



Quality Improvement in Sickle Cell Disease:

Step 1-Improving Time to Initial Opioid Pain
Medication in the Pediatric ED

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September 27, 2012



Disclosures

- Research/Quality Improvement supported by:
 - Joel and Barbara Alpert Endowment for Children of the City
 - Deborah Munroe Noonan Memorial Research Fund
 - Health Resources and Services Administration



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



SCD and the Quality Gap

- Despite therapeutic medical advances, widespread variation in care continues¹⁻³
- A gap exists between advances in medical care and the effective use of those advances in practice
 - Preventing improvement in clinical outcomes

¹Smith et al, 2006, ²Davis et al, 1997

³Booker et al, 2006



Gaps in SCD Care

- Penicillin Prophylaxis⁴
 - Children only received enough antibiotics to cover 40% of the year
- Barriers to TCD Screening⁵
 - Only 41-51% of eligible patients screened
- SCD: A Question of Equity & Quality¹
 - \$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 visit⁶
- ED as last resort
 - After exhausting all home opioid options⁷
- High frequency users of ED⁸
 - More severe disease
 - More complications

⁶Yusuf et al 2010, ⁷Smith et al, 2008,

⁸Wolfson et al, 2012



Importance of Timely Pain Management

- Leading organizations advocate rapid assessment and treatment⁹
- Wang et al., 41 quality indicators
 - timely pain assessment and treatment for VOE received highest ratings by the expert panel¹⁰
- Quality Measure: Initial parenteral opioid medication within 30 minutes

⁹NHBLI, 2012, ¹⁰Wang et al, 2011



Current status

- Pediatric reports of time to initial opioid pain medication:
 - 69-90 minutes^{11,12}
- Adult reports of time to initial opioid pain medication:
 - 74-80 minutes^{13,14}

¹¹Zempsky et al 2010, ¹²Shenoi et al, 2011,

¹³Tanabe et al, 2010, ¹⁴Lazio et al, 2010



Barriers to Effective ED Pain Management

- ED Crowding
 - Waiting times/occupancy rates¹⁵
- Pain and triage level acuity¹⁶
- Patient factors
 - Age, Language¹⁶
- Provider Attitudes^{17,18}
 - Assumptions of 'drug seeking behavior'
 - High Utilizers
 - Race

¹⁵Pines et al 2008, ¹⁶Mitchell et al, 2009,
³Booker et al, 2006, ¹⁷Todd 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



ED Works Hard

- “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.’”



Underdosing Pain Medications

- “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

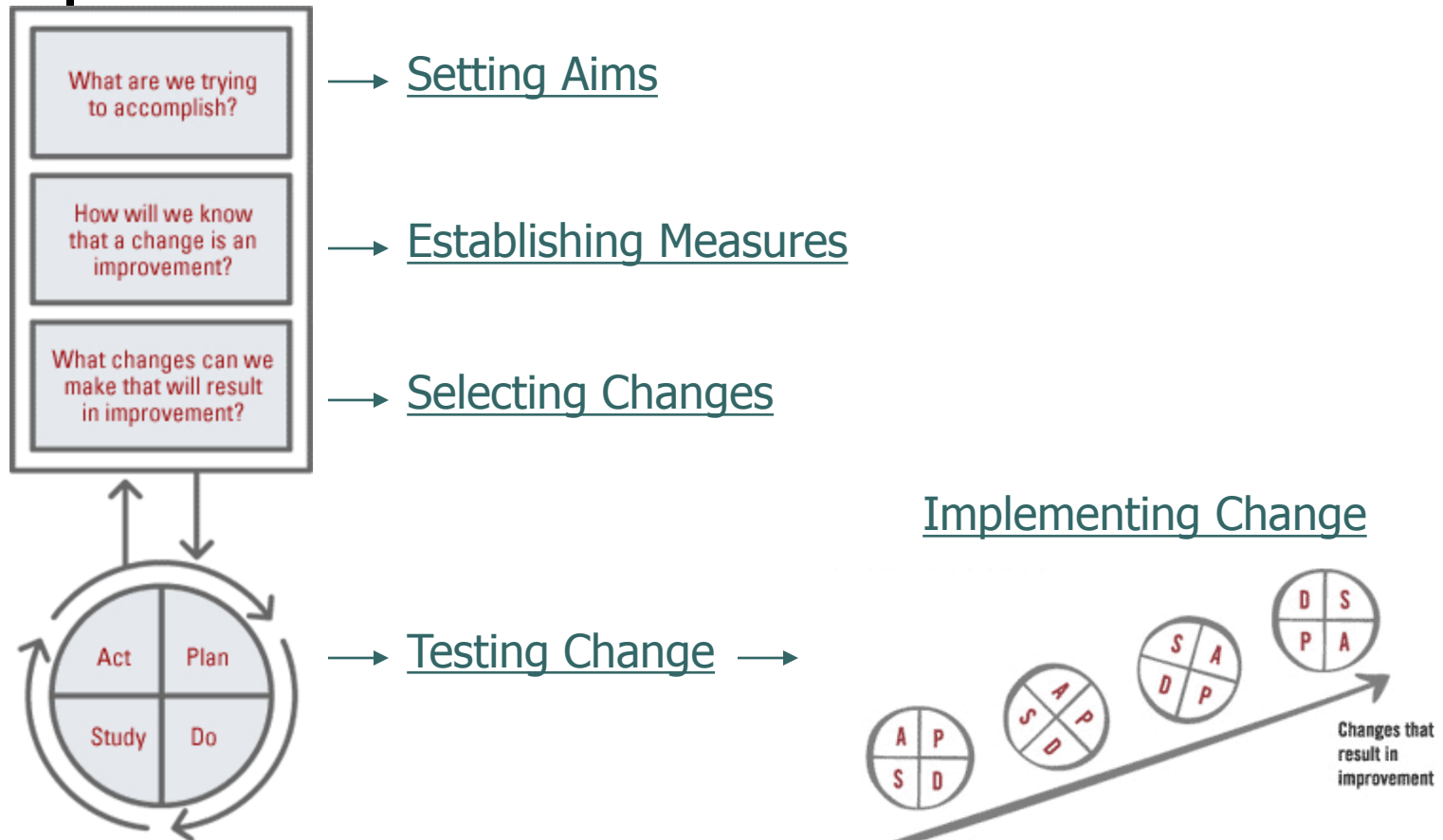
- EMR limitation at BMC
- RN Staffing
 - Triage
 - Acute side
- Reliance on ED for pain management
 - Day Hospital closed due to funding

