

## 15.12 Sickle Cell Disease Clinical Practice Guideline

This guideline is intended to assist the practitioner in clinical decision-making and attempt to define clinical practices that apply to most patients in most circumstances. The treating physician should make the ultimate judgment regarding the care of a particular patient.

### *Goals of Sickle Cell Disease Treatment*

1. Provide appropriate diagnosis, proper screening and routine comprehensive evaluation (attachment A) of Sickle Cell Disease (SCD).
2. Increase the number of patients receiving prophylactic penicillin, vaccination and immunization to prevent infections.
3. Characterize patient's pain status to provide a basis on which treatment decisions can be made.
4. Provide adequate pain management for acute and chronic SCD.
5. Provide transitional care, support and cognitive therapy for patients and their families to keep them informed about the implications of SCD to their health.

### *Clinical Management of Sickle Cell Disease*

#### **1. Diagnosis, Screening and Routine Comprehensive Evaluation**

##### **A. Diagnosis**

###### ***Neonatal***

- Newborn screening may be performed on blood from the umbilical cord or a heel-prick. Abnormal results should be confirmed with a second sample using a different method. Solubility tests to detect Hemoglobin (Hb or Hgb) S are inappropriate screening or confirmatory tests. High levels of fetal Hgb can give false negative results.
- The majority of screening programs use isoelectric focusing (IEF) of an eluate from the dried blood spots that also are used to screen for hypothyroidism, phenylketonuria, and other disorders.
- A few programs use high-performance liquid chromatography (HPLC) or cellular acetate electrophoresis as the initial screening method.
- Most programs retest abnormal screening specimens using a second, complementary electrophoretic technique, HPLC, immunologic tests, or DNA-based assays. This should be accomplished at or before 2 months of age.

###### ***Six Months and Older***

- Screening and if positive, confirm with a second sample and method.
- “Deductive” method based on blood counts, red cell indices, and relative levels of Hb F and A 2.
- Parental testing.

##### **B. Comprehensive Evaluation – ATTACHMENT A**

Each regularly scheduled patient visit should include an age appropriate comprehensive medical evaluation to review previous disease manifestations, document important baseline physical findings and laboratory values, monitor growth and development, detect early signs of chronic organ damage, and develop individualized patient care plans. It should consist of a detailed history and physical exam with emphasis on:

- Vital signs
- Degree of pallor
- Evidence of systemic or localized infection
- Cardiopulmonary status
- Spleen size (Pt/Caregiver should be taught to palpate spleen size)
- Neurologic exam
- Pain management strategies

## 2. Prophylactic Penicillin and Immunization

### A. Prophylactic Penicillin

- Penicillin prophylaxis in children is probably the most important recent advance in the care of patients with SCD since it prevents pneumococcal sepsis in children. All patients between the ages of two months and 5 years should receive prophylactic penicillin.
- The goal is to identify all newborns with SCD and start them on prophylactic penicillin as early as possible. The recommended regimen can be found in **Appendix I**.

### B. Immunizations

The ACIP recommends PCV13 for all children 2 through 59 months and for children 60 through 71 months of age who have underlying medical conditions that increase their risk of pneumococcal disease or complications.

**Table 1. Recommended Schedules for Administering Doses of PCV13 to Children <24 Months of Age by PCV Vaccination History and Age**

<i>Age at Examination</i>	<i>Vaccination history: total number of PCV7 and/or PCV13 doses received previously</i>	<i>Recommended PCV13 Regimen</i>
2 through 6 mos	0 dose	3 doses, 8 weeks apart; fourth dose at age 12-15 mos
	1 dose	2 doses, 8 weeks apart; fourth dose at age 12-15 mos
	2 doses	1 dose, 8 weeks after the most recent dose; fourth dose at age 12-15 mos
7 through 11 mos	0 dose	2 doses $\geq$ 8 weeks apart
	1 or 2 doses before age 7 mo	1 dose at age 7-11 mos, with a second dose at 12-15 mos, $\geq$ 8 weeks later
12 through 23 mos	0 dose	2 doses $\geq$ 8 weeks apart
	1 dose before age 12 mo	2 doses $\geq$ 8 weeks apart
	1 dose at $\geq$ 12 mo	1 dose $\geq$ 8 weeks after the most recent dose
	2 or 3 doses before age 12 mo	1 dose $\geq$ 8 weeks after the most recent dose
	4 doses of PCV7, or other age appropriate, complete PCV7 schedule	1 supplemental dose $\geq$ 8 weeks after the most recent dose

Footnotes Table 1:

- 1) Minimum interval between doses is 8 weeks except for children vaccinated at age > 1 year, for whom minimum interval between doses is 4 weeks.
- 2) No additional PCV13 doses are indicated for children 12 through 23 months of age who have received 2 or 3 doses of PCV7 before age 12 months and at least 1 dose of PCV13 at age 12 months or older.

