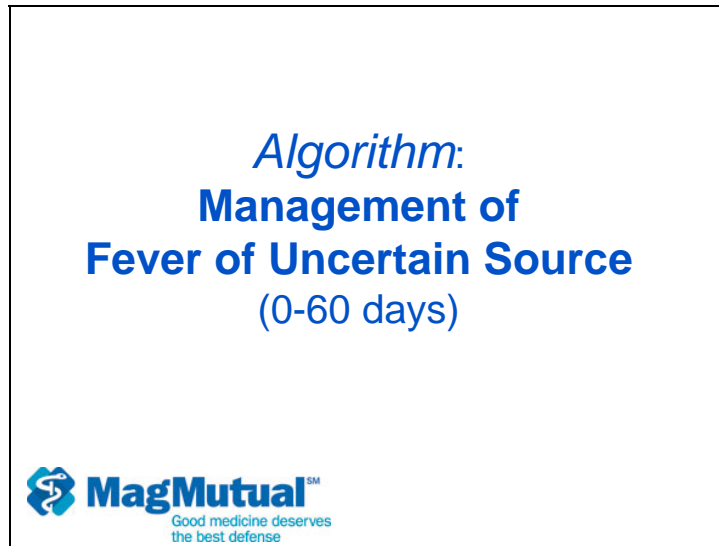
At the Urgent Care, the doctor found petechiae on the child's chest – a sign of blood sepsis. He concluded that she was very sick and needed to be hospitalized immediately. She was transported to the Children's Hospital by ambulance.

Upon arrival at the hospital, the child was diagnosed with meningitis, pneumonia and sepsis. Ultimately, she managed to survive, but her kidneys were severely damaged and she will need 2 to 3 transplants during her lifetime.

The parents eventually sued the pediatrician for malpractice. In deposition, Mom said the doctor conduct evidenced a “put out” attitude. In turn, the doctor said Mom was “overprotective”.

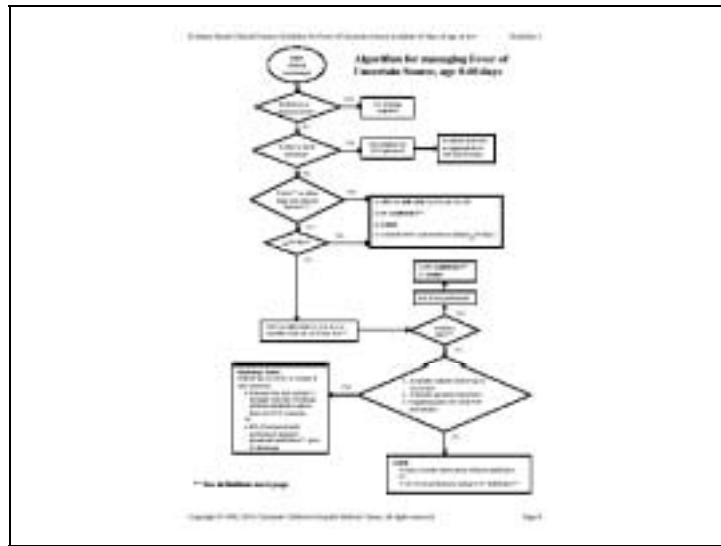
The case led to a sizeable lump sum settlement.

What is the lesson of this case?



From a risk management perspective, algorithms are an invaluable tool to establish and maintain consistency in the early diagnosis and effective treatment of infantile meningitis. While not condition specific, the Cincinnati Children’s Hospital’s “Management of Fever of Uncertain Source” algorithm for children 0 to 60 days old is an outstanding example of a tool to promote excellent care practices in this area.


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This algorithm (copy attached in the supplemental materials) is from Cincinnati Children’s Hospital. It covers the diagnosis and treatment of fever of uncertain source in children 0 to 60 days old.

Diagnosis:
Infantile Meningitis

1. "Fever" - min 100.4° F?
2. Source - uncertain?
3. "Toxic appearance"?
4. Risk factors?
5. Other "serious bacterial infection" (SBI)?
6. Or "Low risk" for SBI?

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The algorithm sets out the diagnostic criteria for fever of uncertain source. When considering infantile meningitis, you should ask:

- 1) Is the child febrile? "Fever" is defined as a minimum temperature of 100.4° F.
- 2) Is the fever source uncertain? Put another way, is there a focal infection of known origin?
- 3) Does the child appear to be toxic?
- 4) Does the child have any risk factors?
- 5) Is there another type of serious bacterial infection present?
- 6) Or, is the child a low-grade risk for serious bacterial infection?