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



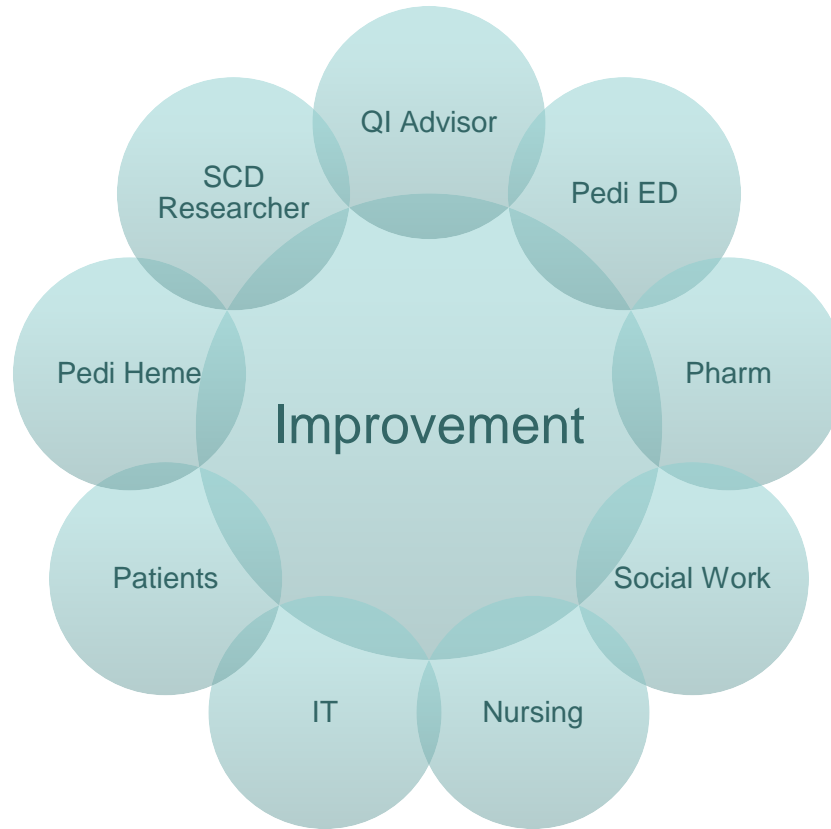


Quality Improvement

- 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

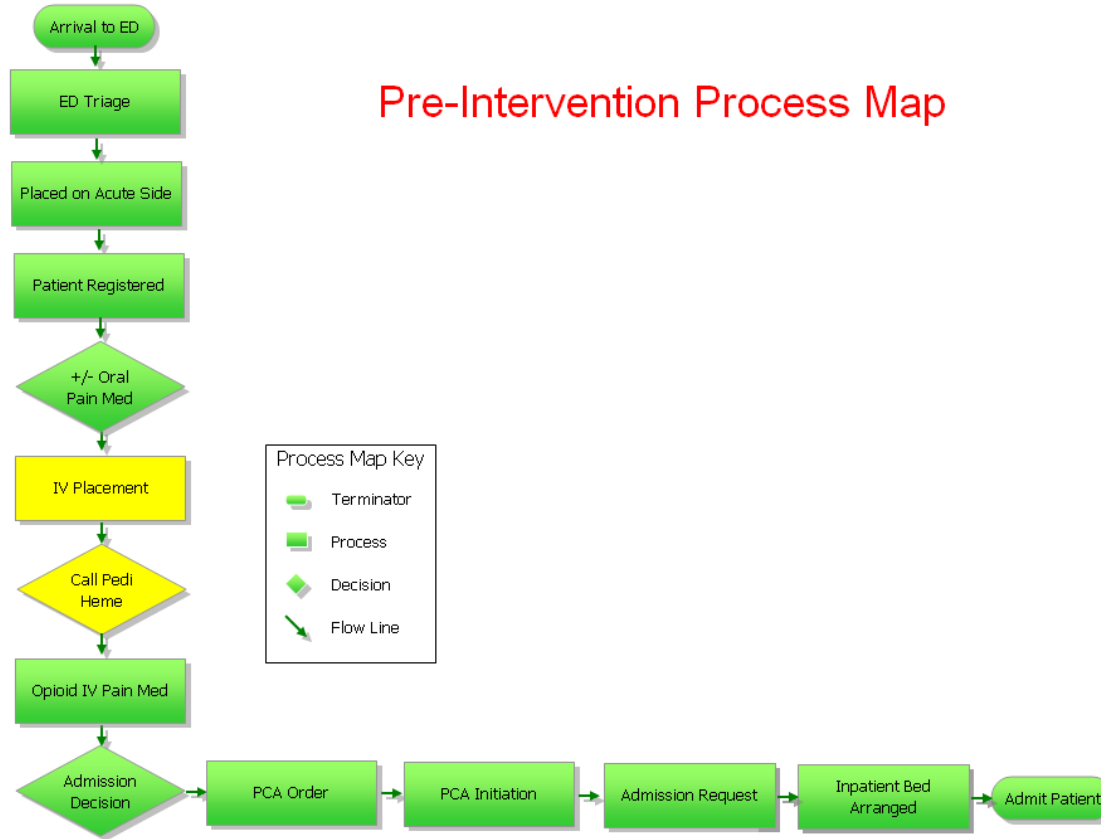


Multidisciplinary Team



ED SCD Pain Management

Step by Step





What we started with....



Boston University School of Medicine



EXCEPTIONAL CARE. WITHOUT EXCEPTION.



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:**

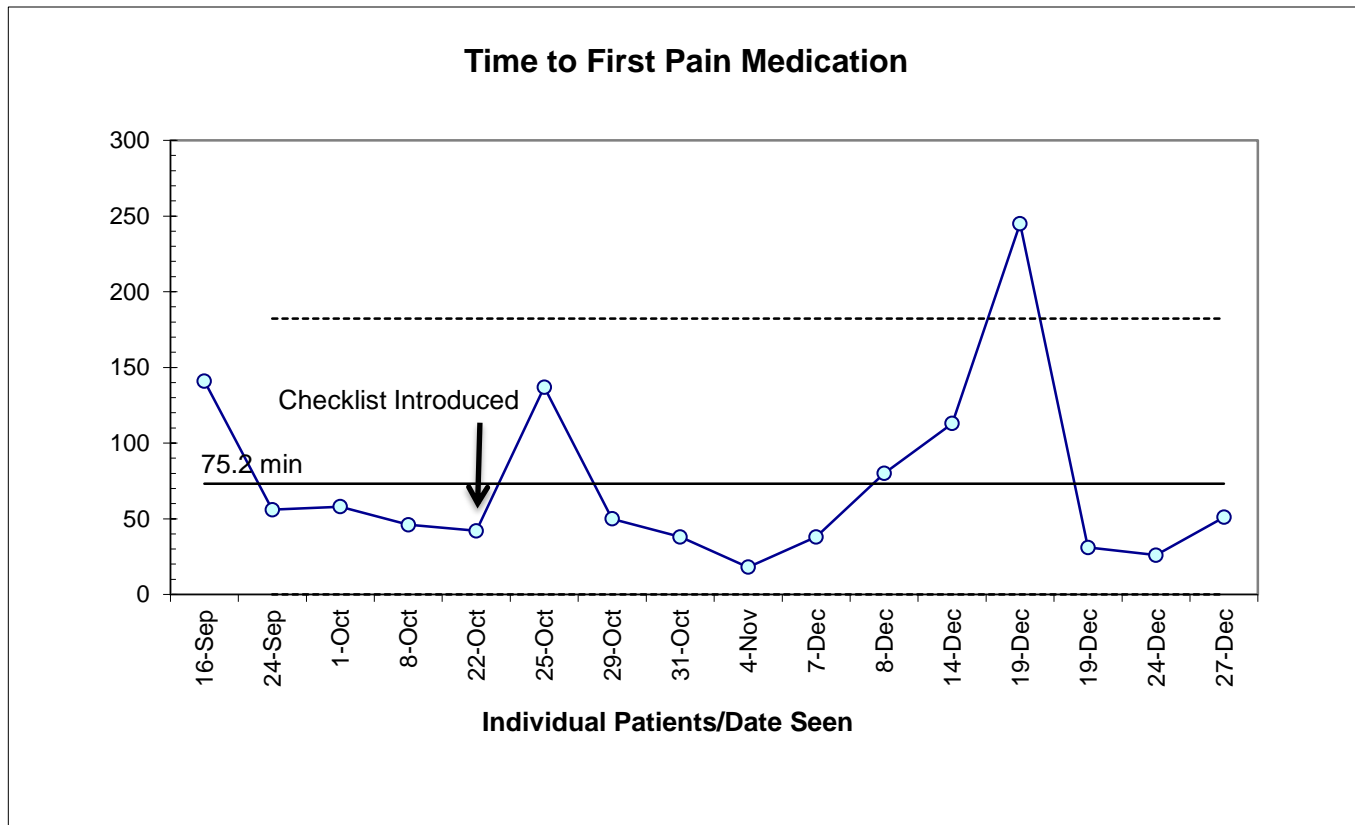
- Time from ED arrival to ED triage to ED bed placement
- Time to initial RN and MD assessment
- Pain level pre/post pain medications
- Time to IV

