Sickle Cell with Fever Clinical Pathway

September 2021

Outcomes/Goals	**1.** Create a team-oriented approach to the evaluation of sickle cell disease (SCD) with fever **2.** Rapidly identify and treat potential complications of SCD with fever **3.** Safely decrease admission rate of SCD patients with fever where possible
Inclusion Criteria	1. Patients with SCD >2 mos and < 20 years or still followed by PHO presenting with symptoms of fever and/or T≥38.3°C
Exclusion Criteria	1. Pts presenting with AMS, severe or atypical HA, focal neurologic findings, new seizure, pain w/o fever (refer to ***Sickle Cell with Suspected VOE*** pathway) 2. Age 0-60 days (use ***ED fever/suspected sepsis*** pathways) or ≥20 yrs
NURSE Documentation	Document evidence of shock, mental, respiratory, and circulatory status. Document onset of fever, presence of central line, and any history of line infections. Document location of pain, symptoms associated with pain, quality of pain, and treatments that have worked and not worked. Medications, allergies, vital signs, height and weight per Peds ED NPEOC.
INTERVENTIONS Initiate on arrival	ESI II Place on continuous cardiac and pulse oximetry, apply O2 for SpO2<92 and/or patient comfort PIV or access central line/port per CLABSI prevention Bundle policy; policy # HC-NSG-259-POL and HC-NSG-260-PRO Draw labs and initiate NS fluid bolus
DIAGNOSTICS	In all pts: CBC w/ diff, retic count, CMP, Blood culture, Type and Screen Other workup directed by H&P, clinical suspicion UA w/ micro, screen for Cx if suspect UTI Chest X-ray, if c/o chest pain, SOB, incr WOB, tachypnea, or hypoxia
PHYSICIAN (LIP)	
Documentation (History)	– Duration of fever, presence of other symptoms, baseline hemoglobin and transfusion hx, Baseline pulse oximetry reading, Previous admissions, ICU admission, Surgical hx, Vaccination hx, Allergies – Prior complications of sickle cell disease, including Acute chest syndrome, Aplastic crisis, Bacteremia, Stroke, Splenic sequestration, Gall bladder disease, Osteomyelitis – Medications: Penicillin prophylaxis, hydroxyurea, folic acid, pain medications, last dose of ceftriaxone
Documentation (Physical Exam)	– VS, pulse oximetry, General appearance, Respiratory, Circulatory, and Neurologic status – Evaluate for evidence of focal infection, spleen size, rash or petechiae
Fluids Bolus	NS 20 mL/kg bolus as needed for hypovolemia/dehydration
Blood Products	*Consult Pediatric Hem/Onc prior to transfusion to determine number of units to transfuse and whether an exchange transfusion is indicated*
Medication **Antipyretics**	Tylenol 12.5 mg/kg po every 4 hours as needed for fever Ibuprofen 10 mg/kg po every 6 hours as needed for mild pain or fever
Pain	Consider PO oxycodone, IV ketorolac, or IV morphine/hydromorphone
Antibiotics	IV ceftriaxone (contraindicated if age < 12 months or ceftriaxone in past 8 weeks) ***OR*** Ampicillin if age < 12 months or recent ceftriaxone in past 8 weeks ***OR*** Levofloxacin if PCN or ceph-allergic (consider ID consult) ***OR*** Ampicillin and azithromycin if Acute Chest Syndrome ***OR*** IV Vancomycin and IV Ceftriaxone if toxic appearing or T≥40°C
ADMISSION	Consult to Pediatric Hematology Oncology Consult PICU if severe Acute Chest Syndrome
*High Risk versus Low Risk Considerations	See flowsheet below

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Immediate Action

1. ESI II
2. Place on continuous cardiac and pulse ox monitor
3. Apply Oxygen for SpO2<95% and/or patient comfort
4. Establish PIV and draw CBC w/diff, CMP, BCx, retic count, and T&S

Ill-appearing or T≥40°C → **Vancomycin Ceftriaxone**

Clinically suspected Acute Chest Syndrome (new pulmonary infiltrate PLUS ANY one of the following: fever, cough, hypoxia, tachypnea) → **Ampicillin Azithromycin**

2-12 months OR 12 months-16 years with recent (<8 wks) ceftriaxone → **Ampicillin**

