Meningitis in Well-appearing Febrile Infants Aged 1-90 Days

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• Fewer in infants 1-90 days is common.
• Management of the well-appearing febrile infant 1-90 days often includes rapid medical evaluation, sterile site cultures and empiric antibiotic therapy.
• Bacterial meningitis is a rare, potentially fatal infection that may occur in well-appearing febrile infants.
• It is unclear if there are evaluable factors that can be used specifically to predict risk of bacterial meningitis in this population.

OBJECTIVES
The objectives of our study were to identify infants with BM in a large population of well-appearing FI and evaluate factors associated with the diagnosis of BM in this population.

METHODS
• The institutional review boards of the University of Utah and Intermountain Healthcare (both in Salt Lake City, UT) approved this study.
• The Intermountain Healthcare System (HIS) is comprised of 22 hospitals across Utah an Idaho and includes Primary Children’s Hospital (PCH), the only pediatric hospital in a catchment area of 400,000 square miles.
• Febrile infants 1-90 days managed within HIS from 7/2004 – 9/2016 were identified.
• The febrile infant cohort is identified using administrative data and is based on presentation of fever > 38 C with no apparent cause. Administrative ICD codes for reason of visit are used. Infant must have been discharged home from the delivery encounter; no NICU stay. Infants with subspecialty attendings (cardiology/surgery)) were excluded.
• Clinical, laboratory and outcome data were reviewed.
• Diagnosis of bacterial meningitis required a positive CSF culture for a significant pathogen.

RESULTS
• We identified 21,335 febrile infant episodes
• 50 infants (0.23%) had a diagnosis of bacterial meningitis (1 infant had 2 episodes)
• Gram-negative organisms predominated in febrile infants 1-28 days (15/24 (63%) and caused 28/54 (52%) cases overall.
• Febrile infants 1-28 days were significantly more likely to have bacterial meningitis than those 29-90 days (1.0% vs. 0.20%, RR 2.11, 95% CI 1.24-3.61)
• Laboratory screening showed abnormal while blood count cell in 63% of febrile infants 1-28 days with bacterial meningitis and 50% of febrile infants 29-60 days (p = 0.42); bands were abnormal in 33% and 47% respectively (p = 0.41); urinalysis was abnormal in 21% and 11% (p = 0.42)
• CSF profile was abnormal and interpretable in 48/54 (89%); CSF pleocytosis was present in 30/48 (63%); 15/21 (71%) 1-28 days and 15/27 (56%) p=0.34
• 954 (17%) febrile infants with bacterial meningitis would not have been considered "high risk" based on laboratory criteria alone.
• Of febrile infants with bacterial meningitis, only 31/54 (57%) had bacteria with the same organism while those 29-90 days, 15/47 (32%) and those 29-60 days, 4/409 (0.9%)

CONCLUSIONS
• Bacterial meningitis is rare and challenging to predict in well-appearing febrile infants.
• Abnormal screening laboratory values identified 83% of febrile infants with bacterial meningitis.
• Awaiting blood culture results before performing lumbar puncture would potentially miss 40%.
• Age was the only predictor for BM risk in our cohort.
• Outcomes for well-appearing febrile infants with bacterial meningitis were severe.
• Improved algorithms are needed to identify febrile infants at increased risk for bacterial meningitis.