For children who have underlying medical conditions, a supplemental PCV13 dose is recommended through 71 months of age. For list of conditions, see MMWR 2010;59:9

**Table 2. Recommended Schedules for Administering Doses of PCV13 to Children ≥24 Months of Age by PCV Vaccination History and Age**

<i>Age at Examination</i>	<i>Vaccination history: total number of PCV7 and/or PCV13 doses received previously</i>	<i>Recommended PCV13 Regimen</i>
Healthy children 24 through 59 mos	Unvaccinated or any incomplete schedule	1 dose, ≥ 8 weeks after the most recent dose
	4 doses of PCV7 or other age-appropriate, complete PCV7 schedule	1 supplemental dose, ≥ 8 weeks after the most recent dose
Children 24 through 71 mos with underlying medical conditions	Unvaccinated or any incomplete schedule of < 3 doses	2 doses, one ≥ 8 weeks after the most recent dose and another dose ≥ 8 weeks later
	Any incomplete schedule of 3 doses	1 dose, ≥ 8 weeks after the most recent dose
	4 doses of PCV7 or other age-appropriate, complete PCV7 schedule	1 supplemental dose, ≥ 8 weeks after the most recent dose

Footnotes Table 2:

1) Minimum interval between doses is 8 weeks.

For children who have underlying medical conditions, a supplemental PCV13 dose is recommended through 71 months of age. For list of conditions, see MMWR 2010;59:9

**Routine immunization with conjugated Hemophilus influenzae vaccine has markedly reduced the risk of infection in children with SCD.**

**3. Pain Assessment**

The goals for assessment of acute and chronic pain are to characterize a patient’s pain and related experiences, provide a basis for therapeutic decisions, and document the efficacy of pain control. There are two major kinds of assessment:

<p><b>Rapid assessment</b> of an acute painful episode that deals with an isolated event and focuses on:</p> <ul style="list-style-type: none"> <li>• Intensity</li> <li>• Prompt Treatment</li> <li>• Relief</li> </ul>	<p style="text-align: center;"><b>Acute Pain</b></p> <ul style="list-style-type: none"> <li>• Unpredictable, abrupt onset</li> <li>• Intensity varies from mild ache to severe and debilitating pain</li> <li>• Generally lasts hours to a few days</li> <li>• Can persist or recur and may migrate from one site to another</li> </ul>
<p><b>Comprehensive assessment</b> provided for chronic pain or follow-up that usually occurs at the end of a painful episode, at office/clinic visit, or between episodes. Assessment is multidimensional and should include the following factors:</p> <ul style="list-style-type: none"> <li>• Physiologic</li> <li>• Sensory</li> <li>• Affective</li> <li>• Cognitive</li> <li>• Behavioral</li> <li>• Sociocultural</li> </ul>	<p style="text-align: center;"><b>Chronic Pain</b></p> <ul style="list-style-type: none"> <li>• Last 3-6 months or more</li> <li>• No longer serves a warning function</li> <li>• Can be debilitating, both physically and psychologically</li> </ul>

#### 4. Pain Management

##### A. Uncomplicated Pain Episode

- Bed Rest
- Hydration
- Analgesia – Medication given on a schedule consistent with drug duration
- Avoid extremes of hot and cold environments
- Reduce stress and situations that are upsetting
- Therapy for precipitating complications
- Practice Relaxation techniques

##### B. Pharmacological

Usual starting doses in opioid-naïve adults and children ≤ 50 kg body weight.

<i>Type of Pain</i>	<i>Medication</i>	<i>Oral</i>	<i>Parenteral</i>
Mild	NSAID's	Not recommended	Not recommended
	Acetaminophen	10 mg/kg q4h	Not recommended
Moderate	Codeine	0.5-1 mg/kg q3-4h	Not recommended
	Oxycodone	0.15-0.20 mg/kg q3-4h	Not available
	Hydrocodone	0.15-0.20 mg/kg q3-4h	Not available
Severe	Morphine sulfate	0.3mg/kg q3-4h	0.1-0.15 mg/kg q2-4h
	Hydromorphone sulfate	0.06-0.08 mg/kg q3-4h	0.015-0.020 mg/kg q3-4h
	Meperidine	Not recommended (1.1-1.75 mg/kg q 3-4 h only if deemed to be necessary after evaluation).	Not Recommended (0.75-1.0 mg/kg, 1.1-1.75 mg/kg q 3-4 h only if deemed to be necessary after evaluation).

