



*Impact of an Emergency Department Pain Management Protocol in Pediatric Patients with Vaso-Occlusive Crisis (VOC)*

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# Background



- Sickle cell disease (SCD) affects ~72,000 people in the United States
- VOC is a complication of sickle cell disease
  - “acute, recurrent, unpredictable, and chronic problem”
- Hospital admission rate is 41-64% for patients with uncomplicated VOC

NIH. Publication No. 02-5214. 2002.

Givens M, et al. *The Journal of Emergency Medicine*. 2007; 32(3):239-243.



# Current VOC Management Guidelines

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- American Pain Society, 1999
  - *Clinical Practice Guideline for the Management of Acute and Chronic Pain in Sickle Cell Disease*
- Recommendations
  - IV or Sub-Q morphine or hydromorphone within 15-20 minutes of arrival in the ED
  - Re-evaluation 15-30 minutes post-dose
  - Opioid titration continued until pain relief is seen



# Compliance with Recommendations



- Adult patients presenting to the ED
- Examined analgesic use, time of initial analgesic administration, pain scores compared to guideline recommendations
- Results
  - 90 minutes to initial analgesic
  - 87% received either morphine or hydromorphone
  - 55% received by recommended route (IV or Sub-Q)
- Conclusions
  - “Further research required to identify strategies and/or protocols that will result in the delivery of rapid analgesia for patients with acute pain episode from SCD in the ED.”



# Compliance with Recommendations



- Adult patients presenting to the ED
- Implemented a pain management protocol
- Examined the total number of hospital visits, likelihood of return to the ED within 30 days, total number of hospital admissions
- Results
  - Decrease in the number of hospital admissions
  - Decrease in the likelihood of return to the ED within 30 days
- Conclusions
  - Pain management protocol improved patient outcomes



# Purpose



- To determine the impact of a VOC pain management protocol in a pediatric ED on patients presenting with uncomplicated VOC



# Methods



- Retrospective chart review
  - Inclusion
    - Children presenting to ED as identified by DRG
    - Received at least 1 opioid analgesic dose
  - Exclusion
    - Other admission or disposition diagnoses (eg, fever, acute chest syndrome)
    - Repeat visit within the calendar month



# Protocol



'PHYSORDER'

Children's Hospital  
Sickle Cell: Acute Pain Crisis  
Pain Management Orders  
Page 2 of 3

Form Origination Date: 9/07  
Version: 1

Version Date: 9/07



This form may be completed on line. Tab or move cursor to text field and type in text.

For HIPAA Compliance reasons, this form IS NOT TO BE SAVED with patient information. Selecting the PRINT button will clear all information from the note.

Patient Name \_\_\_\_\_  
MRN \_\_\_\_\_  
PATIENT IDENTIFICATION LABEL

5. INITIAL OPIOID DOSE: Select one based on previous history and drug sensitivity
- Morphine sulfate \_\_\_\_\_ mg (0.1 to 0.15 mg/kg/dose) IV X 1 (maximum initial dose 10 mg)
  - Hydromorphone \_\_\_\_\_ mg (0.015 to 0.02 mg/kg/dose) IV X 1 (maximum initial dose 1.5 mg)
  - Meperidine \_\_\_\_\_ mg (1 to 1.5 mg/kg/dose) IV X 1 (maximum initial dose 100 mg)  
(may only use meperidine if morphine or hydromorphone intolerant)

6. RESCUE DOSING: After initial dose, reassess pain score and sedation level every 20 minutes X 2. If pain score is  $\geq$  to original score and sedation score is  $\leq$  2, administer 25% of initial opioid dose. Select one:
- Morphine sulfate \_\_\_\_\_ mg (\_\_\_\_\_ mg/kg/dose) IV every 20 minutes prn pain X 2
  - Hydromorphone \_\_\_\_\_ mg (\_\_\_\_\_ mg/kg/dose) IV every 20 minutes prn pain X 2
  - Meperidine \_\_\_\_\_ mg (\_\_\_\_\_ mg/kg/dose) IV every 20 minutes prn pain X 2  
(may only use meperidine if morphine or hydromorphone intolerant)

7. MAINTENANCE DOSE: After last dose, observe patient for 60 minutes. Contact resident physician to obtain order for maintenance dose which equals the sum total of initial dose and subsequent rescue dose(s). Administer maintenance dose as ordered if sedation score is  $\leq$  2.

