

We Can Work It Out



Hiding in Plain Sight.....Part 2



6 month old female

Medical History

- Normal pregnancy/birth
- Healthy through all newborn well check appointments
 - April 8 (time=0)
 - Reported to primary care provider with complaints of high fever (101-104°C) for two days
 - UTI ruled out
 - Tested positive for influenza B via rapid test
 - Decision made to treat symptoms

6 month old female

- Medical History

- April 16 (time= 1 week)

- Reported to primary care provider for routine 6-month well baby check

- No concerns

- Fever had resolved

6 month old female

- Medical History
 - May 4 (time = 4 weeks)
 - Reported to primary care provider with complaints of:
 - Two day history of sinus congestion, greenish nasal discharge, fever, fussiness, decreased appetite, vomiting
 - Temperature 102.9°F
 - Tested positive for influenza B
 - MD believes still positive from previous infection and current symptoms caused by other virus.

6 month old female

- Medical History

- May 6

- Reported to primary care provider for complaints of
 - Continued high fever
 - Temperature 102.9°F
 - Not eating well
 - Vomiting
 - Cold symptoms resolved
 - No signs of bacteria infection (otitis or pneumonia)

6 month old female

- Medical History

- May 7

- Reported to primary care provider for complaints of
 - Continued high fever
 - Lack of activity
 - “lazy eye”, not looking directly at mother
 - Moaning
 - Diarrhea
 - Not eating well
 - Patient walked by provider to ED

6 month old female

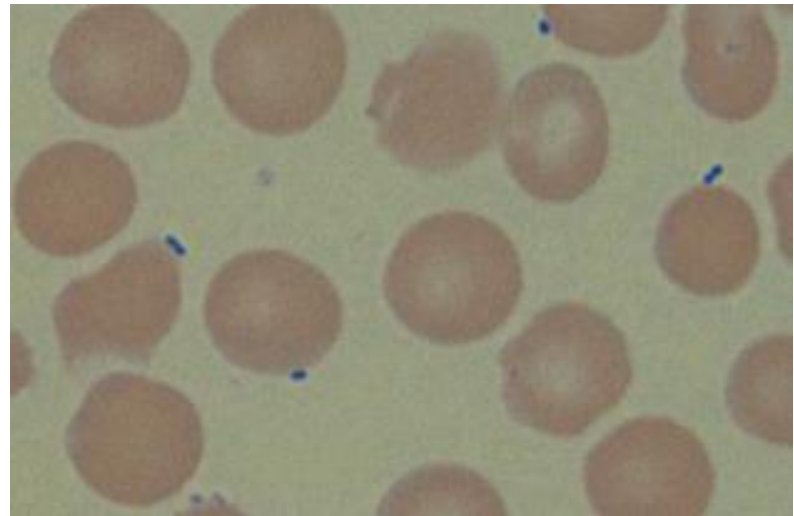
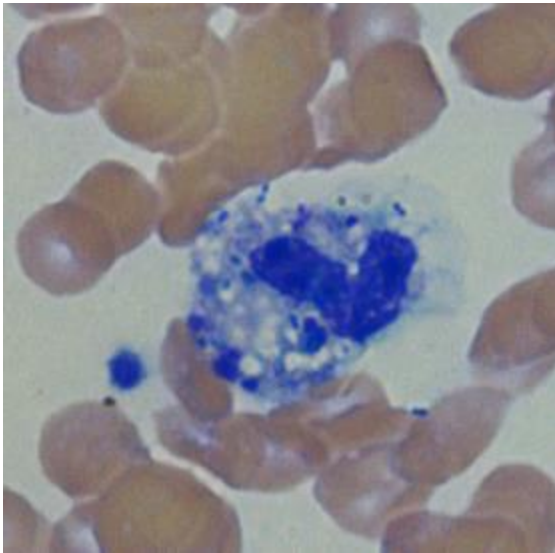
- ED evaluation (5/7)
 - Fever
 - Altered mental status
 - Not responsive to staff
- ED course
 - Bolus of fluids
 - Routine labs
 - Blood cultures
 - Head CT
 - No significant findings
 - Patient transferred to Children's Hospital of WI