- **Balancing Measures:**

- Staff satisfaction scores
- Patient satisfaction scores*



Initial Results





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

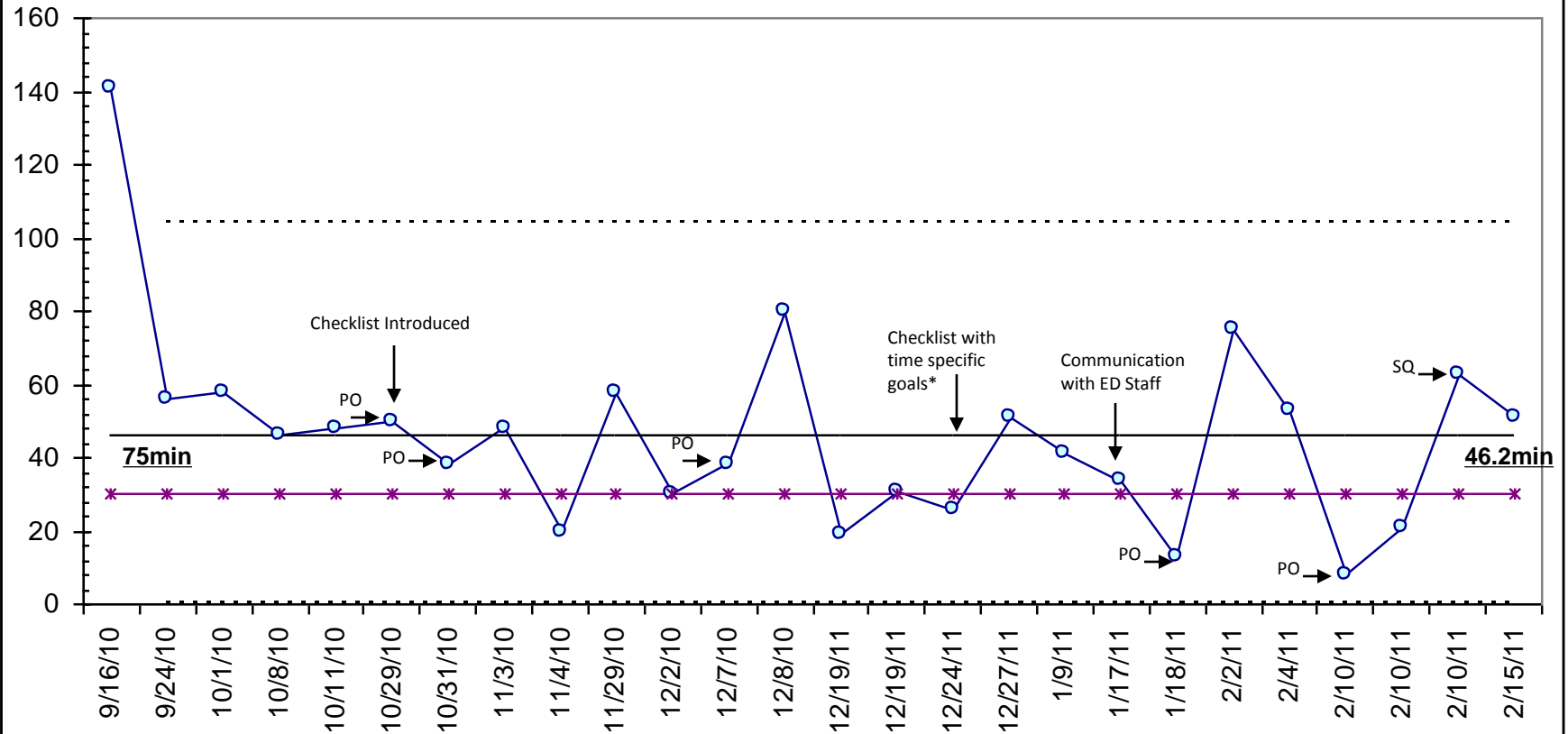


Repeat Cycles of Testing for Learning

- 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

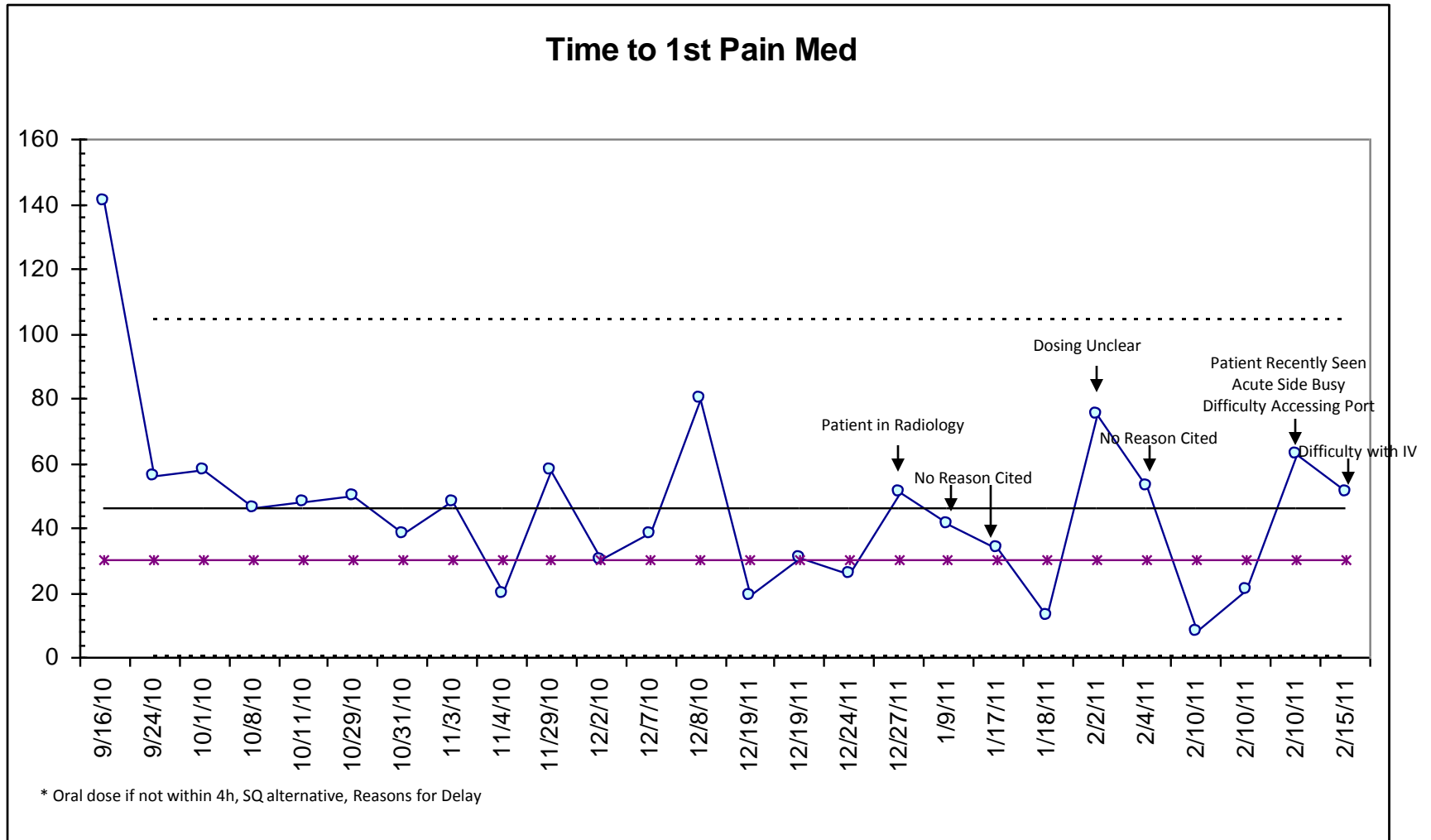
Time to 1st Pain Med



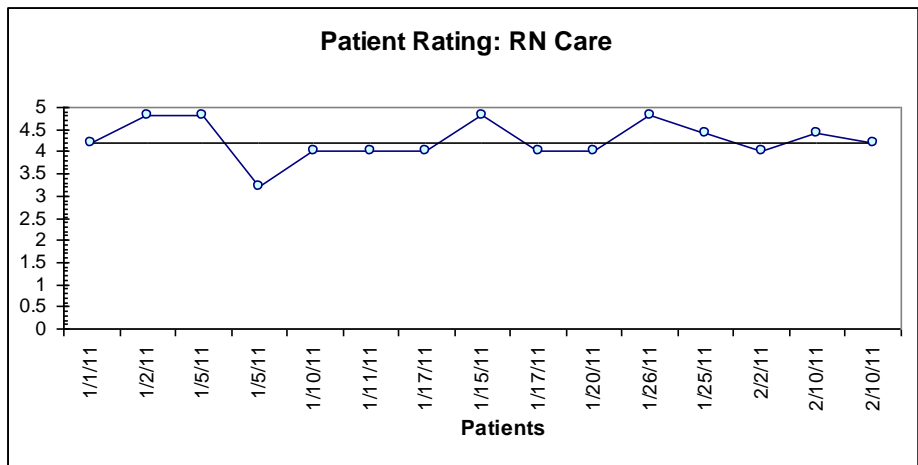
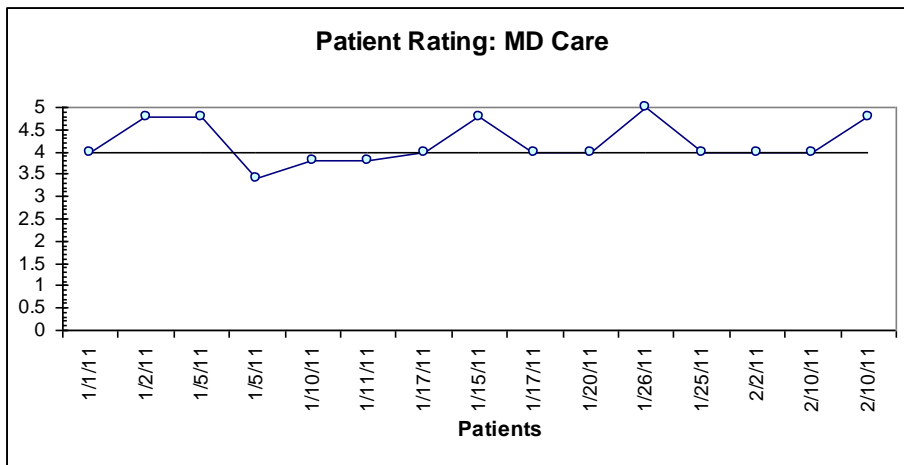
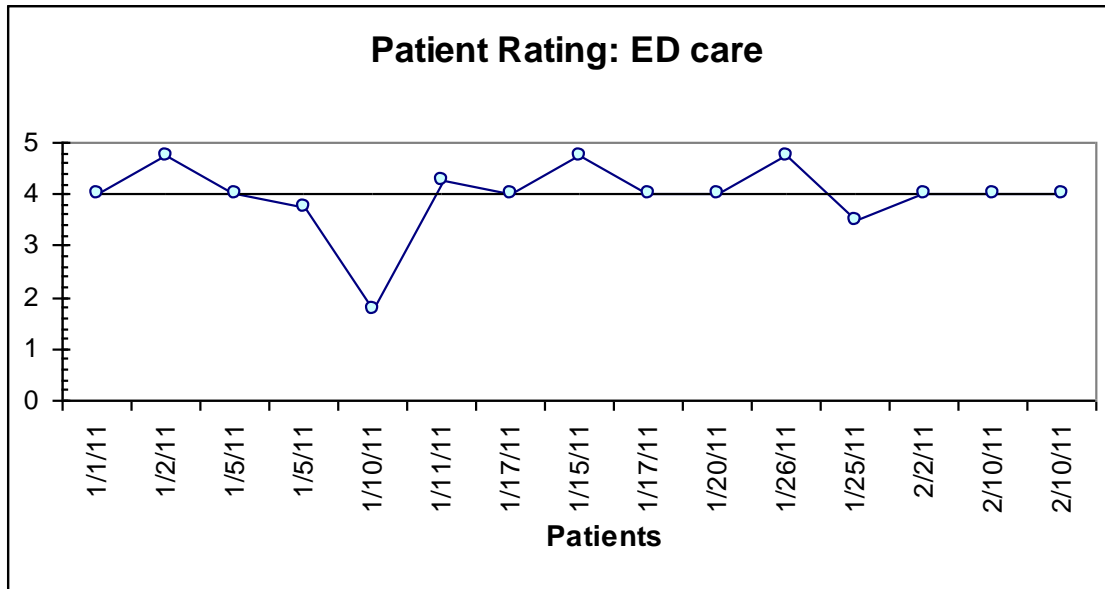
* Oral dose if not within 4h, SQ alternative, Reasons for Delay

Time to 1st Pain Med

