Quality Improvement in Sickle Cell Disease:
Step 1-Improving Time to Initial Opioid Pain Medication in the Pediatric ED

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Objectives

- The ‘Quality Gap’ in SCD medical care
- SCD and ED Pain Management
- Improving Time to Initial Pain Medication
  - A Pediatric ED QI Initiative at BMC
- Conclusions
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A Brief History

- 1970-Robert Scott’s Seminal Reports
  - Health Care Priority and Sickle Cell Anemia
  - Sickle Cell Anemia: High Prevalence and Low Priority

- 1972-National Sickle Cell Anemia Control Act
  - Creation of 10 ‘comprehensive care centers’ with $10 million from NIH given to initiate support for clinical research studies
Treatment Advancements in SCD

- PCN prophylaxis
- Hydroxyurea
- Bone Marrow Transplant
- TCD screening and Stroke Prevention
- Pneumococcal vaccination
Despite therapeutic medical advances, widespread variation in care continues\textsuperscript{1-3}

A gap exists between advances in medical care and the effective use of those advances in practice
  - Preventing improvement in clinical outcomes

\textsuperscript{1}Smith et al, 2006, \textsuperscript{2}Davis et al, 1997
\textsuperscript{3}Booker et al, 2006
Gaps in SCD Care

- **Penicillin Prophylaxis**\(^4\)
  - Children only received enough antibiotics to cover 40% of the year

- **Barriers to TCD Screening**\(^5\)
  - Only 41-51% of eligible patients screened

- **SCD: A Question of Equity & Quality**\(^1\)
  - $9 spent on CF : $1 spent on SCD

2004-Sickle Cell Treatment Act

- Emphasis on improving quality of care by authorizing HRSA to fund up to 40 FQHCs via a competitive grant program with emphasis on medical treatment, education and other services for SCD patients

- Establishes a national coordinating and evaluation center to oversee SCD funding and research and distribution of information regarding best practices
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SCD and ED Pain Management

- VOE most common reason for ED visit\(^6\)

- ED as last resort
  - After exhausting all home opioid options\(^7\)

- High frequency users of ED\(^8\)
  - More severe disease
  - More complications

\(^6\)Yusuf et al 2010, \(^7\)Smith et al, 2008, \(^8\)Wolfson et al, 2012
Importance of Timely Pain Management

- Leading organizations advocate rapid assessment and treatment\(^9\)

- Wang et al., 41 quality indicators
  - timely pain assessment and treatment for VOE received highest ratings by the expert panel\(^10\)

- Quality Measure: Initial parenteral opioid medication within 30 minutes

Current status

- Pediatric reports of time to initial opioid pain medication:
  - 69-90 minutes\textsuperscript{11,12}

- Adult reports of time to initial opioid pain medication:
  - 74-80 minutes\textsuperscript{13,14}

\textsuperscript{11}Zempsky et al 2010, \textsuperscript{12}Shenoi et al, 2011, \textsuperscript{13}Tanabe et al, 2010, \textsuperscript{14}Lazio et al, 2010
Barriers to Effective ED Pain Management

- ED Crowding
  - Waiting times/occupancy rates\(^\text{15}\)
- Pain and triage level acuity\(^\text{16}\)
- Patient factors
  - Age, Language\(^\text{16}\)
- Provider Attitudes\(^\text{17,18}\)
  - Assumptions of ‘drug seeking behavior’
  - High Utilizers
  - Race

\(^\text{15}\)Pines et al 2008, \(^\text{16}\)Mitchell et al, 2009, \(^\text{17}\)Todd et al 2006
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Understanding the Patient Perspective

- Departmental specific initiative using qualitative research to better understand the unmet needs of children with SCD
  - Parents of children with SCD
  - Adolescents with SCD
Methods

- Focus groups and Interviews at BMC
  - Parents of children with SCD
    - 0-5 yrs
    - 6-11 years
    - 12-18 yrs
  - Adolescents with SCD

ED Care Suboptimal
"The emergency room, they do their best to keep me comfortable, and I usually feel better when I come in, because they give me pain medicine. They do all the tests there, to figure out what’s really going on. So the emergency room’s fine."
Delays in Pain Medications

“[The residents] are like, ‘Well, we’re waiting for the hematologist to call back.’ So then I’ll just say…’Do you want me to tell you what they usually do, because they usually start him on the IV now, because he’s in a lot of pain.’ And they’ll say, ‘Ok, we can try that.’”
“Cause sometimes, he’ll be like, ‘Mommy, can I get some painkillers?’ They’ll give him painkillers, but sometimes...they might give him something not as strong as [needed] to soothe the pain. They might give him something and it doesn’t really help, he needs something stronger, and he’s like ‘Where’s the doctor?’”
Access Issues

“I have horrible veins, because I’ve been stuck every month this year, so it takes 8 sticks or 5 sticks usually to actually get an IV in. And by the 5th or 8th stick, I’m absolutely done. I cry.”
Faster Admissions Process

“The amount of time it took from the ER to upstairs… I think we came around 3 in the afternoon and we didn’t get upstairs until 8 and I mean that’s too long… they want food and they’re crying and they’re tired.”
QI Journey