6 month old female

- Significant Laboratory results
 - UA
 - Not significant for infection
 - Chemistries
 - Sodium 130 (slightly low)
 - Bicarb 16 (low)
 - Creat 0.21 (low)
 - Other results within normal ranges
 - WBC – 9.7
 - Unable to perform differential due to deteriorating cells
 - Bacteria observed on smear
 - Path review ordered
 - Pathology review of slide
 - Confirms presence of diplococci

6-month old female

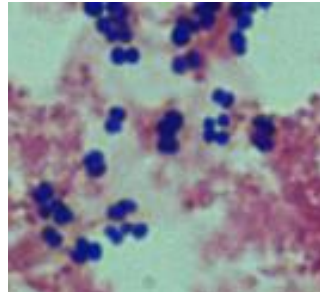
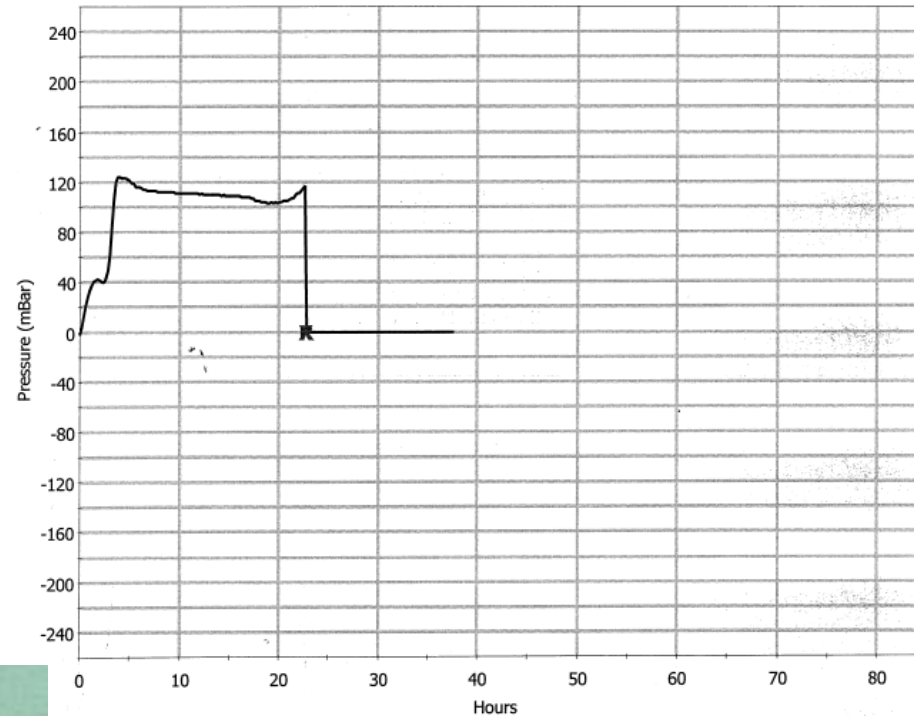
- Significant Laboratory results
 - Intra and Extracellular bacteria present