8. OBSERVATION: Observe patient for 60 minutes after maintenance dose. Contact resident physician to assess patient, determine

9. If patient is to be admitted and select one:

PATIENTS < 12 YEARS equals maintenance

PATIENTS  $\geq$  12 YEARS [link to [pedspainc](#)]

Continue PCA info

Physician Signature \_\_\_\_\_  
s06ee001stgpmgnt



'PHYSORDER'

Children's Hospital  
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MRN \_\_\_\_\_  
PATIENT IDENTIFICATION LABEL

10. NONSTEROIDAL ANTIINFLAMMATORY DRUGS (NSAIDS): SELECT ONE

Medication	Dose	Route	Frequency	Indication
<input type="checkbox"/> Ibuprofen	_____ mg (10 mg/kg/dose; max dose 800 mg)	PO	X 1	Pain
<input type="checkbox"/> Ketorolac	_____ mg ( 0.5 mg/kg/dose; max dose 30 mg) (order BMP prior to administration of ketorolac)	IV	X 1	Pain

11. ANTIPRURITIC:

Medication	Dose	Route	Frequency	Indication
<input type="checkbox"/> Diphenhydramine	_____ mg (1 mg/kg/dose; maximum 50 mg)	<input type="checkbox"/> PO <input type="checkbox"/> IV	X 1	Itching

12. OTHER ORDERS:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 10. NONSTEROIDAL ANTIINFLAMMATORY DRUGS (NSAIDS): SELECT ONE

Medication	Dose	Route	Frequency	Indication
<input type="checkbox"/> Ibuprofen	_____ mg (10 mg/kg/dose; max dose 800 mg)	PO	X 1	Pain
<input type="checkbox"/> Ketorolac	_____ mg ( 0.5 mg/kg/dose; max dose 30 mg) (order BMP prior to administration of ketorolac)	IV	X 1	Pain

## 11. ANTIPRURITIC:

Medication	Dose	Route	Frequency	Indication
<input type="checkbox"/> Diphenhydramine	_____ mg (1 mg/kg/dose; maximum 50 mg)	<input type="checkbox"/> PO <input type="checkbox"/> IV	X 1	Itching

Time \_\_\_\_\_ AM/PM  
OTE 920611 9/07



# Methods



- 
- Time frame
    - Pre-implementation: February - March 2007
    - Post-implementation: November - December 2007
  
  - Data
    - Demographics
    - Time to readmission
    - Home medications
    - Registration and triage time
    - Time to first analgesic administration
    - Time to subsequent analgesic administration
    - Vital signs including pain scores



# Outcomes Measures



- Primary Outcomes
  - Success rate
    - Discharge from ED
    - No return visit within 72 hours
  
- Secondary Outcomes
  - Guideline compliance
    - Medication administered
    - Time to first analgesic dose
  - Pain relief

## Pre-implementation

63 encounters (36 patients)

26 included

37 excluded

- 25 for fever &/or received antibiotics in ED
- 11 for repeat visits
- 1 received no medication

## Post-implementation

89 encounters (58 patients)

33 included

56 excluded

- 32 for fever &/or received antibiotics in ED
- 22 for repeat visits
- 1 for asthma exacerbation
- 1 received no medication



# Results - Demographics



	Pre- Implementation (n=26)	Post- Implementation (n=33)
Age (years) Median (range)	14 (3-16)	14 (0.58-17)
Gender; n (%)		
Male	15 (58)	16 (48)
Female	11 (42)	17 (52)
Home hydroxyurea; n (%)	5 (19)	4 (12)
Home pain regimen; n (%)	24 (92)	30 (91)
Initial Pain Score (out of 5) Median (range)	4 (1-5)	4 (0-5)



# Results



	Pre-implementation	Post-implementation	
		Form Used	Form Not Used
Success rate	11/26 (42)	13/25 (52)	3/8 (38)
Discharged; n(%)	12/26 (46)	14/25 (56)	5/8 (63)
No return in 72 hours; n(%)	11/12 (92)	13/14 (93)	3/5 (60)
LOS in ED (hrs)	5.5	5.9	5.6
Return to ED in 30 days; n(%)	8/12 (67)	5/14 (36)	4/5 (80)
Compliance with protocol; n(%)	N/A	4/25 (16)	N/A



# Results



	Pre-implementation (n=26)	Post-implementation	
		Form Used (n=25)	Form Not Used (n=8)
Time to 1 <sup>st</sup> opioid; hrs (range)	1:09 (0:30-2:19)	1:06 (0:31-1:50)	1:49 (0:11-2:47)
Time between 1 <sup>st</sup> & 2 <sup>nd</sup> opioid; hrs (range)	1:33 (0:55-2:45)	0:55 (0:20-1:46)	1:06 (0:30-1:30)
# of opioid doses; median (range)	3 (1- 4)	3 (1- 5)	3 (1- 4)



# Results



Last Pain Scores	Pre-implementation (n=20)	Post-implementation	
		Form Used (n=22)	Form Not Used (n=8)
Median (range)	4 (0-5)	2 (0-5)	1 (0-4)
Admitted; median	4	3	3
Discharged; median	3	1	0.5



# Limitations



- Barriers to implementation
- Retrospective
  - All inclusive?
  - Relied on documented information
- Protocol violations
  - Procedure if schedule disrupted
    - Out of the unit
    - Other patient(s) required nurses attention
  - Compliance
    - q20 minute checks
    - Dissatisfaction with protocol



# Conclusions



- Pain management protocol has the potential to decrease the number of hospital admissions for uncomplicated VOC.
  - Appropriate and timely analgesic administration
- Further education needs to be provided
  - Importance of the protocol
  - How to use the protocol effectively
  - What to do if the patient gets off schedule
- Follow up analysis
  - Protocol compliance
  - Re-examination of outcomes



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