- **Why:**
  - Our current system of care is not meeting the needs of our patients

- **What, Where, and Who:**
  - To improve time to initial pain (opioid) medication to 30 minutes or less for patients with sickle cell disease presenting to BMC Pedi ED with pain

- **How?**
Every system is perfectly designed to get the results it gets

-Paul Batalden
Pediatric ED-BMC

- Clinical Setting
  - 16 bed ED
  - 5 acute beds staffed by 1-2 nurses per shift
  - Staffed by: 1 Pediatric ED attending, 1 fellow and 4-5 residents

- Annual Pedi ED volume: 27,500 visits
Resource Limitation

- EMR limitation at BMC
- RN Staffing
  - Triage
  - Acute side
- Reliance on ED for pain management
  - Day Hospital closed due to funding
Staff and System Barriers

- RN and MD staff
  - Why change? System not seen as broken
  - Pain not a treatment priority

- Systems not built for rapid tests of change
  - IT turnaround limited
  - Analysis Paralysis vs. Testing by next Tuesday
Model for Improvement

- Setting Aims
- Establishing Measures
- Selecting Changes
- Testing Change

Implementing Change
Quality Improvement

- Defined as:
  - Iterative cycles of testing to *LEARN* what changes can be made to improve care process

- Primary Assumption:
  - Solutions are best identified by testing in actual clinical settings with multidisciplinary input

- Effective Strategy:
  - Start small and spread tests of change as ‘degree of belief’ that interventions will lead to improvement grows
Multidisciplinary Team

- QI Advisor
- Pedi ED
- Pharm
- Social Work
- Nursing
- IT
- Patients
- Pedi Heme
- SCD Researcher

Improvement
ED SCD Pain Management
Step by Step

Pre-Intervention Process Map

- Arrived to ED
  - ED Triage
    - Placed on Acute Side
      - Patient Registered
        - +/- Oral Pain Med
          - IV Placement
            - Call Peds Home
              - Opioid IV Pain Med
                - Admission Decision

Process Map Key:
- Terminator
- Process
- Decision
- Flow Line

- PCA Order
- PCA Initiation
- Admission Request
- Inpatient Bed Arranged
- Admit Patient

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Exceptional Care. Without Exception.
What we started with....
Questions at the beginning

- How long are patients waiting in the ED prior to initial assessment?
  - Can we expedite that process?

- Once assessed, how long do patients wait to receive pain medications?

- What is the best timing for pedi hematology input?
  - Before ED arrival → before pain med → at time of admission

- Does patient satisfaction improve if we improve the care processes involved in the ED?
Our ‘Checklist Manifesto’

- Needed a tool with two roles:
  - Identify problems and facilitate constant feedback
  - Serve as ‘prompt’ for ED RNs, Residents, Attendings on steps of care

- Checklist created and immediately tested in ED
Keys to Learning: Measurement

- **Outcome Measures:**
  - Time to Initial Pain (Opioid) Medication from ED Triage
  - Patient satisfaction scores*

- **Process Measures:**
  - Time from ED arrival to ED triage to ED bed placement
  - Time to initial RN and MD assessment
  - Pain level pre/post pain medications
  - Time to IV

- **Balancing Measures:**
  - Staff satisfaction scores
  - Patient satisfaction scores*
Initial Results

Time to First Pain Medication

Checklist Introduced

75.2 min

Individual Patients/Date Seen
Early Lessons Learned

- Checklist can successfully be used by ED for VOE
  - Without time-specific goals, no improvement

- Time to pain med not great: 75 minutes
  - IV dose within 30 minutes - Difficult

- Further testing with improved checklist needed
Repeat Cycles of Testing for Learning

- Test #2-Checklist amended to include time specific goals

- Test #3-All patients started with oral pain med if not taken within 4 hours prior to ED presentation
  - #3b: if >3sticks → Subcutaneous Dose

- Test #4-Introduced patient satisfaction/patient-centeredness of care assessment
Realizing Initial Improvement

Time to 1st Pain Med

Checklist Introduced

Checklist with time specific goals*

Communication with ED Staff

* Oral dose if not within 4h, SQ alternative, Reasons for Delay
Time to 1st Pain Med

by Problem Identified

* Oral dose if not within 4h, SQ alternative, Reasons for Delay
Lessons Learned

- Oral route faster than IV
  - but most patients taking oral pain med within 4 hours of ED presentation
  - And oral not fast-acting (parenteral)

- Only 1 patient receiving subcutaneous dose
  - Patient reported he’d rather get stuck 6-7x for IV than get another subcutaneous dose!

- Difficult with IV access confirmed

- Despite this: Patients are happy with care
  - Outcome measure→Balancing Measure
We Need Another Idea!