6 month old female

Microbiology course

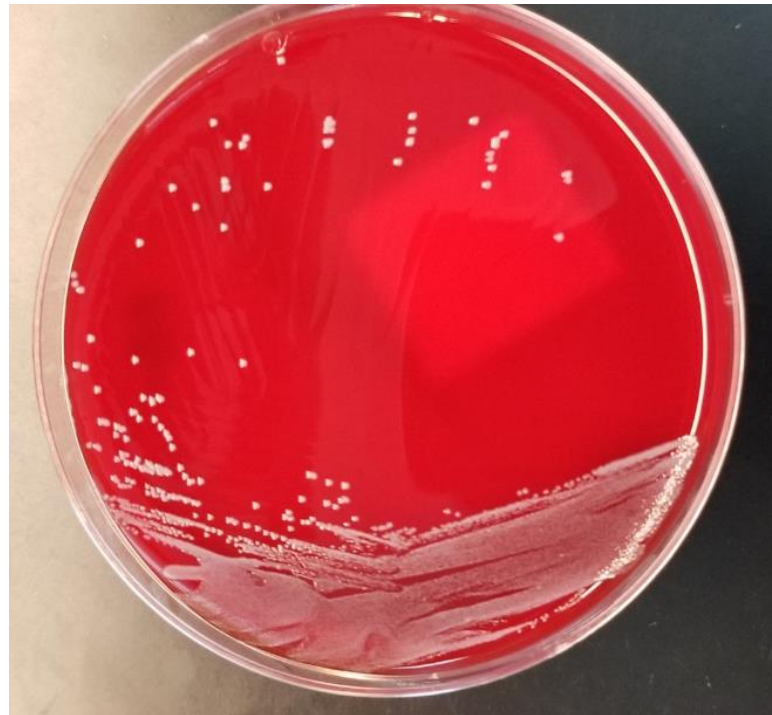
- Blood culture positive at 22.9 hours
- Gram stain – Gram positive cocci in clusters
- Verigene – Strep pneumoniae



6 month old female

Microbiology culture

- Subculture from positive blood culture bottle



6 month old female

Microbiology culture

- Subculture from original EDTA tube

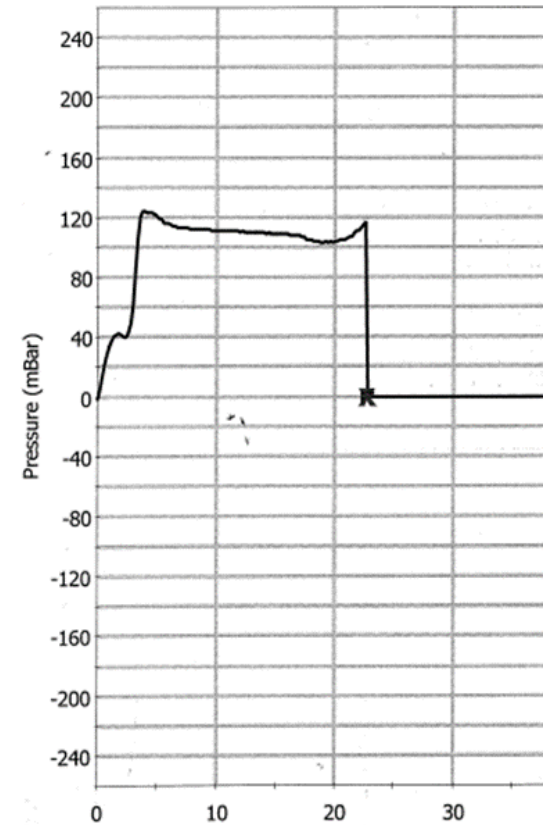
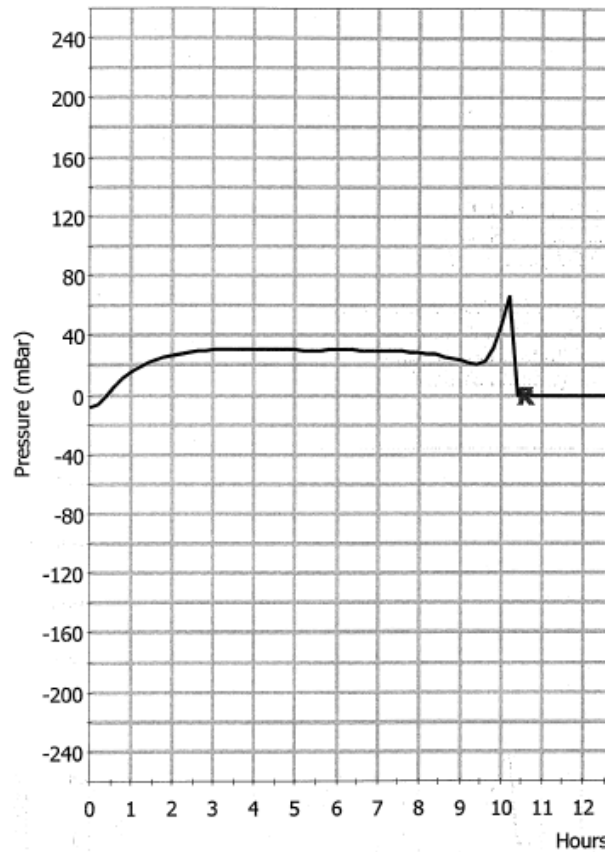
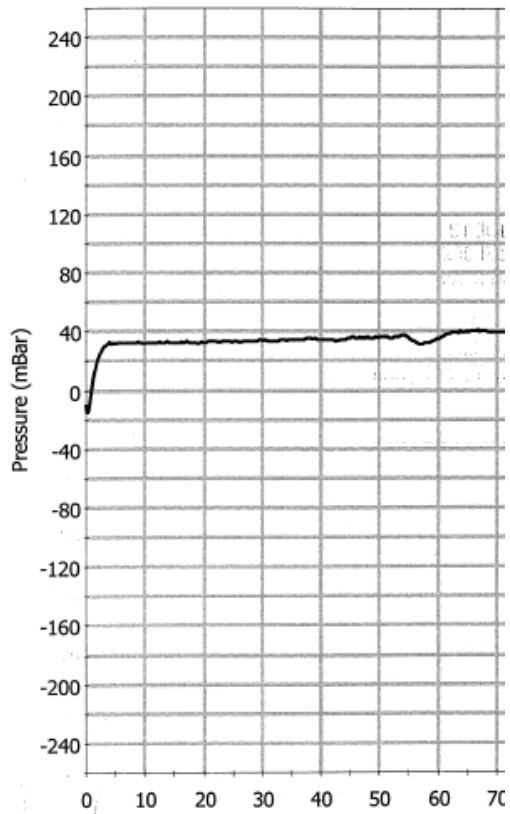


