Sickle Cell Disease (SCD) Pain Pathway: Inpatient Management

June 2026

Children's Healthcare of Atlanta

Initial Workup

Inclusion Criteria

Sickle cell disease
> 1 year old, with acute pain

Patient admitted with standard orders[1]

Assess within 30-60' of arrival to unit

1. Admission Orders

- Aflac IP Sickle Cell Disease Admission orderset
- Daily CBC-Diff & retic
- CMP 2x/week & RFP daily on the other days

Non-pharmacologic interventions

For every patient, consult:
- Child Life, PT, School Teacher
- ADL: hygiene by 9am, 8hrs of sleep each night

Consult as needed:
- Psychology, Psychiatry, Chaplain, Social Work

Opioid
- Assess effectiveness of doses given in ED
- Assess level of consciousness
- Assess pain relief

Opioid Excess
- **Symptoms**: over-sedation, bradypnea
- Reduce opioid dosing

Non-opioids

See medication tables on pages 3-7
- **NSAID**: ketorolac if not contraindicated
- **Acetaminophen:** schedule for all patients if not contraindicated
- **Focal superficial pain**: lidocaine patch, diclofenac gel
- **Muscle tenderness**: methocarbamol or follow pain plan
- **Neuropathic/hyperesthesia**: gabapentin
- **Bowel regimen:** must order for every patient

Does patient have a Pain Plan or is on buprenorphine?

Yes → Follow Pain Plan

No

1. Patients >8 yo: Start morphine PCA, unless declined by patient/family, contraindicated, or patient has individual pain plan
2. Patients </= 8yo, start morphine NCA (continuous infusion with nurse-controlled analgesia)
3. For opioid-naïve patients: consider nalbuphine PCA or NCA based on age. An opioid-naïve patient is one who has never received IV opioid in the past.

Other Long Acting Opioids
(methadone, morphine, oxycodone-ER)
- Do not discontinue home dosing
- Refer to individual pain plan
- If on PCA, use bolus dosing only.

PCA Started?

No → Schedule intermittent opioid dosing for one day

Yes → Reassess 2x daily

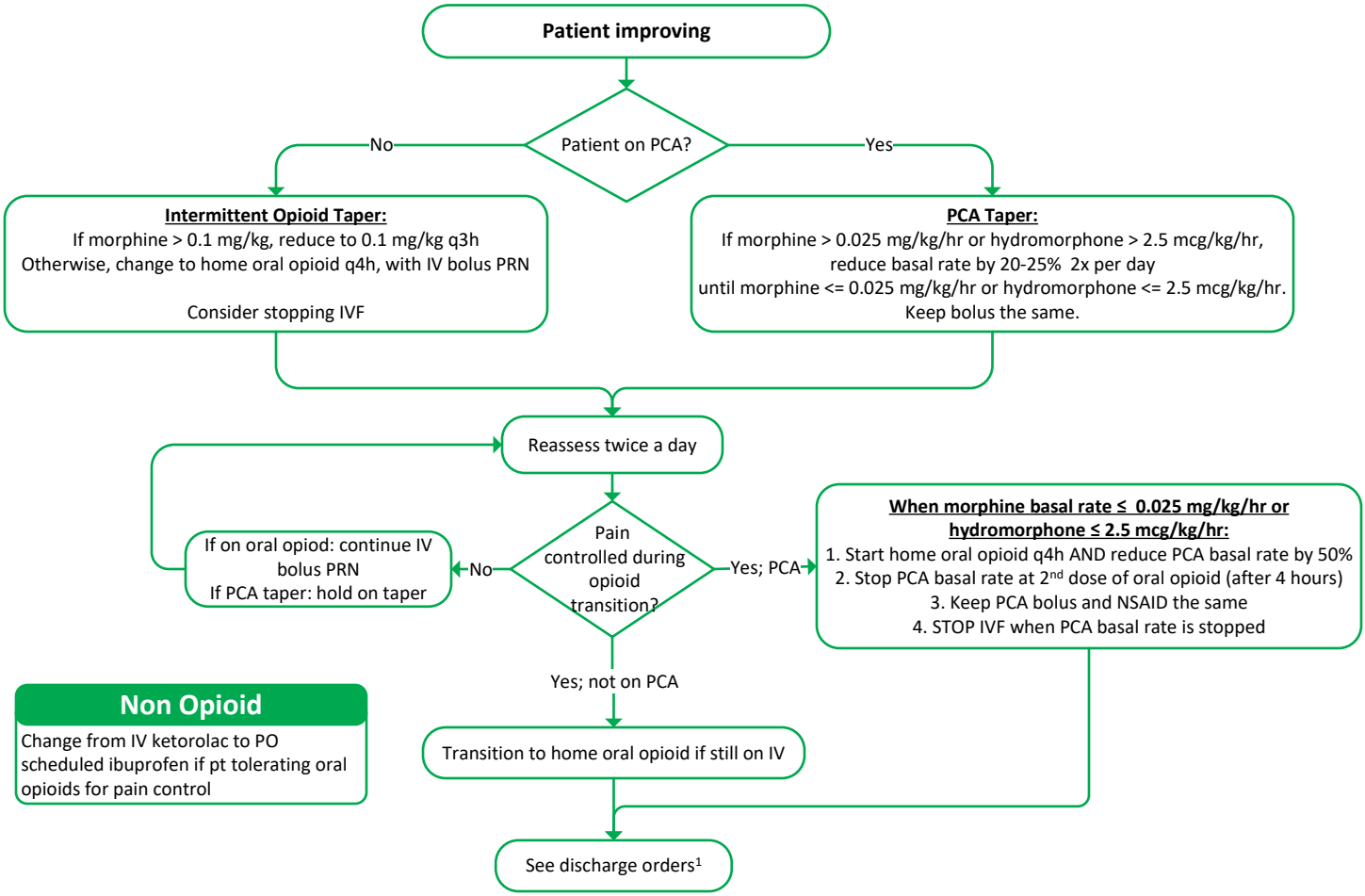
Did pain improve?

