Developing an Emergency Department Order Set for Sickle Cell Disease Acute Pain

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Background

- Sickle cell disease (SCD) is a life-threatening, multifaceted, debilitating disease

- Recurrent vaso-occlusive episodes (VOEs) are the hallmark of SCD
  - Patients with SCD have 2.59 emergency department (ED) visits per year on average, the majority of which are for VOEs[2,3]
  - Inequity in ED care exists[4-6]

- Guidelines recommend treatment within 30 minutes of triage, but this is rarely achieved in practice

- There has been some success with implementing ED protocols to manage VOEs in both adults and children with SCD[3,7,8]

Objective

- **Our goal was to develop an evidence-based order set** that could be implemented in New York City (NYC) EDs to expedite and standardize emergency care for SCD patients presenting with acute pain
  - Similar to the Community Care of North Carolina Sickle Cell Task Force local protocol[9]

- Improve the quality and consistency of care provided to patients with SCD

Used a RAND/UCLA modified Delphi panel method

- A valid, reliable, and reproducible method that can be used to generate consensus

- Convened 10 clinicians practicing in NYC with an average of 11 years' experience caring for patients with SCD

- Provided clinicians with a review of evidence primarily based on the National Heart, Lung, and Blood Institute (NHLBI) guidelines on how to best manage SCD pain in the ED

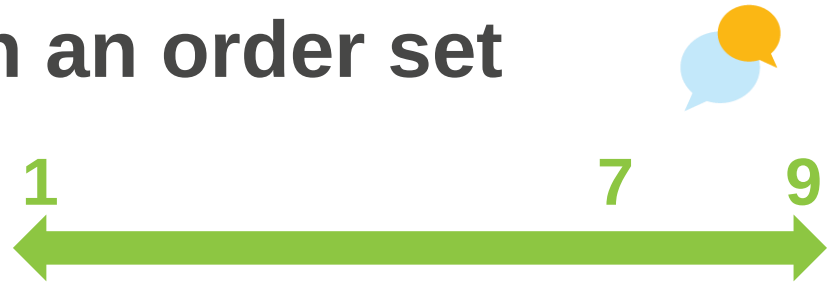
5 emergency medicine

2 emergency medicine & internal medicine

2 hematology

1 pain & palliative care

Rated 202 items that could be included in an order set



A. Triage (e.g., initiate SCD protocol, assign ESI level 2)	
B. Initial medical encounter (e.g., implement individualized plan)	
C. Targeted evaluation (i.e., rule out other complications)	
D. Initial pain management	
E. First pain reassessment	
F. Second pain reassessment	
G. Third pain reassessment	
H. Preventive care (e.g., vaccinations, referrals)	
I. Discharge (e.g., prescriptions, follow-up appointments)	
J. Other considerations (e.g., non-pharmacologic approaches)	

Consensus order set

A. TRIAGE
☐ Identify SCD patient and initiate SCD protocol ☐ Assess vitals, including oxygen saturation (O_2 sat) ☐ Assess pain using VAS or verbal scale (1-10)[i] ☐ Confirm allergies to medications (opiates, NSAIDS, antibiotics, etc.) ☐ Assign ESI level 2 ☐ Begin implementation of rapid protocol (initiate analgesic therapy <30 minutes after triage)

B. INITIAL MEDICAL ENCOUNTER
☐ Review vitals (including O_2 sat) ☐ Assess pain using VAS or verbal scale (1-10) ☐ Note treatment prior to coming to ED or in triage (opioids, NSAIDS) ☐ Note baseline hemoglobin* ☐ Note date of and reaction to last transfusion*
Assess if patient has a documented SCD treatment plan: ☐ If yes, review with patient and integrate with items in sections **E [INITIAL PAIN MANAGEMENT]** and **F, G, H [PAIN REASSESSMENTS]** ☐ If no, attempt to find analgesic history during previous ED visits in medical record
☐ Confirm usual analgesic type and dose with patient

C. DRAW LABS	
Draw labs as appropriate:	
☐ CBC with differential	☐ Bilirubin
☐ Reticulocyte count	☐ Type and screen (if no active type and screen)
☐ Electrolytes (CHEM-7)	☐ Hemoglobin fractionation/electrophoresis*
☐ ALT and AST*	☐ Iron studies (Fe, TIBC, Ferritin) if not performed in the past 90 days
☐ LDH	

*The majority of the panel rated as likely to improve outcomes, with at least two panelists disagreeing.