6 month old female

Microbiology culture

- Why was *S pneumo* not isolated from blood culture bottles?

6 month old female





A Review of Pneumococcal Vaccines: Current Polysaccharide Vaccine Recommendations and Future Protein Antigens

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Pneumococci virulence

- Polysaccharide chains
 - Protect organism from phagocytosis
 - Highly immunogenic
 - 92 different subunits
 - Organisms express one

Vaccine Development

Table 1. Pneumococcal Vaccine Approval Dates, Serotypes, and General Effect on

Vaccine	FDA Approval	Serotypes Contained in Vaccine*†
PPSV23	June 1983	1, 2,* 3, 4, 5, 6B, 7F, 8,* 9N,* 9V, 10A,* 11A,* 12F,* 14, 15B,* 17F,* 18C, 19A, 19F, 20,* 22F,* 23F, and 33F*

- Recommendations

- All adults >65 y.o.
- At risk adults <65 y.o.
- At risk children
 - Chronic heart or lung disease
 - Diabetes
 - CSF leaks
 - Cochlear implant
 - Asplenia
 - Immunocompromised

- Efficacy

- Reduced infections with covered serotypes by 65%
- Did not reduce carriage rate
- Did not generate immune response in children <2 y.o.

Vaccine Development

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PCV7	February 2000	4, 6B, 9V, 14, 18C, 19F, and 23F

- Polysaccharide Conjugate Vaccine
 - T-cell dependent antibody response
 - Effective in children <2
 - Generated higher antibody titers

Vaccine Development

PCV7 February 2000 4, 6B, 9V, 14, 18C, 19F, and 23F

- Efficacy
 - Reduced infection rate in vaccinated children
 - Reduced infection rates in unvaccinated children via herd effect
 - Hospitalizations due to pneumonia reduced in immunized children and elderly
 - Reduced carriage rates in vaccinated and unvaccinated children and household members
 - Did NOT reduce otitis media rate

Smart bugs?