12 months – 19 years, no recent ceftriaxone or penicillin or cephalosporin allergy → **IM/IV Ceftriaxone Observe 2 hours**

Admit
PICU if Severe ACS

Discharge
Provided 24 hr Hem/Onc f/u is available and all LOW-RISK criteria are met

SCD PMH
No history of:

- Ceftriaxone in preceding 8 weeks
- Bacteremia
- Sepsis
- History of splenic sequestration within the past 4 weeks
- Recent antibiotic treatment
- Multiple visits for same febrile illness
- The presence of splenectomy alone does not exclude a patient from discharge if all other low risk criteria are met

SOCIAL
No history of:

- Non-compliance with penicillin prophylaxis
- Missing, delayed immunizations
- Low likelihood of follow-up:
  a. No phone
  b. No transportation
  c. Missed appointments

CLINICAL

- >12 mos
- Well-appearing
- Good VS
- Tolerating po well
- No concern for complications:
  - Sequestration
  - Acute chest syndrome
  - VOC requiring IV analgesia
  - No new hypoxia
- O_2 sat ≥ 92% if baseline not known *or* RA sat no < 3% below baseline
- No Central Venous Access Device

LABS/X-RAY FINDINGS

- Hgb >5
- Reticulocyte count >1% (unless Hgb >10)
- No significant drop Hgb (>2g)
- WBC >5K and < 30K
- Chest x-ray (if indicated) without infiltrate
- UA (if indicated)

Sickle Cell Rationale and Data

Goals of Clinical Pathway

1. Create an efficient team-oriented approach to the evaluation and treatment of sickle cell disease (SCD) with fever
2. Rapid identification and prevention of potential complications including sepsis, acute chest syndrome, and focal infections
3. Safely decrease admission rate of SCD patients with fever where possible

Data Considerations	Interventions	Rationale
Historic bases for treating fever in SCD as an emergency	ESI II, Blood culture, rapid assessment	Patients with Sickle Cell Disease (SCD) and their parents are routinely taught that a fever of ≥38.3 C represents a medical emergency, regardless of accompanying symptoms, and are instructed to present to the Emergency Department for evaluation. Until the past decade, the standard of care for each febrile episode was admission for IV antibiotics. The reason for this high degree of vigilance in febrile patients with SCD is due to their decreased splenic function, which renders these patients highly susceptible to serious bacterial infections (SBI), particularly by encapsulated organisms such as *Streptococcus pneumonia*, *Neisseria meningitides,* and *Haemophilus influenza*. Data prior to the introduction of vaccines against these organisms and prior to the routine use of penicillin prophylaxis suggested that a febrile patient with SCD had a bacteremia risk of 3-5%.
Rationale for reducing admissions		Frequent admission may lead to complications including poor performance in school, decreased literacy, financial stress, difficulty of parents maintaining employment, and reluctance of parents to present their children for care in the face of certain hospitalization. After vaccines against S. pneumonia and H. influenza, penicillin prophylaxis, and early detection of SCD with routine genetic screening all came into widespread use, new data (Baskin, Pediatrics 2013) demonstrated that the incidence of bacteremia among febrile SCD patients had decreased to 0.8% (95% confidence interval: 0.3%–1.3%). They also showed no adverse outcomes among febrile 'low-risk' SCD patients who were managed outpatient (466/1118 total febrile episodes). The safety of using low risk criteria to reduce admissions while avoiding adverse outcomes was demonstrated in a study out of CHOP in 2018.
Lab studies	CBC with diff, retic count, blood cx, CMP +/-UA, CXR, T&S	Obtain CBC, reticulocyte count to risk stratify patient. CMP may help identify hemolysis. Blood culture is key to detect bacteremia. CXR should be ordered in all sickle cell patients with fever, as ACS is frequently not clinically suspected.
Avoidance of repeat ceftriaxone dosing within 8-week interval		Ceftriaxone-induced immune hemolytic anemia can be a fatal adverse event of ceftriaxone administration when there is a recent history of prior ceftriaxone administration. [6] Therefore, when ceftriaxone has been received within the previous 8 weeks, IV ampicillin is given instead.

References:

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7. Neumayr, L., et al., *Mycoplasma disease and acute chest syndrome in sickle cell disease.* Pediatrics, 2003. **112**(1 Pt 1): p. 87-95.