Consensus order set

D. PERFORM TARGETED EVALUATION	
Evaluate if patient experiencing their typical VOE symptoms: ☐ If yes, confirm usual analgesic type and dose with patient	
☐ If O_2 sat <95%, provide oxygen (not indicated if O_2 sat ≥95%)	
If concerned for **PE**: ☐ Confirm adequate renal function ☐ Order CT angiogram	If concerned for **MI**: ☐ Order EKG ☐ Send troponin
If concerned for **acute chest syndrome**: ☐ Order chest radiograph ☐ Hematology consult, consider: ☐ Adding hemoglobin fractionation/ electrophoresis to labs ☐ Exchange transfusion	If concerned for **stroke** (e.g., patient reports headache): ☐ Implement SCD stroke protocol, if available ☐ Order brain imaging ☐ Hematology consult, consider: ☐ Adding hemoglobin fractionation/ electrophoresis to labs ☐ Exchange transfusion
If concerned for worsening **anemia**: ☐ Notify blood bank for phenotype matched red cells Add the following to labs: ☐ CBC with differential ☐ Type and screen ☐ Hemoglobin fractionation/electrophoresis ☐ Reticulocyte count ☐ LDH ☐ Total and direct bilirubin ☐ Iron studies (Fe, TIBC, Ferritin)	If concerned for **sequestration or acute cholecystitis** (e.g., patient reports abdominal pain): ☐ Order abdominal ultrasound Add the following to labs: ☐ CBC with differential ☐ Type and screen ☐ ALT and AST ☐ Total and direct bilirubin
Assess **SIRS criteria**: T >38°C (100.4°F) or <36°C (96.8°F); HR >90; RR >20 or $PaCO_2$<32mmHg; WBC >12,000/mm^3, <4,000/mm^3, or >10% bands	If ≥2 SIRS criteria present: ☐ Implement sepsis protocol ☐ Consider empiric treatment

Consensus order set

E. INITIAL PAIN MANAGEMENT: Initiate analgesic therapy within 30 minutes of triage

- ☐ **If the patient has a documented individualized SCD pain plan, integrate here**
- ☐ If opioid is administered, initiate continuous O_2 sat monitoring

If the patient has an **opioid allergy**, provide alternative (assess renal/liver function as needed):

For children:
- ☐ PO acetaminophen 15mg/kg
- ☐ PO ibuprofen 10mg/kg
- ☐ If >2 years IV ketorolac 0.5mg/kg
- ☐ If <2 years IV ketorolac 0.25mg/kg

For adults:
- ☐ PO acetaminophen 975mg
- ☐ PO ibuprofen 600mg
- ☐ IV ketorolac 30mg

Alternative for adults:
- ☐ PO acetaminophen 650mg*
- ☐ IV ketamine 0.25mg/kg*
- ☐ IV ketorolac 15mg

If patient **has IV access** (e.g., peripheral or central line), administer opioid IV (1st dose)*:

For patients who are **not** opioid naïve:
- ☐ Calculate and administer patient-specific opioid dose (IV route preferred)[ii]

For patients who **are** opioid naïve or with no available analgesic history, administer:
- ☐ Morphine 0.1mg/kg[iii]*
- ☐ Hydromorphone 0.02mg/kg[4]*
- ☐ Ketamine 0.25mg/kg[iv]*

Avoid meperidine*

If patient **does not have IV access**, administer opioid via other routes (1st dose):

For patients who are **not** opioid naïve:
- ☐ Calculate and administer patient-specific opioid dose (SQ if no IV access)[2]

For patients who **are** opioid naïve or with no available analgesic history, administer:

For children:
- ☐ PO hydromorphone 0.05mg/kg
- ☐ PO morphine 0.3mg/kg

Avoid IN fentanyl in patients under <7 years old or <10kg[5]

For adults:
- ☐ SQ morphine 0.1mg/kg
- ☐ SQ hydromorphone 0.02mg/kg
- ☐ PO morphine 30mg*
- ☐ PO hydromorphone 5mg
- ☐ IN fentanyl 2-3 doses 5 minutes apart (max single dose (100µg) may limit efficacy, especially >65kg)[v]