- Need to find another way for initial pain med to get to patient within 30 minutes

- **Intranasal Fentanyl**
  - Not used in SCD Pain Management
  - Used to control pain—Fractures, other conditions
    - Benefit unknown in non-narcotic naïve
  - Telfer et al \( \rightarrow \) Intranasal Diamorphine\(^{18}\)

- Onset of Action-5-10 minutes
  - Lasts 30-40 minutes
    - In time for IV!
  - Parenteral

\(^{18}\)Telfer et al, 2009
And the survey says….
Lessons Learned

○ Feasibility
  ● Time to pain med has decreased significantly from 46 min to 19 min (overall from 75 min)
  ● Growing RN comfortability with process

○ Effectiveness
  ● Some patients with benefit
  ● Continued issues with IV access-so potential
  ● Patients>64kg frequent in ED, so not getting theoretical appropriate dose

○ Tolerance
  ● Well-tolerated; however some don't like swallowing pain med after being given intranasally
  ● Minimal complaints of irritation
Then to Now

- Revised checklist to ‘guideline’ with time specific goals with **streamlined steps in care**

- Continued testing with IN Fentanyl as initial opioid medication given
  - Now 2 doses for everyone

- Increasing Autonomy of ED Staff
  - Pedi Heme Input after 2\textsuperscript{nd} IV dose
  - Creation of SCD Pain Med Calculator

- New PCA pumps
Sickle Cell Patient with Pain?

Use Excel spreadsheet for all dose calculations

Moderate/Severe (Pain ≥ 5)

See Reverser for MILD pain

1. Assess Pain (Document in BEX)

2. Give 2 DOSES of Intranasal Fentanyl, 5 minutes apart, to all patients >10kg (Refused/Document in BEX)

3. Reassess pain and give 1st dose IV opiate pain med (Document pain and time given in BEX)

4. Give 2nd dose IV opiate pain med (Document time given in BEX)

5. Reassess Pain and page Fidi Hematologist on call AFTER 2 doses of Intranasal Fentanyl AND 2 doses IV pain medication

6. Order PCA, Tenecol and request inpatient bed

7. Initiate PCA (Document time given in BEX)

To PCA/Admit or Oral/DC

If increased Fentanyl NOT given:
- Imaging
- Reduced
- IV placed

Please help us learn reason(s) for delay:

Date of Visit: _/__/________

Time: __________

Triage Time: ______

Time from Triage

Remember to administer IV dosing ASAP if IV is already placed

Remember to offer DEX/Pain med after 2-3 IV attempts

Remember to continue IV dosing until PCA is initiated

If admission required

Admission Decision

≤ 120 min

≤ 70 min

≤ 60 min

≤ 50 min

≤ 30 min

≤ 15 min

≤ 10 min

≤ 5 min

2 doses IN Fentanyl

2 doses IV Opioid
Only Enter Age and Weight
Time to First Parenteral Opioid

Mean = 56.7 min

Mean = 29 min

Intranasal Fentanyl

Mean = 22.9 min

Algorithm: Streamlined Care Steps

Goal: 30 min

Individual Patients Over Time
Time to 2\textsuperscript{nd} Opioid IV Dose

![Time to 2nd Opioid IV Dose Sept 2010 - June 2012](chart)

- Mean = 99.3 min
- Mean = 86.9 min
- Intranasal Fentanyl
- Algorithm - Streamlined Care Steps
- Goal: 60 min

Individual Patients Over Time
Time to PCA Initiation

Time to PCA Initiation Sept 2010 - June 2012

Mean = 212.1 min
Intranasal Fentanyl

Mean = 166.8 min
Algorithm: Streamlined Care Steps

Goal: 120 min
Time to Admission Request

Mean = 161.2 min

Mean = 127 min
Time to Discharge Disposition

Mean = 256.9 min

Mean = 171.5 min
Aim Statement: First dose of parenteral opioid analgesia within 30 minutes of triage for uncomplicated Sickle Cell pain

Primary Drivers:
- Timely Medication Ordering
- Route of Medication Delivery
- Shared mental model

Secondary Drivers:
- Timely bed placement
- Timely MD assessment
- Timely RN order double-check
- Standardized calculation of appropriate medication doses
- PED and Hematology staff is aware of the treatment plan
- Patients and families are aware of and willing to consent to the treatment plan

Change Strategies:
- Timely triage
- Pain Medication Calculator auto calculates weight-and age-based doses
- Sickle Cell Medication Group Ordering in EMR
- VOE Algorithm: Intranasal Fentanyl and time directed care steps
- PED and Hematology provider education
- Patient education
Driving toward sustainability

- Is checklist/guideline needed?
  - Nurses see documentation outside EMR as redundant

- Can we sustain results?

- ED MD/RN Buy-In
  - Now see problem but still question so much focus on one patient population
Next Steps

- IV visualizer
  - To decrease number of sticks per successful IV placement

- Continue to improve use of IN Fentanyl and VOE Guideline

- Assimilate ‘guideline’ into EMR
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Take Away Points

- QI provides a way to improve systems of care

- It is based on repeated testing with the purpose to learn what is effective or not within the system

- Importance of Multidisciplinary Input
  - Especially from patients/families

- Start small, build sequentially on learning
Navigating our Quality Journey

- Patient centered care vs. Standardization
- Ideal care vs. Care in reality
- Time to 1st pain med vs. Time to pain control
- Role of Patient Satisfaction
Bibliography