by Problem Identified



Patient Ratings





Lessons Learned

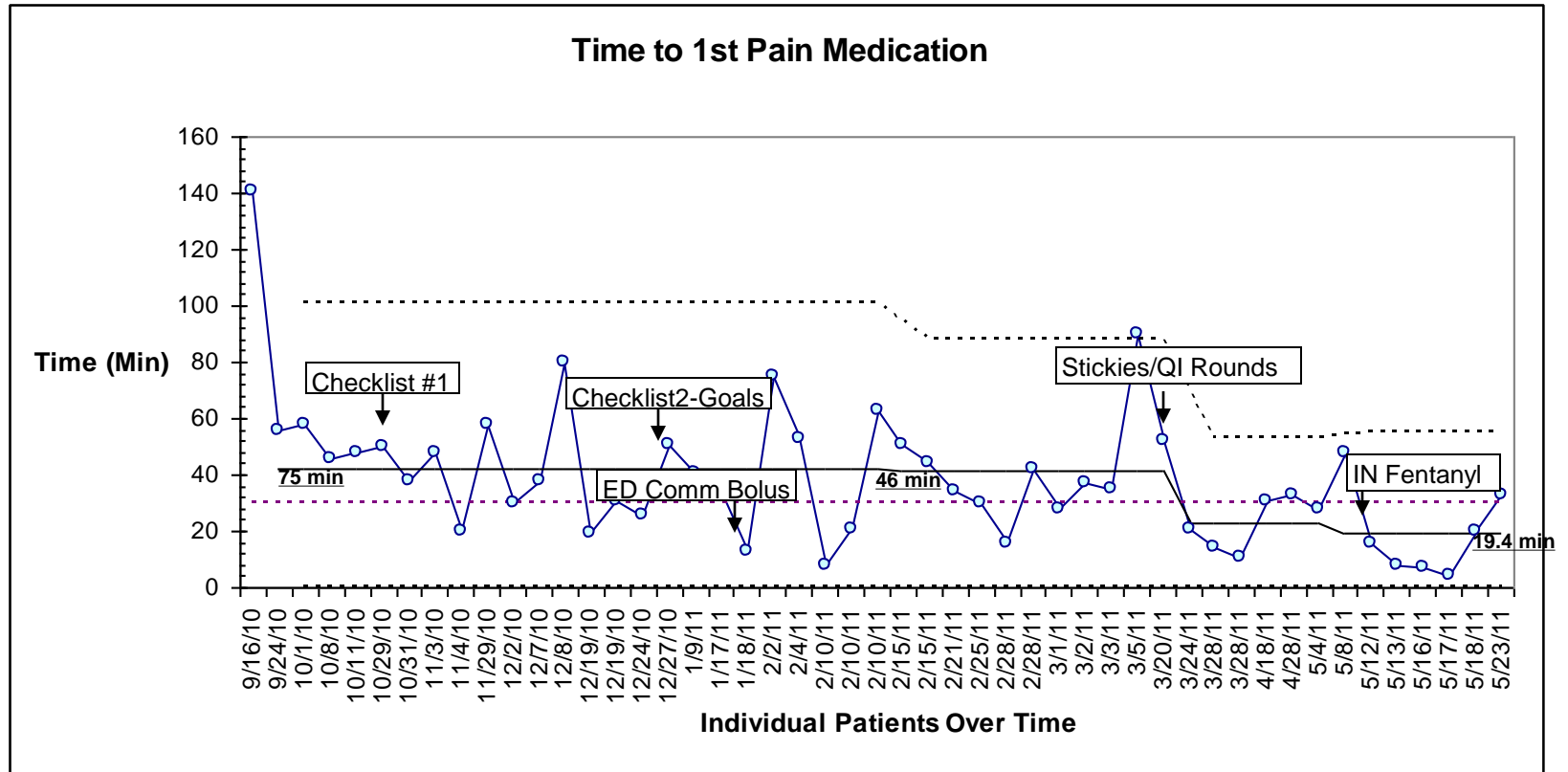
- Oral route faster than IV
 - but most patients taking oral pain med within 4 hours of ED presentation
 - And oral not fast-acting (parenteral)
- Only 1 patient receiving subcutaneous dose
 - Patient reported he'd rather get stuck 6-7x for IV than get another subcutaneous dose!
- Difficult with IV access 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→Intranasal Diamorphine¹⁸
- Onset of Action-5-10 minutes
 - Lasts 30-40 minutes
 - In time for IV!
 - Parenteral

