

Clinical Pathway

Neonatal Fever/Suspected Sepsis (documented Temp >38.0 R in infants <30 days)

Updated: January 2012

Outcomes/Goals	<ol style="list-style-type: none"> 1. Rapid identification and treatment of infants less than or equal to 30 days (or corrected age of less than 30 days) with presenting complaint of documented fever >38 R 2. Create a standardized team-oriented approach to efficient and timely evaluation and work-up. 3. Antibiotic administration within 60 minutes
NURSE documentation	Chief complaint. Onset of fever. Documented route of measuring temperature. Associated symptoms. Birth and medical history, medications, allergies, vital signs including naked weight.
INTERVENTIONS Initiate on arrival	ESI Triage level II Full set of vitals including rectal temperature and naked weight Evaluate for use of infant warming table Continuous pulse oximetry Oxygen to maintain SaO ₂ > 93% IV with bedside CBG LMX to LP site & LP setup at bedside
DIAGNOSTICS	Bedside CBG Catheter specimen UA/Mandatory Culture CBC with differential BMP / CMS – draw and hold. Send if indicated/physician order Blood culture (prep site with chloraprep unless less than 32 weeks gestation) CSF (gram stain, cell count, protein, glucose, culture, hold extra fluid) Chest x-ray if applicable (tachypnea, hypoxia, WBC >20)
PHYSICIAN (LIP)	
Fluids (if indicated)	Normal Saline bolus 10 ml/kg
Medication Hypoglycemia	D10 5ml/kg for CBG <50
Antipyretics	Acetaminophen 12.5 mg/kg PO Acetaminophen 15-30 mg/kg PR
Antibiotics (Administer within 60 minutes of arrival)	Ampicillin 50 mg/kg/dose IV q6 hours <u>and</u> Gentamicin <u>2.5 mg/kg/dose IV q12 hours if <1 week of age. Dosing interval increases to q8 hours with >1 week of age.</u> +/- *Acyclovir 20 mg/kg IV (If Acyclovir is used, then use Cefotaxime to reduce nephrotoxic drug load) <i>Do not delay antibiotics in cases of no IV access. Antibiotics may be given IM (provider/presentation of pt dependent)</i>
ADMISSION	Call primary care physician Call peds ward/DNCC attending Prepare family/infant for admission to DNCC, PICU or ward as appropriate
*HSV Consideration and Risk Factors	Incidence of neonatal HSV infection is about 30/100,000 live births (Koskiniemi 1989, Sullivan-Bolyai 1986) 95-98% present prior to 22 days of age (Koskiniemi 1989, Sullivan-Bolyai 1986) 68% with vesicular rash (skin or mucous membranes); 27% present with seizures (Kimberlin 2001) High Risk Factors (Kimberlin 2001, Fleming 1998) <ul style="list-style-type: none"> ◦ Primary maternal HSV infection at delivery Low Risk Factors (Kimberlin 2001, Fleming 1997) <ul style="list-style-type: none"> ◦ Known exposure to HSV infected persons ◦ Less than 37 weeks ◦ Fetal scalp electrodes ◦ Maternal Hx of STDs or unexplained fever at delivery ◦ CSF pleocytosis with a negative GS and negative bacterial cultures ◦ Unexplained CNS signs ◦ Bacterial cultures negative