Consensus order set

F. FIRST PAIN REASSESSMENT: Within 30 minutes (60 minutes after triage)	
Assess pain using VAS or verbal scale (1-10): If VAS ≥5: If no hypoxia or sedation: ☐ Repeat initial dose of IV opioid (2nd dose) if route is available (if route is not available, consider other routes) ☐ Escalate initial dose of IV opioid by 25% If signs of excessive sedation: ☐ Decrease dose of IV opioid	If VAS ≤4 see **G [SECOND PAIN REASSESSMENT]**

G. SECOND PAIN REASSESSMENT: Within 30 minutes (90 minutes after triage)		
☐ Assess vitals ☐ Perform follow up lab tests* or review lab results and address abnormalities ☐ Re-evaluate for serious complications (see **D [TARGETED EVALUATION]**)		
Assess pain using VAS or verbal scale (1-10): If VAS ≥7: If no hypoxia or sedation: ☐ Repeat 2nd dose IV opioid (3rd dose) if route is available (if route is not available, consider other routes) ☐ Escalate 2nd dose of IV opioid by 25% If signs of excessive sedation: ☐ Decrease dose of IV opioid Consider adjunctive NSAIDS or acetaminophen (assess renal/liver function as needed):	If VAS 5-<7: If no hypoxia or sedation: ☐ Repeat 2nd dose IV opioid (3rd dose) if route is available (if route is not available, consider other routes) ☐ Escalate 2nd dose of IV opioid by 25% ☐ Consider switching opioid* If signs of excessive sedation: ☐ Decrease dose of IV opioid	If VAS ≤4: ☐ Offer short-acting oral opioid Assess if long-acting oral pain med prescribed as outpatient: ☐ If yes, restart long-acting oral pain med ☐ If no, call for pain service consult or SCD provider team* Ready for discharge (see **J [DISCHARGE]**) ☐ Call hematology/SCD expert about patient being readied for discharge*

Consensus order set

I. PREVENTIVE CARE	
Consider vaccinations: ☐ Consult CDC vaccination schedules[vii] ☐ If under age 5, twice-daily prophylactic penicillin* ☐ Pneumovax (wait ≥8 weeks since prior Prevnar)*	
Inquire about access to behavioral health/psychiatric services: ☐ Order psychiatric referral*	Consult Case Management and social work: ☐ Support enrollment in appropriate services (e.g., disability)

J. DISCHARGE	
☐ Confirm patient's pain is adequately controlled ☐ Schedule outpatient follow-up with PCP, hematology, or other SCD expert within 1 week	
Determine the patient's current supply of pain medication If patient has adequate supply of pain medication, do not prescribe	If patient does not have adequate supply of pain medication: ☐ Check prescription monitoring program (I-STOP)[viii] ☐ Prescribe 3-day supply of opioids.* Consider 5-7-day supply. ☐ Prescribe adjunctive NSAIDS (consider renal function; should not be prescribed alone) ☐ Prescribe constipation prophylaxis
Provide and review SCD Pain Home Management discharge instructions and SCD education: ☐ Discuss signs of serious complications and instruct patient to return to ED if experience (e.g., acute chest syndrome, stroke, sepsis, fever, etc.) ☐ Discuss addiction awareness ☐ Discuss overdose signs ☐ Prescribe Naloxone kits (for self and family members) if receiving ≥50 mg/day morphine equivalent dose ☐ Consider recommending that the patient discusses other disease modifying treatments with hematologist: ☐ Hydroxyurea ☐ L-glutamine[ix]* ☐ Discuss setting up individualized treatment plan with SCD provider	

Limitations

- The order set was developed by and for NYC clinicians and may not be generalizable to SCD care across the United States
- Whether this order set improves outcomes has not yet been demonstrated
- Despite high median ratings, some panelists disagreed on some items – the order set should be adapted to individual clinic settings
- Only 10 clinicians were involved, who brought their individual judgement and experience to the process

Conclusions

- A valid, reliable, and reproducible method was used to develop an order set to help standardize care for patients experiencing VOEs in NYC EDs

- Items in the order set have been shown to improve outcomes:
  - Implement or establish a patient's SCD plan
  - Implement rapid triage (ESI level 2)
  - Initiate analgesic therapy within 30 minutes of triage
  - Assess pain repeatedly throughout the visit
  - Schedule follow-up appointments at discharge

- Consistent with the National Heart, Lung, and Blood Institute (NHLBI) Guidelines and Community Care of North Carolina Sickle Cell Task Force local protocol

- **Implementation of this order set in NYC EDs is ongoing**

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