And the survey says....





Lessons Learned

○ Feasibility

- Time to pain med has decreased significantly **from 46 min to 19min** (*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 2nd IV dose
 - Creation of SCD Pain Med Calculator
- New PCA pumps

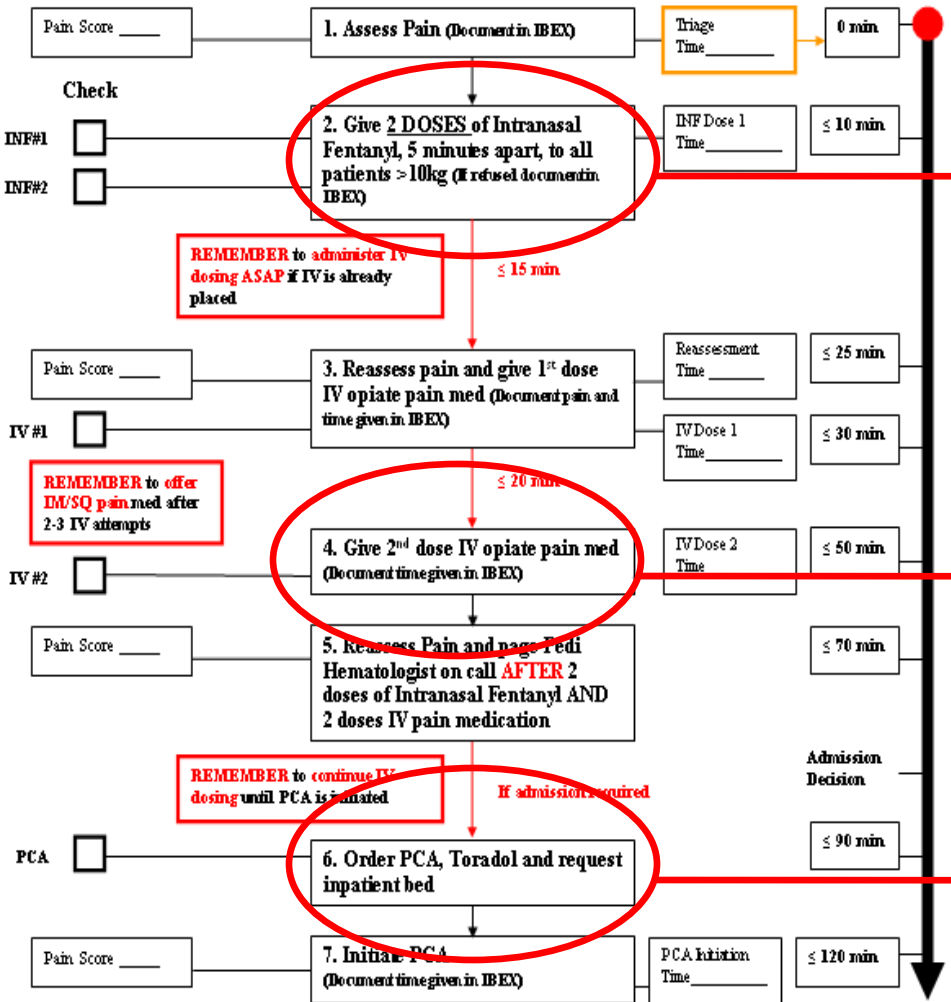
Sickle Cell Patient with Pain?

Use Excel spreadsheet for all dose calculations

Moderate/Severe (Pain ≥ 5)

See Reverse for MILD pain

Time from Triage



2 doses IN Fentanyl

2 doses IV Opioid

To PCA/Admit or Oral/DC

Date of Visit: ___/___/___ Triage Time: _____
 RN Print Name: _____
 RN Signature: _____
 MD Print Name: _____
 MD Signature: _____

If Intranasal Fentanyl not given:
 Refused
 IV placed

Please help us learn **reason(s) for delay:**
 Imaging IV access
 Other: _____

[Place patient sticker here]



Sickle Cell Pain Medication Calculator
Complete Blue Cells (Weight and Age) to Calculate Dose

Enter Patient Weight (kg)	30
Enter Patient Age (yr)	10



Only Enter Age and Weight

IntraNasal Fentanyl (not used in patients <10 kg)

Dose	~1.5 mcg/kg; round to closest 10 mcg	0
Volume	50 mcg/mL	0

For Moderate - Severe Pain (IV/IM/Subq)

IV Morphine (mg)	0.1 mg/kg 10 mg MAX/Dose	0.0
IV Hydromorphone (mg)	0.015 mg/kg 1.2 mg MAX/Dose	0.0
IV Ketorolac (mg)	0.5 mg/kg <12 yr: 15mg MAX/Dose ≥12yr: 30 mg MAX/Dose	0

PCA Orders

	Morphine		Hydromorphone	
	Dosing	Dosage	Dosing	Dosage
Loading Dose mg/kg	0.05	0.0	0.008	0.0
Basal Rate (mg/kg/hr)	0.02 - 0.04 mg/kg/hr	0.0 - 0.0	0.003 - 0.007 mg/kg/hr	0.0 - 0.0
PCA Dose (mg/kg)	0.015 mg/kg	0.0	0.0025 mg/kg	0.0
Lockout Period (min)	≥ 6 min	6	≥ 6 min	6
One hr Limit	0.17 - 0.19 mg/kg/hr	0.0 - 0.0	0.028 - 0.032 mg/kg/hr	0.0 - 0.0

Oral Medications

Short Acting Opioids

In ED, use: Oxycodone (immediate release) 5 mg, 15 mg tab 5 mg/5 mL solution	0.1 – 0.2 mg/kg MAX 15 mg/dose	0.0 - 0.0
Morphine (immediate release) 15 mg, 30 mg tab 10 mg/5 mL solution	0.2 – 0.5 mg/kg MAX 60 mg/dose	0.0 - 0.0
Hydromorphone (Dilaudid®) 2 mg tab	0.03 – 0.08 mg/kg MAX 2 mg/dose	0.0 - 0.0

Long Acting Opioid
(not commonly used in patients <50 kg, ck w/Heme)