Clinical Pathway & Decision Making Process

Neonatal Fever/Suspected Sepsis

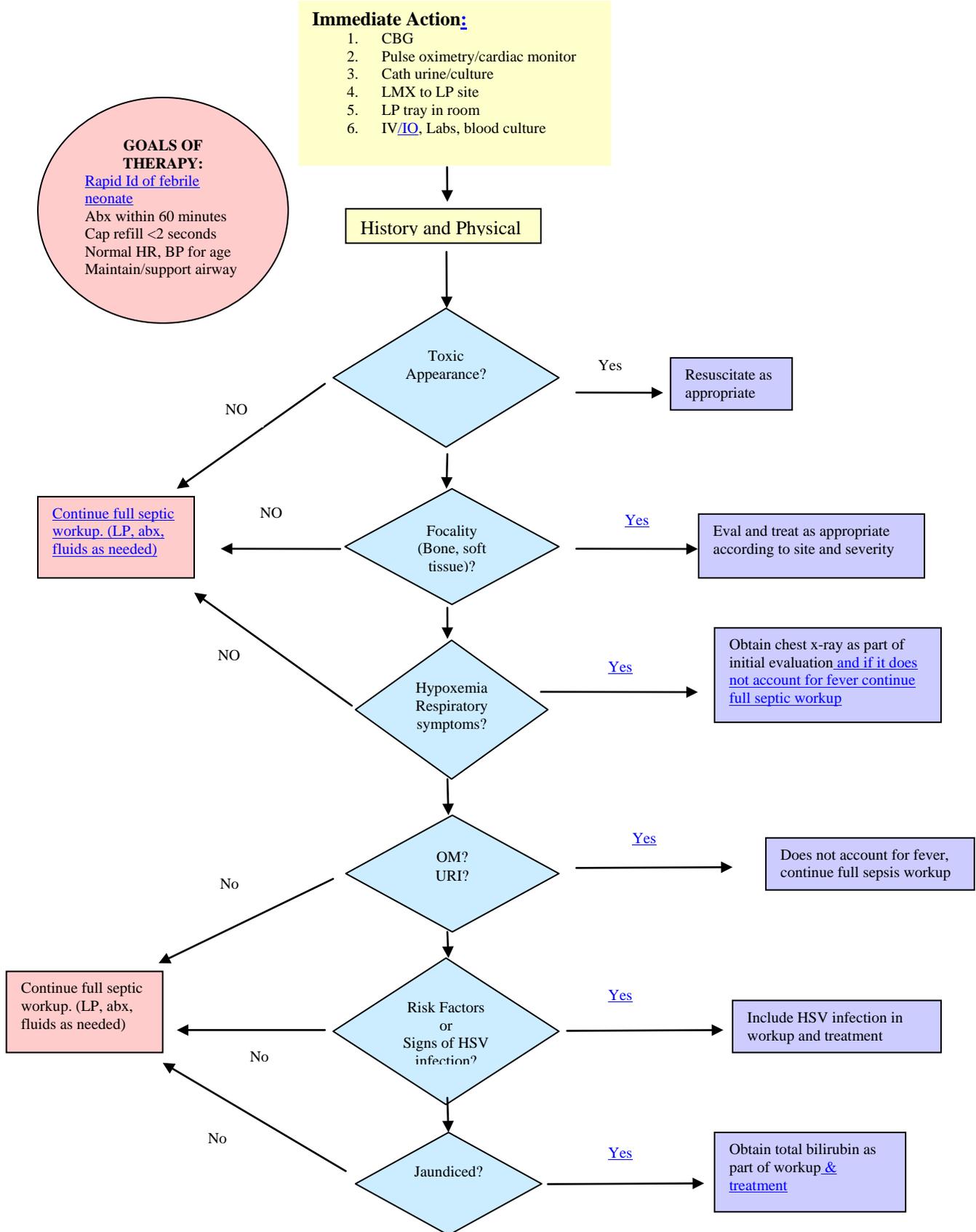
Temp >38.0 R in infants <30 days)*

(* Rectal temperature by parent, clinic or ED)

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GOALS OF THERAPY:
[Rapid Id of febrile neonate](#)
 Abx within 60 minutes
 Cap refill <2 seconds
 Normal HR, BP for age
 Maintain/support airway

- Immediate Action:**
1. CBG
 2. Pulse oximetry/cardiac monitor
 3. Cath urine/culture
 4. LMX to LP site
 5. LP tray in room
 6. IV/IO, Labs, blood culture



Neonatal Fever / Suspected Sepsis Rationale and Data

Goals of Clinical Pathway

1. Rapid identification and treatment of infants less than or equal to 30 days (or corrected age of less than 30 days) with presenting complaint of documented fever >38 R
2. Create a team-oriented approach to efficient and timely evaluation and work-up.
3. Antibiotic administration within 60 minutes

