Intra-Nasal Fentanyl for Fracture Patients in the Pediatric Emergency Department

Category of submission (select as many as apply):

Resident/Fellow Project

IOM Domains that this project addresses (select as many as apply)

Patient Centered

Effective

Equitable

Please share how you defined your project. Consider addressing the questions below. (Max 500 Words)
What was the identified Quality Gap? - What was the improvement target? - What was the timeline of the project? - Who were the stakeholders? - What was the stakeholders' input? - What was the method for collecting stakeholder input? - What was the potential for significant impact to the institution? - What was the potential for significant impact to society?

Long bone fractures are a common and painful complaint among pediatric emergency department (PED) patients. Communication limitations due to age and delays with IV insertion are known factors contributing to delays and under treatment of pain control. We aimed to improve analgesia and decrease time pediatric fracture patients wait to receive analgesic medication after PED arrival. Stakeholders included the PED clinical providers (attendings, fellows, residents), and pediatric nursing staff. We collaborated extensively with PED nursing leadership to design the protocol, educate nursing/staff, and implement the project. Our goal was to administer analgesia to >50% of pediatric fracture patients within 45 minutes of arrival.

Please describe how you measured the problem. Consider addressing the questions below. (Max 500 Words)
What data sources were used? - Was a numeric baseline OUTCOME measure obtained? - What defined the sample size? - What counterbalance measures were identified? - What numeric baseline COUNTERBALANCES were obtained? - Was the outcome measure clinically relevant? - Was the outcome measure a nationally recognized measure?

We retrospectively measured the time from arrival to the PED until administration of the first analgesic medication for patients with a long bone fracture. Patients were identified by PED visit International Statistical Classification of Diseases and Related Health Problems (ICD) codes. Pre-intervention data included patients cared for during 2019, which was the year prior to development of the protocol. We excluded patients arriving by emergency medical services, expecting that many received analgesics en route. We excluded patients who did not receive analgesics within 8 hours of arrival to the PED, as chart review confirmed that most were private-vehicle transfers from outside hospitals who arrived with splints in place and were likely to have received analgesia prior to transfer. Prior to intervention, we found that only 44% of long bone fracture patients received an analgesic medication within 45 minutes of arrival, and median time to first analgesic medication was 51 minutes. We compared these metrics for English vs. non-

English speaking patients, and for white vs. non-white patients to determine whether there were disparities and found no significant differences.

Please describe how you analyzed the problem. Consider addressing the questions below. (Max 500 Words)
What was one factor contributing to the gap? - Were multiple factors contributing to the gap? - Was a structured root cause analysis undertaken? - What was the appropriate QI method or tool used for root cause analysis? - Was a root cause analysis performed prior to identifying potential solutions? - What was the rationale for selecting intervention(s)? - Did the project use a QI method or tool for selecting intervention(s)?

We reviewed baseline data and informally interviewed nursing and physician staff about their observations and experiences to identify factors associated with delays in analgesia medication administration in our PED. Analysis of our baseline data indicated that IV medications were not given as promptly as medications ordered for administration by non-IV routes. We noted that while IV insertion was perceived as a quick intervention, there were often significant delays in completing this procedure. Staff perceived that an IV would eventually be needed for sedation for fracture manipulation in many cases, and did not consider ordering medication to be given by alternate routes prior to IV insertion. There were also delays associated with wait times as patients were not always immediately roomed or evaluated by a physician after arrival with a suspected fracture. Intranasal (IN) fentanyl was not commonly used in the PED prior to development of this protocol. Both physicians and nurses were not familiar with ordering it.

Please describe how you improved the problem. Consider addressing the questions below. (Max 500 Words)
What was the implementation of intervention(s) (date/time of go live)? - Was the target measure re-measured afterwards with comparison graph? - Was a structured plan for managing change used? - Was the project counterbalance re-measured with a comparison graph? - Was the counterbalance adversely affected? - Is the improvement in target outcome measure shown? - Was a statistical significance demonstrated in the outcome measure?