Yes → Following day: begin tapering per flowchart on page 2

No → Consider increasing dosing, adding additional agents, or changing opioid

If pain is severe for over 2 days or prolonged for over 4 days, Anesthesia Pain Service

Patient Improving/Opioid Tapering



Non Opioid

Change from IV ketorolac to PO scheduled ibuprofen if pt tolerating oral opioids for pain control

1. Discharge Orders

- Instructions: opioid q6h x 1 day, NSAID scheduled x 2 days, then PRN
- If on full agonist opioids ≥ 10 days, consider home tapering schedule
  - Discuss with pharmacist
- Prescribe: adequate pain meds for at least 72 hrs
- Follow up appointment: If VOE only, follow up within 3 months or sooner, at discretion of IP team.
- Refill management: *Patients may not get appt for up to 3 months.*
  - *Opioids max 1 month supply*
  - Non-opioids up to 3 months supply
- If Psychiatry consulted and patient being discharged on psychotropic medications, order Outpatient Psychiatry FU appt

IV Opioids

Medication	Route	Morphine Mg Equivalents (MME)	Dosage	Notes
Morphine	IV	10 mg IV morphine = 30mg PO morphine	**Infants >6 months, Children, and Adolescents:** **Initial Bolus Dosing**: < 50 kg: 0.1-0.2 mg/kg /dose every 3-4 hours, initially may use 0.05 mg/kg/dose. Maximum 5mg/dose. ≥50 kg: 2-6 mg /dose every 2-4 hours. Maximum 8mg/dose. **Initial PCA Dosing:** 0.01-0.04 mg/kg/hr continuously (basal rate). Patient controlled dose (bolus) 0.01-0.04 mg/kg. For PCA bolus: give 50-100% of PCA basal rate.	Recommended first choice. Renal failure is a contraindication. Consider bolus only PCA in patient on long-acting opioids or older patients
Hydromorphone	IV	1.5mg IV hydromorphone = 30mg PO morphine	**Infants >6 months, Children, and Adolescents:** **Initial Bolus Dosing**: < 50 kg: 0.015 mg/kg /dose every 3-4 hours ≥50 kg: 0.2-0.6 mg /dose every 2-4 hours. Maximum 1mg/dose Opioid naive **Initial PCA Dosing:** 1-4 mcg/kg/hr continuously (basal rate). Patient controlled dose (bolus) 1-4mcg/kg. For PCA bolus: give 50-100% of PCA basal rate.	
Nalbuphine	IV		**Infants >6 months, Children, and Adolescents:** - **Initial Bolus Dosing**: 0.1- 0.15 mg/kg /dose every 3-6 hours. Maximum: 10mg/dose - **Initial PCA Dosing**: 0.01-0.04 mg/kg/hr continuously (basal rate). Patient controlled dose (bolus) 0.01 -0.03 mg/kg. For PCA bolus: give 50-100% of PCA basal rate.	Partial opioid agonist/antagonist. Consider for use in opioid-naïve patients. **Do not use** in patients who are on daily or long-acting opioids at home because antagonist may displace the other opioids from receptors.