“Toxic Appearance”

- Lethargy
- Eye contact - poor/absent
- Can't recognize parents
- Can't interact with familiar people/objects
- Extremities perfusion - poor
- Acrocyanosis
- Mottling
- Capillary refill time - slow (over 2 secs)
- Ventilation - hyper/hypo



Factor number 3 asks whether the child has a “toxic appearance”. Of course, the real question is, is the baby acting normally? The Yale Observation Scale includes several criteria, including lethargy, eye contact and a child’s inability to recognize their own parents.

“Risk Factors”

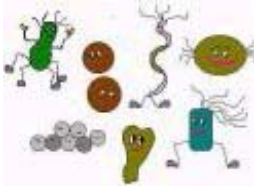
- Born at term (37 wks)
- No previous hospitalization
- No chronic/underlying illness
- Not hospitalized longer than mom
- No tx - unexplained hyperbilirubinemia
- No antimicrobials received
- No infectious intrapartum hx of mom
- No focal infection on phys exam
- Neg lab screen




Question number 4 details several risk factors, which are drawn from the Rochester Criteria. Notable items include whether the child was born at full term (defined as 37 or more weeks of pregnancy) and whether they remained hospitalized after mom was discharged.

Other
“Serious Bacterial Infections”

- Bone & joint infections
- Cellulitis
- Pneumonia
- UTI
- Sepsis/bacteremia
- Enteritis




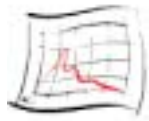
The illustration shows several colorful, anthropomorphic microorganisms. There are green, orange, and blue shapes with legs and arms, some resembling viruses or bacteria. One is a long, thin, wavy structure. Another is a green, oval shape with a face. There are also some grey, pill-like shapes.

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Other types of serious bacterial infection besides meningitis should be considered. These include infection of the bones, joints, soft tissue, urinary tract and sepsis.

Lab Tests

- CBC w/differential
- Blood culture
- Urinalysis
- Urine culture
- Lumbar puncture




The five tests above should be performed to confirm a meningitis diagnosis. Of course, only a positive lumbar puncture (or spinal tap) is conclusive evidence of meningitis. If a patient is at low risk or their parent is reluctant to allow a spinal tap, then the physician may wait to perform the test.


“Low risk” in this case means: 1) the patient is reliably available for follow up in 12 to 24 hours, 2) the physician is confident the family can and will observe the patient in the interim, 3) the primary care doctor and the family agree with this approach, and 4) that antibiotic therapy won’t be started at least until the patient’s return.

Several additional tests to consider, in appropriate circumstances, are: a stool culture (if there’s diarrhea), a viral culture (during cold/flu season), a chest x-ray (if there are respiratory symptoms) and a herpes simplex virus study (HSV).

Flashpoint:
Diagnostic Test Tracking

- Crucial whether in or out-pt
- Causes bad outcomes
- Preventable system failure
- Promptly obtain & review results
- Timely notify & recall pt





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A reliable diagnostic test tracking system is a given, to effectively diagnose and promptly treat meningitis. Tracking not only includes ensuring that results are obtained for all tests that are sent out, but that the patient's parents are promptly notified of the results, as well.

Flashpoint: Spinal Tap

- Failure often alleged
- Informed consent/refusal issue
- Document well
- Helps pt compliance
- Aids clm defensibility



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Failure to perform a spinal tap, or to do so in a timely manner, is often alleged in meningitis claims. When and under what circumstances to perform a lumbar puncture is the physician's prerogative. Whenever the sample is obtained, however, proper informed consent should be carried out and documented. On the other hand, if the parents do not wish to allow the patient to undergo a tap (in spite of your recommendation to the contrary), their refusal should be documented on a separate form.

When you do perform the final tap, be sure to document the relevant details in the operative note, including: 1) that the field was sterile, 2) that the baby was appropriately held by the assistant, 3) whether the tapped fluid was bloody or clear, 4) the number of vials of fluid actually drawn (usually 3) and 5) whether appropriate labwork was ordered (usually a cell count, smear and culture).

Flashpoint: Informed Consent


- Often alleged.
- Process, not form.
- Opportunity to build rapport.
- Empowers pt.
- Reduces surprise.
- Don't rush it!



The importance of obtaining proper informed consent cannot be overemphasized. Always remember that informed consent is a process, not merely obtaining a signature on a form. Of course, obtaining consent from the parents also gives physicians the opportunity to establish rapport and build trust between themselves and patients' families.

Informed Consent & Refusal

- Truly “informed”
- Include:
 - Proposed tx & benefits
 - Alternative tx options
 - Possible complications
 - Likelihood of success
 - Anticipated outcome if no action
- Informed Refusal



What are the elements of “informed consent”? Communication with the parents must be real and knowing. Verbal and written communication should be in layperson’s language, not medical jargon. The consent form should include the items listed above. Finally, where the patient’s parents refuse to undergo your recommended treatment, that should be documented on a separate form.