- After PCV7
 - 5 years post implementation
 - Serotype replacement noted
 - Increase in 19A
 - Infection rates returned to pre vaccine levels in high risk groups
 - Resistance rates increased
- 2010 - PCV13
 - 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F

Smart bugs?

- After PCV7
 - 5 years post introduction
 - Serotype replacement noted
 - Infection rates returned to pre vaccine levels in high risk groups
 - Resistance rates increased
- 2010 - PCV13
 - 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F
 - Included 6 most prevalent serotypes not included in PCV7
 - Post introduction - Increase in only one serotype
 - 35B

Vaccine Development

Table 1. Pneumococcal Vaccine Approval Dates, Serotypes, and General Effect on Pneumococcal Disease

Vaccine	FDA Approval	Serotypes Contained in Vaccine*†	Pneumococcal Disease Effect From Vaccine Serotypes
PPSV23	June 1983	1, 2,* 3, 4, 5, 6B, 7F, 8,* 9N,* 9V, 10A,* 11A,* 12F,* 14, 15B,* 17F,* 18C, 19A, 19F, 20,* 22F,* 23F, and 33F*	<ul style="list-style-type: none"> • Reduced invasive disease • No effect on carriage
PCV7	February 2000	4, 6B, 9V, 14, 18C, 19F, and 23F	<ul style="list-style-type: none"> • Reduced invasive disease • Reduced carriage • Protective herd effect • Increase in 19A infections
PCV13	February 2010	1, 3, 4, 5, 6A,† 6B, 7F, 9V, 14, 18C, 19A, 19F, and 23F	<ul style="list-style-type: none"> • Reduced invasive disease • Reduced carriage • Increase in 35B infections

PCV7, 7-valent pneumococcal conjugate vaccine; PCV13, 13-valent pneumococcal conjugate vaccine; PPSV23, 23-valent pneumococcal polysaccharide vaccine

*Serotypes in PPSV23 are unique to this vaccine.

†Serotype in PCV13 is unique to this vaccine.

PCV13 Vaccine Impact

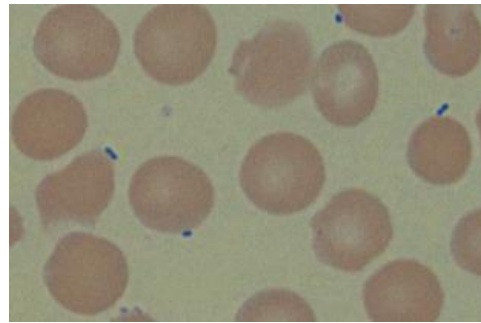
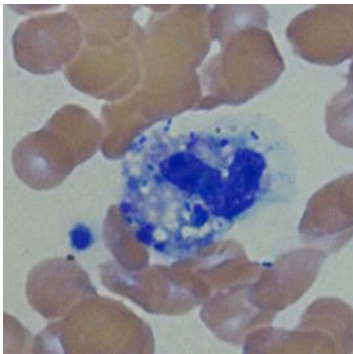
- Reduction in incidence of invasive pneumococcal disease
 - 65% reduction in children <5 y.o.
 - Decrease in invasive disease in non-immunized adults
 - Possible reduction in otitis media

Pneumococcal Vaccine Future

- Concerns
 - Continued serotype replacement
 - Continued increase in resistance in replacement strains
 - Large diverse pool of capsular polysaccharide serotypes
- Future
 - Search for more conserved protein-based antigen

6-month old female

- Intra and Extracellular bacteria present



- Received three doses of PCV13 vaccine
 - (1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F)
- Clinical isolate serotyped as 33F/33A/37

Discussion Questions