Non-steroidal anti-inflammatory drugs (NSAID)

Drug	Population	Route	Dose	Frequency	Comments
ketorolac	Children ≥ 2 years and Adolescents ≤16 years	IM, IV	0.5 mg/kg/dose maximum dose: 30 mg/dose Do not exceed 5 days (or 20 total doses) per month	Q6-8h	Caution in patients with renal impairment Patient limit to 20 doses of ketorolac in 30 days Order oral ibuprofen after 20th dose of ketorolac (on admission) Consider discontinuing IV Toradol when improving, or at discharge •GI prophylaxis: add famotidine or PPI
ibuprofen	Children ≥ 6 months	Oral	10 mg/kg/dose maximum daily dose: 40 mg/kg/day or 3,200 mg/day	Q6-8h	
naproxen	Children ≥ 6 months	Oral	5 to 6 mg/kg/dose (maximum daily dose: 1,000 mg/day	Q8-12h	Caution in patients with renal impairment Consider first line for patients with dysmenorrhea or inadequate pain relief with ibuprofen

Oral Opioids

Medication	Population	Dosage	Frequency	Notes
morphine (immediate release)	Opioid Naïve*	0.15 mg/kg/dose	Q4-6h	*A patient who has never received IV opioid in the past.
	Patient weight <50 kg	0.3mg/kg/dose	Q4-6h	
	Patient weight ≥50 kg	7.5mg-15mg, Max dose 30mg	Q4-6h	
hydrocodone/ acetaminophen	Patient weight <50 kg	Initial dose: 0.1-0.2 mg/kg/dose	Q4-6h	Limit use of combination products Consider for patients who require suspension Caution with total daily acetaminophen dose
	Patient weight ≥50 kg	Initial dose: 5-10 mg Forms: 5/325, 7.5/325, 10/325, oral solution 7.5/325 per 15 ml	Q4-6h	
hydromorphone	Patient weight <50 kg	Immediate release: 0.03 to 0.08 mg/kg/dose	Q3-4h	
	Patient weight ≥50 kg	Immediate release: initial Opioid-naive: 1 to 2 mg (usual adult dose 2-4mg/dose)	Q3-4h	
oxycodone	Infants ≤6 months	Initial dose: 0.025 to 0.05 mg/kg/dose	Q4-6h	
	Infants >6 months, Children, and Adolescents ≤50 kg	Initial dose of 0.1 to 0.2 mg/kg/dose Usual max dose range: 5 to 10 mg	Q4-6h	
	Children, and Adolescents >50 kg	5-10 mg Max Dose: 20mg	Q4-6h	
Long-acting Opioids: must discuss with primary hematology team before starting				
methadone	Infants > 6 months, Children, and Adolescents <50 kg	0.05-0.1mg/kg/dose	Q8-12h	Long-acting opioid, full opioid agonist
	Children, and Adolescents ≥50 kg	5-10mg Maximum **initial** dose 5mg	Q8-12h	
buprenorphine +/- naloxone	adolescents >/= 16 years	Refer to individual pain plan	Q8-24h	Consult SCD Pain Team. See POP 1-02 Buprenorphine Induction and Maintenance. Younger patients may be considered on an individual basis.

Opioid Equianalgesic Doses[6]

Recommend two-clinician verification with opioid conversions prior to placing order with additional confirmation using GlobalRPH.com.

Drug	PO/PR (mg)	SubQ/IV (mg)
Morphine	3	1
OxyCODONE	2	n/a
HYDROmorphone*	0.75	0.15
Methadone	*(see page 10)*	
FentaNYL *(see page 8)*	n/a	0.01 (10 mCg)

Equianalgesic ratios are ***approximate***. The ratios chosen above reflect a consensus drawn from several sources. Other conversions tables exist and may show different ratios. Individual patients may have very different absorption or cross tolerance and ALL opioid conversion procedures should be conducted or overseen by clinicians with experience.