Data Considerations	Interventions	Rationale
Fever	Documented rectal temperature	Defined as rectal temperature $>38^{\circ}\text{C}$ (100.4F). Hooker 1993 demonstrated low correlation between tympanic temperature and rectal temperature. Correlation is worse when fever is present. <i>Note: Parental report of tactile fever is likely to be accurate. Range of reported sensitivity 82-89%, specificity 76-86% (Graneto 1996, Hooker 1996, Singhi 1990)</i>
Urine collection	Catheter specimen collection	Bladder catheterization or suprapubic bladder aspiration is the methods of choice for obtaining urine samples. (AAPQI 1999) <i>Note: Bag collection sample has an increased risk of contamination, false-positive rate ranging from 12-83%.</i>
Urine Analysis	Mandatory urine culture	Urine culture should be obtained in conjunction with dipstick and microscopy. Pyuria is not a sensitive marker in infants. Crain 1990 reported 52% of febrile infants (<8 weeks) with UTI had a normal urine analysis. Landau 1998 reported absence of pyuria in 28% of the infants with UTI.
WBC	Lumbar puncture	Decision to perform or withhold LP should not be based on total peripheral WBC. (Bosnu 2003) Total peripheral WBC is an inaccurate screen for bacteremia in febrile young infants. Cut-off of 5,000 has sensitivity of 79%, specificity of 5%. Cut-off of 15,000, sensitivity is 45%, specificity 78%.. (Boxnu 2003)
Jaundice	Total Bilirubin	Elevated total bilirubin has been associated with higher incidence of UTI. Garcia and Nager 1999 reported a 7.5% incidence of UTI in asymptomatic, afebrile, jaundiced infants <8 weeks. Of note, 58% of those infants with UTI had a normal urine analysis.

Serious Bacterial Infection (SBI) in infants less than 30 days

Fever in this age group should be presumed to have a SBI (ACEP Clinical Policy, 2003)

Numerous studies have assessed the applicability of Rochester, Philadelphia, and Boston criteria to this age group. All found an increase in rate of SBI in this age group.

- Ferrera 1997 found that 6.3% of infants identified as low risk by the Rochester criteria in this age group have SBI
- Baker 1999 reported a SBI prevalence of 12.6% in this age group. In addition, 43% of infants identified as low risk by the Philadelphia criteria (studied in infants 2-3 months) in this age group have SBI
- Kadish 2000 reported a 12% SBI prevalence in this age group. 3% would have been sent home with a SBI based on the Boston and Philadelphia criteria

Serious Bacterial Infection (SBI) in infants 0-60 days

Low Risk "Rochester Criteria" (Jaskiewicz et al 1994)

1. Well appearing
2. Previously Healthy
 - Born at term ≥ 37 weeks
 - Did not receive perinatal antimicrobial
 - Was not treated for unexplained hyperbilirubinemia
 - Has not received and was not receiving antimicrobial agents
 - Had not been previously hospitalized
 - Had no chronic or underlying illness
 - Was not hospitalized longer than the mother
3. No Evidence of skin, soft tissue, bone, joint, or ear infection.
4. Labs:
 - WBC 5,000-15,000
 - Absolute band count $\leq 1,5000$
 - ≤ 10 WBC on UA microscopy
 - ≤ 5 WBC on stool smear microscopy (only for infants with diarrhea)

Bacterial Pathogen Consideration

Most common pathogens isolated (Baker 1999)

- Escherichia coli (39%)
- Klebsiella (11%)
- Group B streptococcus (6%)
- Enterobacter cloacae (6%)
- Listeria monocytogenes (6%)

Note: NNT for Ampicillin for prevention of an enterococcal or listeria infection is 138 (Brown 2002)

Initial Review: David Spiro, Denise Langley, Pediatric Section Meeting November 2007

Content review: David Spiro, Denise Langley, [Melinda Hartenstein](#), Pediatric Section Meeting December 2011