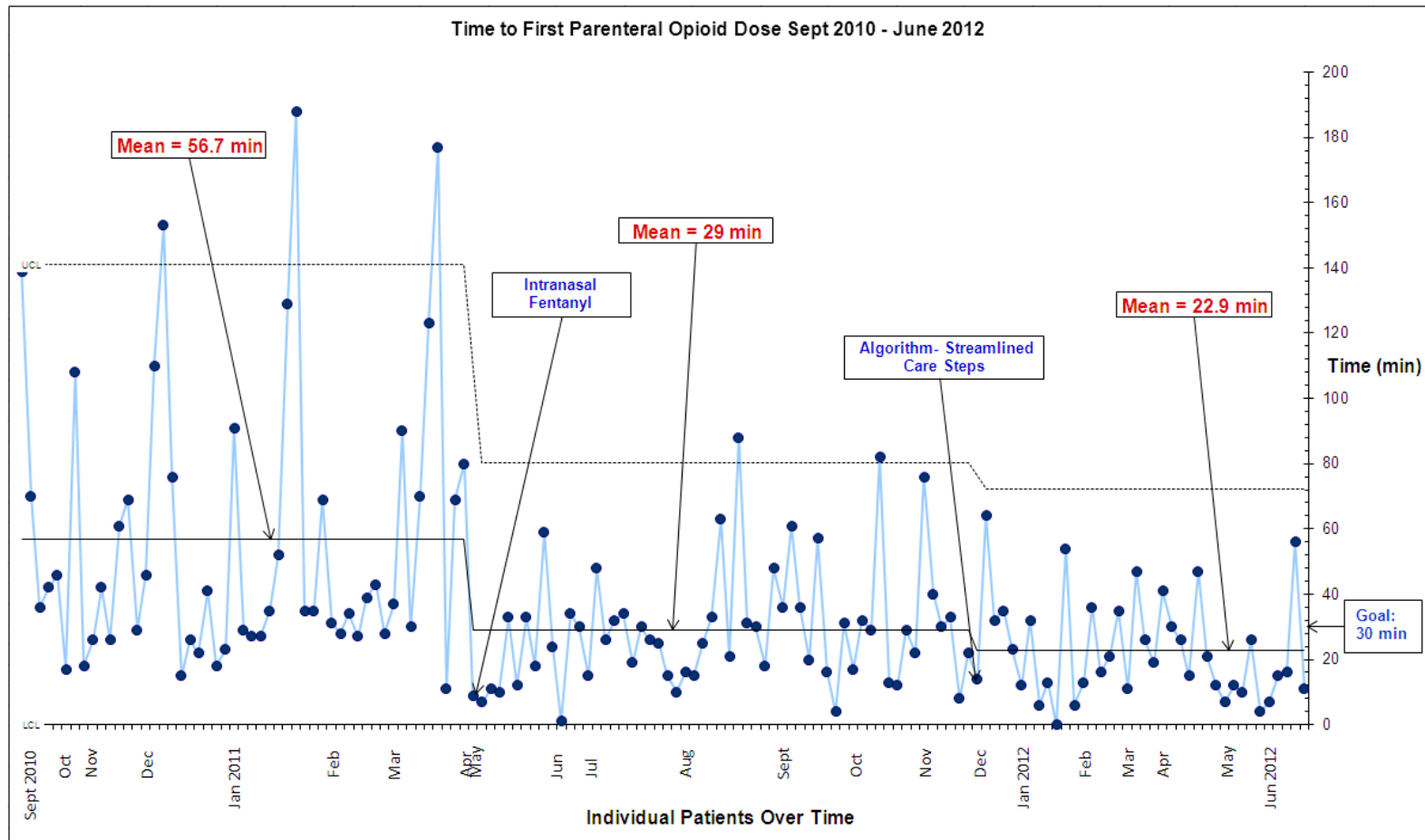
Morphine (sustained release-MS Contin®) 15 mg, 30 mg, 60 mg SR tab	0.3 – 0.6 mg/kg MAX 60 mg/dose	0 - 0
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Non-opioid Pain Medication

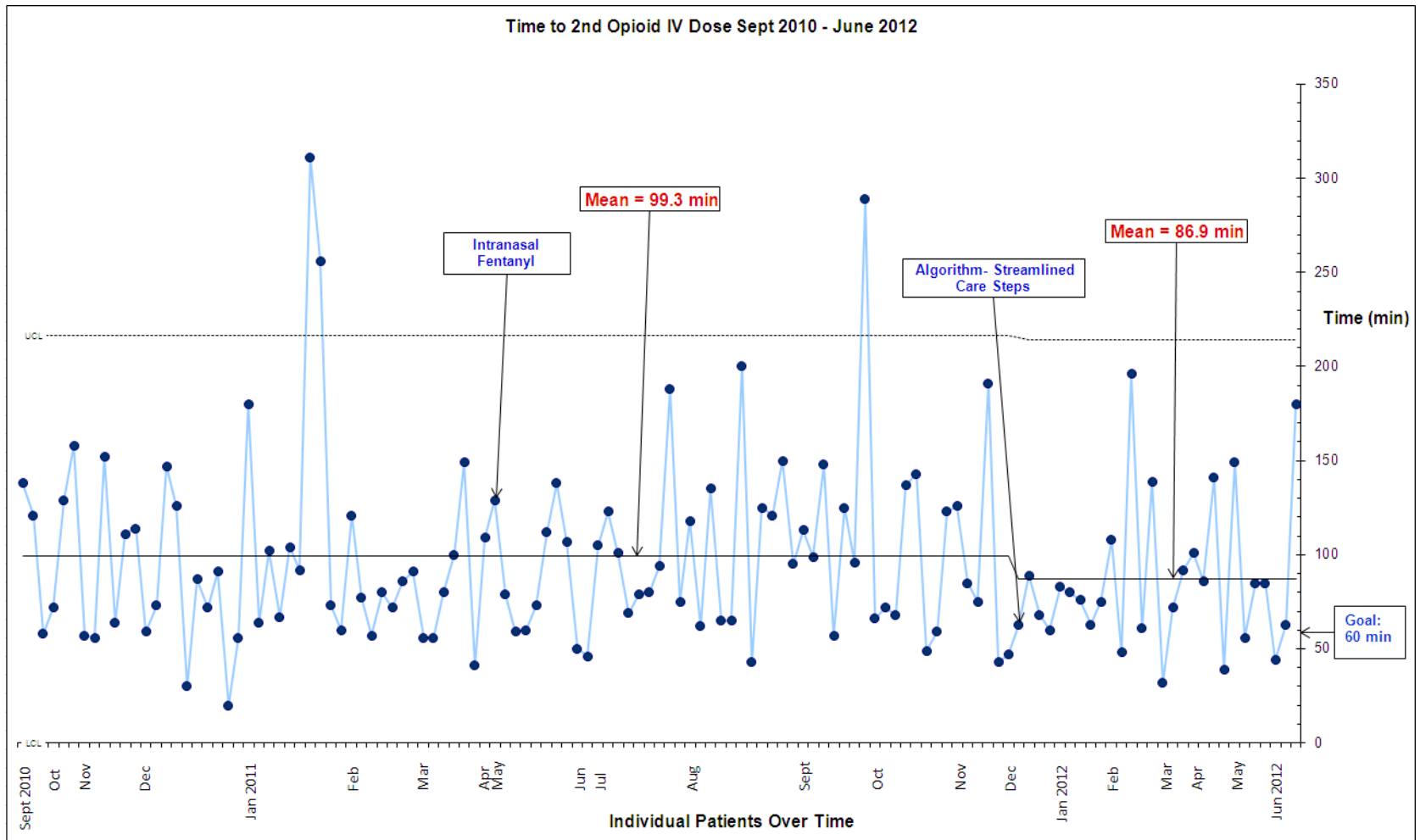
Ibuprofen 200 mg, 600 mg, 800 mg tab, 100 mg/5 mL solution	10 mg/kg MAX 800mg/dose	0
Acetaminophen 325 mg (only form avail. BMC), 500 mg tab 160 mg/5mL	15 mg/kg MAX 1000mg/dose	0