Admission Criteria: *FUS*

- 0-30 days - all in-pt
- 31-60 days & hi risk → in-pt or out-pt
& lo risk → in or out-pt
- Consider: family needs
- PCP judgment
- Outpt follow-up
- Caregiver communication



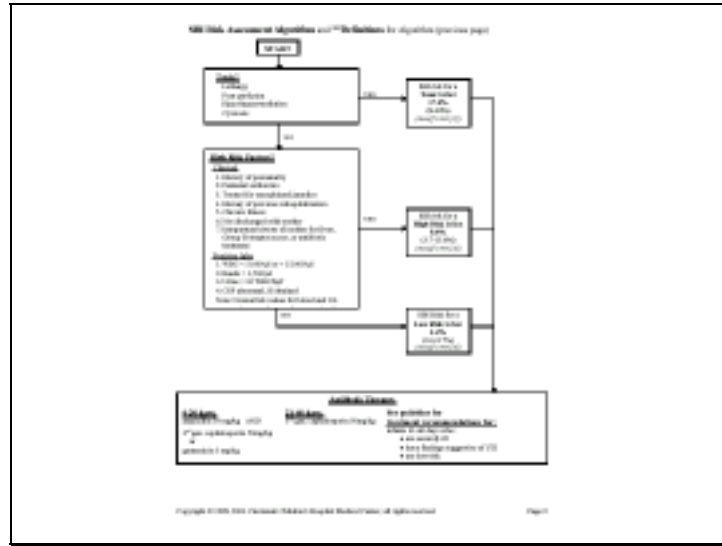
Absent a strong sense that the patient's family can and will carry out instructions, the physician should seriously consider admitting the patient for observation. Regardless, any patient who presents with a fever from an unknown source within the first 30 days of life should be admitted.

Treating Infantile Meningitis: *Therapeutic Plan*

- Drug therapy
- Patient education
- Discharge Criteria



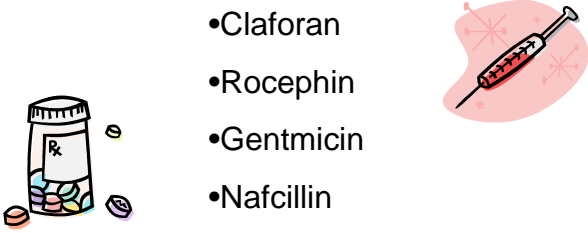
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The Cincinnati Children’s Hospital algorithm (copy attached in supplemental materials) includes detailed risk factors, laboratory finding parameters and antibiotic treatment guidelines.

Drug Therapy

- Ampicillin
- Claforan
- Rocephin
- Gentamicin
- Nafcillin
- Acyclovir

The image contains two illustrations. On the left is a white pill bottle with a black cap and a black 'Rx' symbol on its label. Several colorful pills (orange, yellow, green, blue) are scattered around the base of the bottle. On the right is a syringe with a red plunger and a needle, set against a light red circular background with faint red starburst patterns.

Various drug options exist to treat meningitis. Dosing may be done according to the attached guidelines. Note that if Gentamicin is used, the physician should be sure to check for ototoxicity after 48 to 72 hours of administration.

Case Study #2

- Visit #1 - wait on LP, Rx & send home
- Visit #2 - temp down; cont tx
- Visit #3 - admit to PICU
- No doc proof of LP offer



An eight-week-old boy is brought into the Emergency Department by his mother. She says he's been fussy and eating poorly – less interested in eating and not taking in his usual amount of formula. However, urination and bowel movements have been normal.

On physical examination, the child is awake but in acute distress. His rectal temperature is 101.8° F, pulse is 142, respiratory rate is 28, no blood pressure was taken, the lungs are clear, heart rhythm is normal, the fontanel was concave and a neurological exam produced a normal startle response.

The Emergency physician was concerned about meningitis and discussed a spinal tap with Mom. Since it was late at night and Mom had other children, she was opposed; the doctor reluctantly complied. He started the child on oral Ampicillin and instructed Mom to follow up with her pediatrician in a few days if the child's condition didn't improve. Because the Emergency Dept. was busy, the doctor documented the patient encounter and the nurse prepared the discharge instructions; however, nowhere was the offered spinal tap noted.

The next night, Mom and the child returned. She reported that the child had felt better during the day, but went downhill at night. The original Emergency physician was working, but away at dinner, so the patient was seen by a covering doctor.