Usual starting doses in opioid-naïve adults and children ≥ 50 kg body weight

<i>Type of Pain</i>	<i>Medication</i>	<i>Oral</i>	<i>Parenteral</i>
Mild	NSAID's	800 mg q6-8h	Not recommended
	Acetaminophen	10 mg/kg q4h	Not recommended
Moderate	Codeine	15-60 mg q3-6h	Not recommended
	Oxycodone	10 mg q 4-6 h	Not available
	Hydrocodone	5 mg q 4-6 h	Not available
Severe	Morphine sulfate	10-30 mg q3-4h	5-10 mg q2-4h
	Hydromorphone sulfate	7.5 mg q3-4h	1.5 mg q3-4h
	Oxymorphone	Not available	1-1.5 mg q6h or 0.5 mg IV cautiously titrate upward.
	Meperidine	Not recommended (50-150mg q3-4h only if deemed to be necessary after evaluation)	Not recommended (50-150 mg q3h only if deemed to be necessary after evaluation)

**NOTE: Tables vary in the suggested doses that are equianalgesic to morphine. Clinical response is the criterion that must be applied for each patient; titration to clinical responses is necessary. Because there is not complete cross-tolerance among these drugs, it is usually necessary to use a lower than equianalgesic dose when changing drugs and to retitrate to response.**

## **5. *Transitional Care, Support and Cognitive Therapy***

### **A. *Transitional Care***

Continuity of care is important to minimize morbidity and mortality. In patients older than 20 years with frequent painful events there is an increase of early death. The course of SCD varies as patients mature, but the frequency of pain episodes correlates with disease severity. Transitional care issues to remember:

- At any given time a patients may require a number of specialists – surgeons, hematologists, ob/gyn, cardiologists, nephrologists, counselors, and social workers.
- The primary care practitioner (PCP) should provide primary preventive care and serve to educate the patient, family and other health care providers engaged in the patients care.
- The PCP acts as a resource and provides key information and recommendations in regards to the patients care.
- In order to reduce stress, there should always be an individual crisis plan in effect.
- Additional help is needed for the patient to transition from pediatricians and/or their PCP to new health care providers and facilities.
- Coordination should balance fostering independence and ensuring optimal health care for patients to be active in their own health care.
- If possible, the idea of transition needs to be mentioned a year or so before the process begins.
- Continuous and ongoing communications between providers is essential for effective continuity of care.
- ***Primary team should consist of:***
  - Physicians
  - Nurses or Physicians Assistant
  - Pain management specialists
  - Counselor
  - Social Service workers
- ***Assessment:***
  - Patients compliance with treatment and medication
  - Readiness of patient and parents/caregivers for transition
  - Readiness of patient to accept responsibility
  - Chronological age vs developmental age
  - Coping skills for dealing with psychosocial problems of chronic illness
  - Availability of psychosocial support

### **B. *Support and Cognitive Therapy***

Psychosocial interventions should be woven across the spectrum of medical care. Points to consider when a patient needs counseling include:

- Genetic Counseling
- Difference between SCD and Sickle Cell Trait (SCT)
- Planning for Crisis situations
- Skills for coping with pain and other complications
- Variability of and inability to predict occurrence and frequency of health problems
- Family Planning options
- The role of stress in the severity of chronic illness and pain
- Educational needs

### **C. Special Consideration**

- Illness Requiring Urgent Medical Care
  - T > 38.5 degrees C (101.3 F)
  - Pain inadequately relieved by home measures
  - Significant respiratory symptoms (e.g. severe cough, shortness of breath, chest pain)
  - Abdominal pain, distension and/or acute enlargement of the spleen
  - Any neurological symptoms or sign – even if transient
  - Significant increase in pallor, fatigue and/or lethargy
  - Priapism episode persisting >3-4 hours with no resolution
  - Significant vomiting or diarrhea
- Every patient should have a predetermined plan to rapidly access an appropriate provider/facility that can provide:
  - Expertise in SCD and/or immediate contact/consultation with a pediatric hematologist or the patient's PCP with expertise in SCD
  - Access to patient's baseline data (past problems, exam, lab, radiographs)
  - Access to appropriate transfusion support

*Based on The Management of Sickle Cell Disease; National Institutes of Health, National Heart, Lung, and Blood Institute, Division of Blood Diseases and Resources, NIH Publication No. 02-2117, Fourth Edition, June 2002  
Sickle Cell Disease In Children and Adolescents: Diagnosis, Guidelines for Comprehensive Care, and Care Paths and Protocols for Management of Acute and Chronic Complications, Sickle Cell Disease Care Consortium, November 2001*

*Guidelines for the Treatment of People with Sickle Cell Disease, Sickle Cell Advisory Committee of GENES (The Genetic Network of New York, Puerto Rico and the Virgin Islands) with the support from grants from U.S. Health Resources and Services Administration (HRSA), March 2002*

*ACIP Provisional Recommendations for Use of 13-Valent Pneumococcal Conjugate Vaccine (PCV13) Among Infants and Children; Center for Disease Control and Prevention, March, 2010.*

*Licensure of a 13-Valent Pneumococcal Conjugate Vaccine (PCV13) and Recommendations for Use Among Children-Advisory Committee on Immunization Practices (ACIP), 2010; Morbidity and Mortality Weekly Report, Vol. 59, No. 9; March 12, 2010.*

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