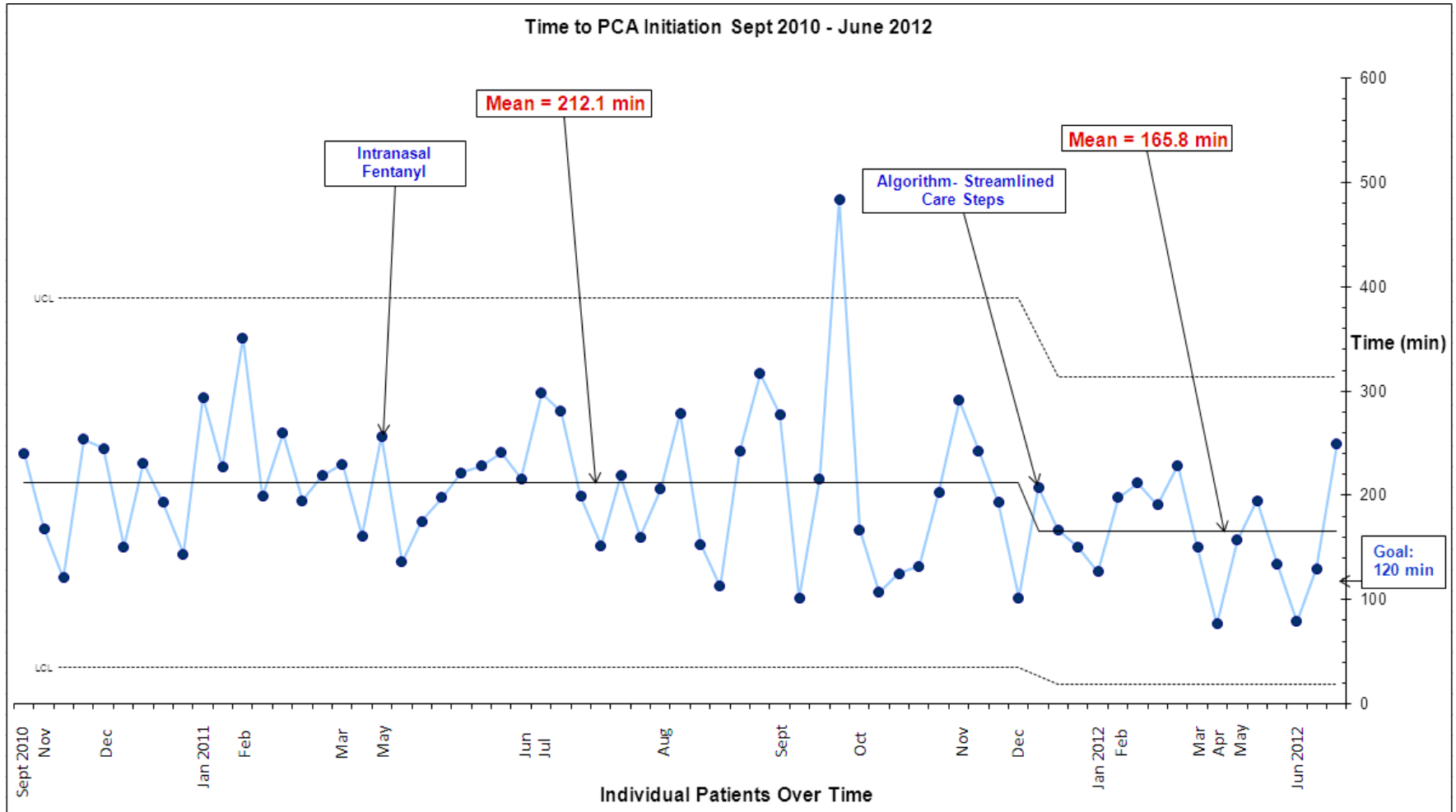
Time to First Parenteral Opioid



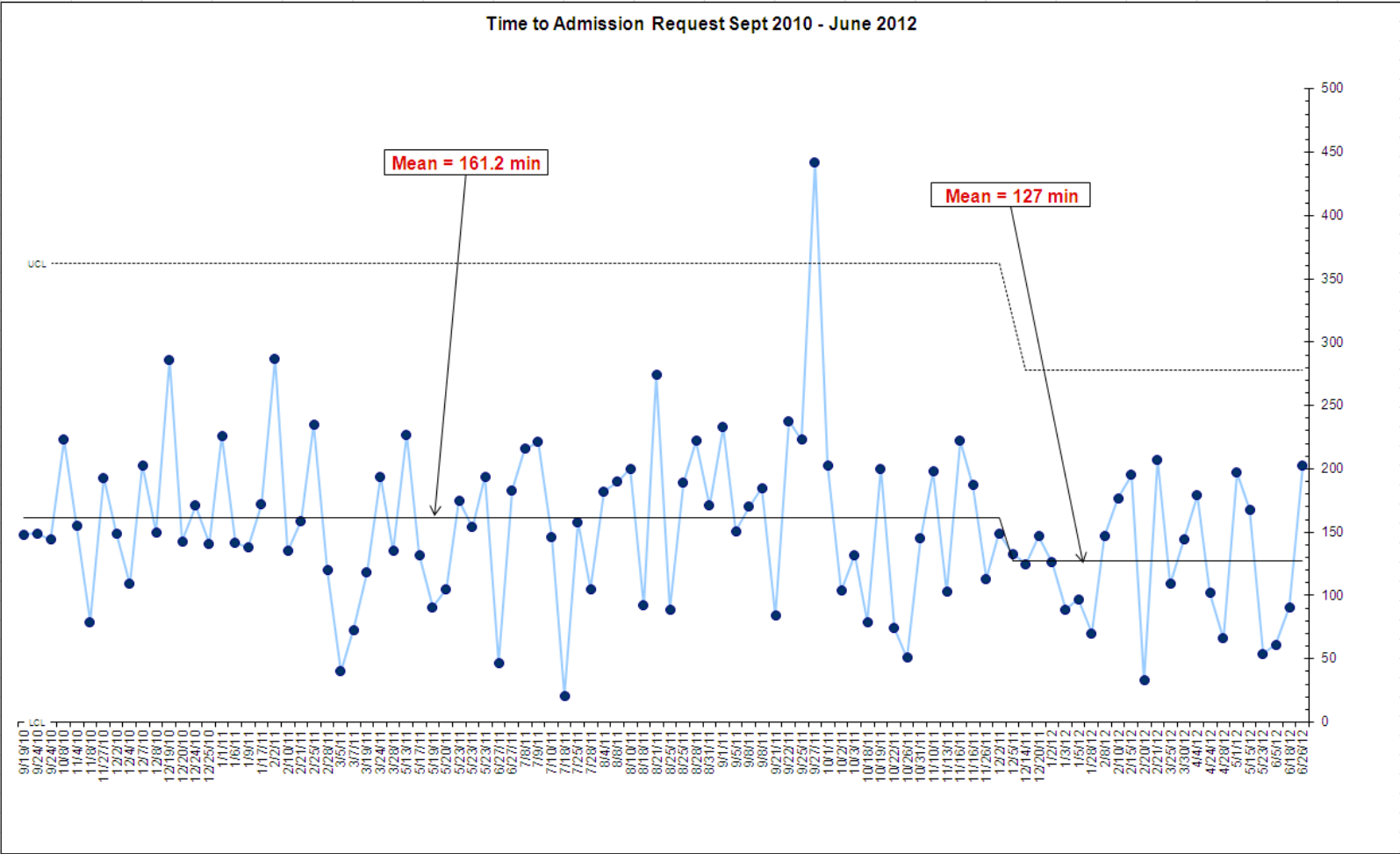
Time to 2nd Opioid IV Dose



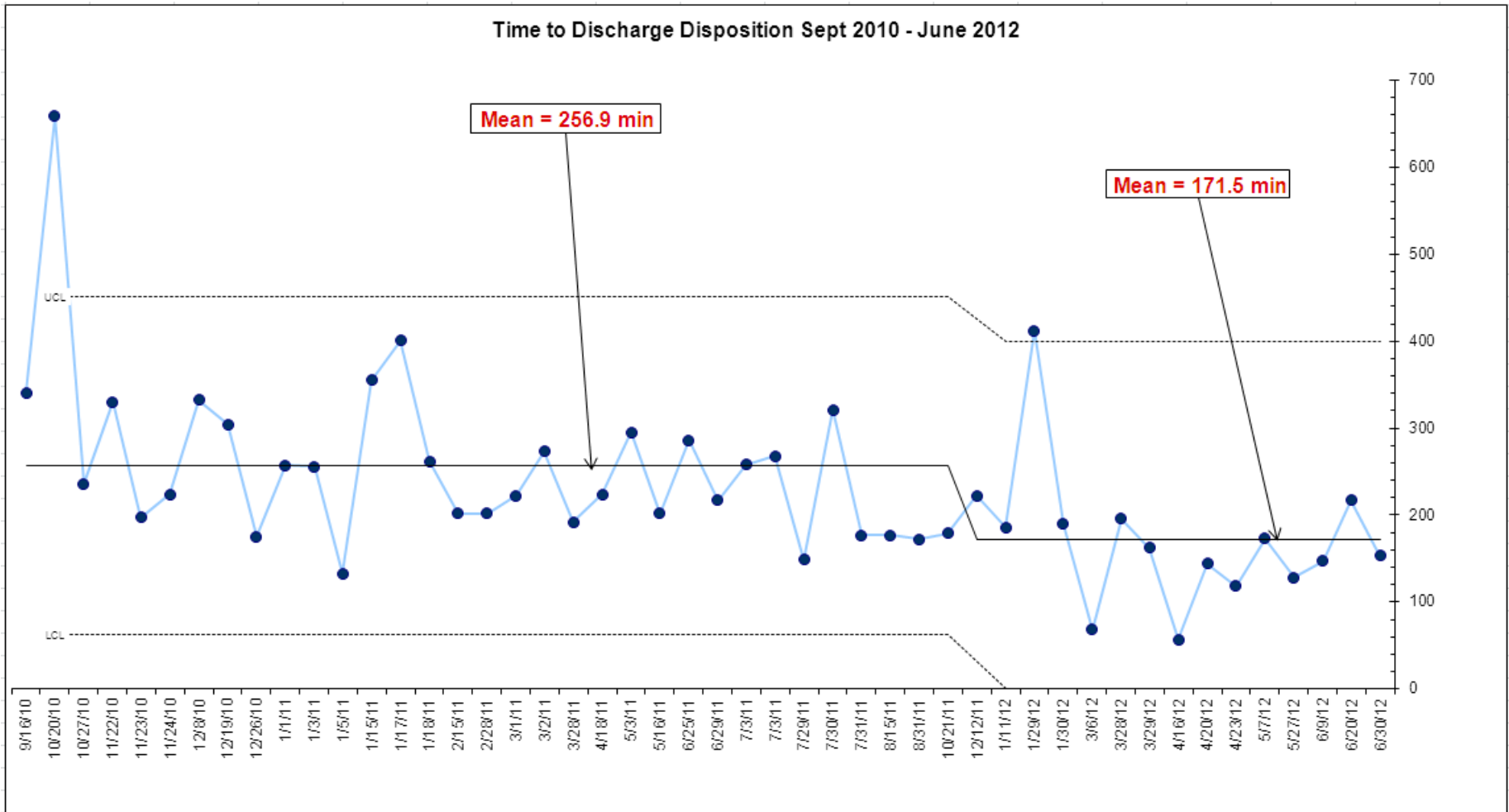
Time to PCA Initiation



Time to Admission Request