Our triage nurses are the first point of contact with newly arrived patients, so we developed a nurse-driven protocol which empowered them to administer ibuprofen to patients with mild pain without waiting for physician evaluation.

We proposed expanding the use of IN fentanyl for pediatric fracture patients with moderate/severe pain to avoid delays associated with IV insertion. IN fentanyl has several advantages for pediatric use. It is safe, fast-acting, effective, and does not require an IV line. For patients with moderate to severe pain, we instructed nursing staff to notify the physician and request an IN fentanyl order. Patients were moved to a monitored bed prior to IN fentanyl administration. Partnering with our nursing colleagues avoided delays associated with staggered evaluations by resident and attending at our academic teaching hospital. We collaborated with our PED nurse educator to teach nursing staff about the protocol. We also presented the protocol and baseline data at ED resident conference and PED faculty meeting. We incorporated feedback from all stakeholders prior to finalizing the protocol. We created a FAQ document about IN fentanyl for the pediatric ED nurses and disseminated it by email to further educate our nursing partners and proactively address potential questions and concerns. After incorporating feedback from stakeholders, we rolled out the protocol on June 1, 2021. We added a weight based IN fentanyl order that was prominently located in our EMR to facilitate ease of ordering. We retrospectively compared pre- and post-intervention data describing the time from arrival to the

PED until administration of the first analgesic medication for patients with a long bone fracture. Patients were identified by PED visit International Statistical Classification of Diseases and Related Health Problems (ICD) codes. Pre-intervention data included patients cared for during 2019, which was the year prior to development of the protocol. Post-intervention data included patients cared for from 06/21/2021 through 01/31/2022. We excluded patients arriving by emergency medical services, expecting that many received analgesics en route. We excluded patients who did not receive analgesics within 8 hours of arrival to the PED, as chart review confirmed that most were private-vehicle transfers from outside hospitals who arrived with splints in place and were likely to have received analgesia prior to transfer.

For statistical comparisons we used medians and Wilcoxon rank-sum tests to compare time-to-administration between groups and chi-square tests to compare proportions. The median time to analgesia administration decreased from 51 minutes to 40 minutes (p-value 0.0029). The proportion of patients who received analgesia in goal time of <45 minutes after arrival increased from 44% to 54% (p-value 0.0122). IN fentanyl was given to 7% of fracture patients in the pre-intervention group and increased to 37% of patients in the post-intervention group. IN fentanyl patients waited a median time of 26 minutes post-arrival for their medication, and 74% received the medication within 45 minutes of arrival. Patients who received IV medication waited significantly longer, a median of 81 minutes for IV morphine and 52 minutes for IV fentanyl.

Please describe the control phase of your project. Consider addressing the questions below. What were the lessons learned from the project? - Was there communication to stakeholders of the summary of the project, and lessons learned? - Was a process owner identified? - Did the process owner acknowledge ownership of ongoing monitoring? - What control measures were identified? - What was the reaction plan for deficiencies identified in the control measure? - Was there at least one year of sustained monitoring demonstrated? - Was the project successfully diffused in scholarly form (i.e. poster, manuscript, etc)?

PED patients with long bone fractures obtained analgesic medication significantly faster after implementation of a protocol encouraging use of ibuprofen for mild pain or IN fentanyl for patients with moderate/severe pain. The proportion of patients receiving analgesia within goal time of <45 minutes improved significantly. When IN fentanyl was the first analgesic ordered, it was given much faster compared to other analgesics. It was also administered much more quickly than IV medications, confirming our perception that waiting for an IV contributes to delays. Overall use of intranasal fentanyl use for fracture patients increased markedly in our PED. We so far have 8 months of post-intervention data, and will continue to monitor and seek opportunities for further improvement using PDSA cycles. We have shared our post-intervention data with our PED nursing team and will continue to collaborate. This project will be presented at an upcoming EM nursing conference, and we also plan to submit to a national Emergency Medicine conference (we obtained IRB approval and ACEP 2022 submission is pending). This project's success is largely due to excellent communication and collaboration between PED nurses and providers to reach the goal of providing timely analgesia for our fracture patients.