*Hydromorphone ratios have been shown to have large interpatient variability.[11]

Treatment/Prevention of Medication Side Effects

Indication	Medication	Population	Dosage	Frequency	Notes
Prophylaxis for gastritis from NSAIDs	famotidine (1st choice)	Infants, Children, & Adolescents	0.5-1mg/kg/dose Max: 20mg/dose	Q12h	
	PPI - omeprazole	Infants, Children, & Adolescents	1-4mg/kg/day Max: 40mg/day	Q24h	
Constipation	polyethylene glycol 3350 (first choice)	Infants, Children, & Adolescents	0.2-0.8g/kg/day Forms: powder 8.5, 17 g Max: 17g	1x daily or divided doses	
	Senna Sennosides: Syrup (8.8 mg sennosides/5 mL)	Children < 2 years	1.25-2.5mL (2.2-4.4mg) per day Max daily: 5mL (8.8mg) per day	1x daily	
		Children 2 to <6 years	2.5-3.75 mL (4.4-6.6 mg sennosides) at bedtime Max: 3.75 mL (6.6 mg sennosides) 2x daily	1-2x daily	
		Children 6 to <12 years	5-7.5 mL (8.8-13.2 mg sennosides) at bedtime Max: 7.5 mL (13.2 mg sennosides) 2x daily	1-2x daily	
		Children ≥12 years and Adolescents	10-15 mL (17.6 -26.4 mg sennosides) at bedtime Max: 15 mL (26.4 mg sennosides) 2x daily	1-2x daily	
	magnesium citrate	Children 2 to <6 years	60-90 mL administered as a single dose or in divided doses	1-2x daily	Contraindication: do not use if on low salt diet
		Children 6 to <12 years	90-150 mL administered as a single dose or in divided doses	1-2x daily	
		Children ≥12 years and Adolescents	150-300 mL administered as a single dose or in divided doses	1-2x daily	
	lactulose	Children and Adolescents	0.667-2g/kg/day (1-3mL/kg/day) divided (max 6g/day (90ml/day))	Q2h until bowel movement	Contraindicated in patients on galactose-restricted diet.
	bisacodyl	Children ≥3 years to <10 years	5 mg	1x Daily	
		Children 10 to <12 years	5 to 10 mg	1x Daily	
		Children ≥12 years and Adolescents	5 to 15 mg	1x Daily	

Treatment/Prevention of Medication Side Effects

Indication	Medication	Population	Dosage	Frequency	Notes
Pruritus	hydroxyzine	Children and Adolescents	0.5 mg/kg/dose (10 mg may be sufficient) (maximum dose: 50 mg/dose)	Q6-8h	Concerns related to adverse effects: QT prolongation/torsade's de pointes: Oral hydroxyzine is contraindicated in patients with a prolonged QT interval.
	diphenhydramine	Infants and Children	1 mg/kg/dose usual dose: 12.5 to 25 mg/dose (maximum dose: 50 mg/dose)	Q6-8h	Monitor closely for over-sedation
		Adolescents	1 mg/kg/dose usual dose: 25 to 50 mg/dose (maximum dose: 50 mg/dose)	Q6-8h	
	cetirizine	Children < 2 years	2.5 mg	1x daily	
		Children 2-5 years	2.5-5mg	1x daily	
		Children > 5 years	5-10mg	1x daily	
	nalbuphine	Children and Adolescents	10-20mcg/kg IV	Q6h	Effects may be potentiated when used with other sedative drugs.
	naloxone	Infants, Children, & Adolescents	IV Drip: Prevention 0.25mcg /kg/hr Treatment 1-3 mcg/kg/hr	Continuous infusion	
Nausea/ Vomiting	ondansetron	Infants, Children, & Adolescents	IV: 0.15 mg/kg/dose once (maximums: 8mg/dose, 32mg/day) 8 -15 kg: Oral: 2 mg/dose once. 15 - 30 kg: Oral: 4 mg/dose once. 30 kg: Oral: 8 mg/dose once	Q8h	Monitor for signs of serotonin syndrome.
	promethazine	Children ≥2 years and Adolescents	Oral, rectal: 0.25mg/kg/dose Do not exceed usual adult dose of 6.25 - 25 mg/dose	Q6h	Caution if patient is also on an anti-psychotic medication, as the combination increases risk of sedation, dystonic reaction, and NMS. Consider giving with diphenhydramine to counteract extrapyramidal symptoms. Do not give IV.
Urinary Retention	bethanechol	Children and Adolescents	Oral: 0.3 to 0.6 mg/kg/day in 3 to 4 divided doses max dose: 10 mg	Q6-8h	Reflux infection: If patient has bacteriuria, there is potential for reflux infection if the sphincter fails to relax as bethanechol contracts the bladder.
	nalbuphine	Children and Adolescents	10-20mcg/kg IV	Q6h	Effects may be potentiated when used with other sedative drugs.
	naloxone	Infants, Children, & Adolescents	IV Drip: Prevention 0.25mcg /kg/hr Treatment 1-3 mcg/kg/hr	Continuous infusion	