Time to Discharge Disposition

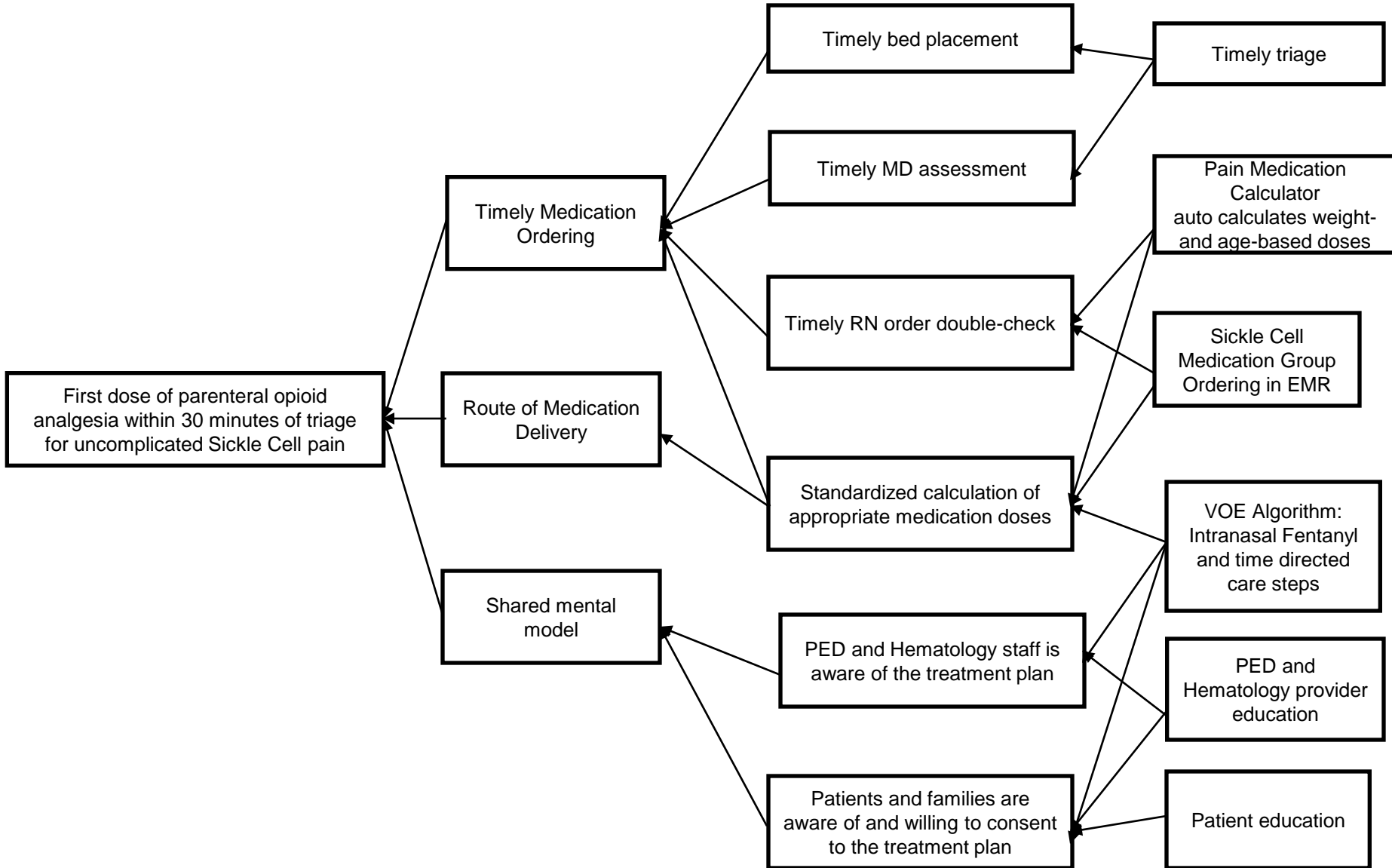


Aim Statement

Primary Drivers

Secondary Drivers

Change Strategies





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



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