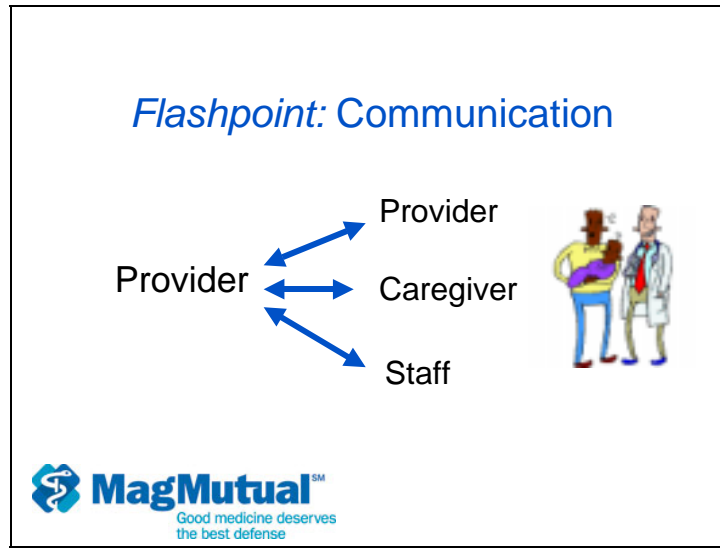
On exam, the child's temperature was 100.9° F and he was only somewhat responsive. The doctor attributed his condition to fatigue and diminished appetite. Because the child's temperature had dropped, he decided to wait to morning to see if things improved.

By morning, the child was totally flacid and had a bulging fontanel. He was finally admitted to the hospital – directly to the PICU. He immediately underwent a spinal tap, which confirmed bacterial meningitis. He ultimately survived, but suffered serious longterm hearing and vision losses, along with general increased spasticity.

The parents sued for malpractice, alleging a failure to timely diagnose and treat meningitis. Both Emergency doctors and the hospital were named in the suit.

Eventually, the plaintiffs accepted a sizeable settlement.


What is the lesson of this case? Recall that some 36 hours had passed before the first documented offer of lumbar puncture.




Effective communication between all involved parties is essential to bringing about a good outcome in a meningitis case. This includes all providers and caregivers. Whoever the caregiver is, it is crucial to assess their ability to follow instructions, including observing the patient, noting their observations and returning for re-evaluation.

Patient Education: Major Topics

- “Fever” defined
- ER & possible tests
- Define terminology
- Treatment if admitted
- Home care & when to call back
- Follow up





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With diagnosis and treatment of meningitis (or any other serious infection) comes the responsibility to properly educate patient families. Some commonly used words that warrant definitions include septic work-up, catheter, saline well, preliminary test results and cultures.

Discharge Criteria

- Well-appearing
- Eating well
- Rx therapy done or cont at home
- Cultures neg after 36 hrs
- In-hosp pt OK 24 hrs post-Rx therapy
- Family able to render care at home
- PCP agrees w/dischg plan



The Cincinnati Children's Hospital algorithm details discharge criteria, the highlights of which are noted above.

Medical Record Keeping

The majority of claims include at least one record keeping failure.

A cartoon illustration of a man in a blue suit and red tie, looking down with a worried expression as he drops a small, multi-colored ball. The ball is on the ground, and the man's hands are outstretched in front of him.

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Careful handling of the details is key to achieving a good outcome when treating infantile meningitis. Likewise, carefully documenting the care that was actually rendered is key to thwarting a potential professional liability claim.

The importance of keeping good records cannot be overstated. The strength of the documentary evidence often dictates the outcome of a claim.

Flashpoint:
Medical Record Keeping

- Biggest problems:
 - Inaccurate
 - Incomplete
 - Illegible
- Best practices solutions:
 - Written charting policy
 - Regular chart audits




Not surprisingly, the biggest problems with medical records continue to be inaccuracy, incompleteness and illegibility. Electronic medical record systems have shored up some issues, like legibility. However, even they have not provided an absolute solution.

In fact, oversight and review (like regular chart audits) are the only real solutions to the vexing problem of record inconsistency.

***Risk Management:
Recommendations***

- ✓ Thorough H & P
- ✓ Involve PCP in follow up
- ✓ Diagnostic test tracking → system
- ✓ Pt instructions → policy & forms
- ✓ Pt recall → policy & procedure
- ✓ Informed consent/refusal → policy & forms
- ✓ Documentation → policy & audit

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The Risk Management recommendations can improve outcomes and reduce medicolegal risk in infantile meningitis cases.

We reviewed:

- Why we must effectively diagnose and treat infantile meningitis
- How to properly diagnose infantile meningitis
- How to overcome some common pitfalls that lead to bad outcomes



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