Other Pain Treatment

Indication	Medication	Population	Route	Dosage	Frequency	Notes
Local Anesthetic	lidocaine	Children ≥ 12 years and Adolescents	Patch OTC 4%	1 patch can be used for up to 12h No more than 1 patch should be used in a 24-hour period	1x per 24h	Apply patch to painful area; only on intact skin. Do not use around or in the eyes. Avoid exposing application site to external heat sources (e.g., heating pad, electric blanket, heat lamp, hot tub).
		Children and Adolescents	Topical Ointment	Max dose: 4.5 mg/kg/dose Do not exceed 300 mg/dose		Do not leave on large body areas for >2 hours
	diclofenac	Children and Adolescents	Topical Gel 1%	1 g is ~2 cm long strip of gel < 40 kg: 2g to large joints, 1g to small joints. >/= 40 kg: 4g to large joints, 2g to small joints.	BID-QID	
Muscle Relaxant	methocarbamol	Patients > 2 years	Oral	15 mg/kg Max dose 1500 mg	Q8h	CNS depression: May cause CNS depression, which may impair physical or mental abilities; patients must be cautioned about performing tasks which require mental alertness
			IV	15 mg/kg Max 1000 mg/dose, Max 3 days	Q8h	
	cyclobenzaprine	Adolescents ≥15 yo: Oral	Immediate release tablet	5 mg 3x daily; may increase up to 10 mg 3x daily if needed. Do not use longer than 2-3 weeks.		Monitor closely for over-sedation, serotonin syndrome, anti-cholinergic effects.
Neuropathic Pain	gabapentin	Children and Adolescents	Oral	- Initial: 5 mg/kg/dose up to 300 mg at bedtime - Day 2: Increase to 5 mg/kg/dose 2x daily (up to 300 mg 2x daily) - Day 3: Increase to 5 mg/kg/dose 3x daily (up to 300 mg 3x daily) further titrate with dosage increases (not frequency) to effect. When given 3x daily, the maximum time between doses should not exceed 12 hours. Max 3600mg/day		Administer first dose on first day at bedtime to avoid somnolence and dizziness.
Priapism	pseudoephedrine		Oral	30-60 mg at bedtime, additional 30 mg when priapism occurs.	Q6h PRN	
Anxiety/ Agitation	hydroxyzine	Children and Adolescents	Oral	0.5 mg/kg/dose every 6 hours (maximum dose is age-dependent: Age <6 years: 12.5 mg/dose; age ≥6 years: 25 mg/dose)		Oral hydroxyzine is contraindicated in patients with a prolonged QT interval.

Avoid benzodiazepines (lorazepam, diazepam) to treat muscle spasm or anxiety in patients on opioids due to additive risk of respiratory depression.

REFERENCES

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2. Brandow et al. American Society of Hematology 2020 guidelines for sickle cell disease: management of acute and chronic pain, Blood Advances 2020

3. Carullo V, Morrone K, Weiss M, et al. Demand-only patient-controlled analgesia for treatment of acute vaso-occlusive pain in sickle cell disease. Pediatr Blood Cancer. 2022;69(8):e29665. doi:10.1002/pbc.29665

4. Heneghan C, CPNP, Vasquez S, MD, Finnerty L, LCSW, et al. Pediatric Palliative Care Approach to Pain & Symptom Management. Dana Farber Cancer Institute/Boston Children's Hospital Pediatric Advanced Care Team Blue Book Nov 2023

REVISION HISTORY

Rev	Change Description	Date
0	Initial document creation	3/24/2026