Peer Reviewed

Quality Improvement Initiative to Decrease Fentanyl Use in ELBW Infants

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Abstract

Introduction:
Fentanyl has been associated with a higher incidence of cerebellar injury and lower cerebellar diameter in preterm infants. We noticed an increased use of fentanyl among extremely low birth weight (ELBW) infants (birth weight < 1000 grams) in our NICU. To reduce its use by 20%, we launched this quality improvement (QI) project.
Methods:
The potential factors involved in fentanyl use were noted down. A driver diagram was created, and areas of improvement were recognized (Figure). A 20% improvement was calculated as:14 (baseline use) – 11(expected use) ÷ 14. The QI team met and discussed the plan. The information was disseminated to all NICU nursing staff via group email and handouts. The results were analyzed for the number of doses used in the following two months.
Results:
In the following sixty days, there were seven ELBW infants. The mean gestation age was 27 weeks (range 24 to 31) with the mean birth weight of 818 grams (range 580 to 990grams). One infant received 9 days of continuous drip (infant developed gram-negative septic shock- we eliminated the infant from the analysis). Out of 6 infants, four (67%) received no fentanyl. One infant received one dose while the other received two doses.
Conclusion:
Our preliminary data suggested that non-pharmacological management of pain and agitation with strict medication guidelines resulted in a reduction in fentanyl use. We expect other units to adopt our policy. A larger pool of infants will enhance and further validate our findings.

Introduction:

Opioids use has increased in the last two decades. Use of opioids in neonates has been associated with longer duration of mechanical ventilation, longer time to first meconium passage, and higher mean airway pressure levels. 1 In preterm infants, higher cumulative fentanyl dose has been associated with a higher incidence of cerebellar injury and lower cerebellar diameter. 2 Recently, Ancora et al. 3 demonstrated a significant decrease in eye and hand coordination skills in fentanyl exposed infants.

In May 2019, we undertook an audit to look at the utilization of fentanyl in extremely low birth weight (ELBW) infants (birth weight < 1000 grams) 4. We looked at the 8-months data and found fentanyl usage of 14 doses per month, which was very alarming (the data is reported and is in press). As a quality improvement (QI) initiative, we launched this project. We aimed to decrease fentanyl use by 20% in the following 2-month period.

Methods:

The factors associated with fentanyl use were identified. A driver diagram was created, and areas of improvement were recognized (Figure). A 20% improvement was calculated as:14 (baseline use) – 11(expected use) ÷ 14. The QI team met and

Figure

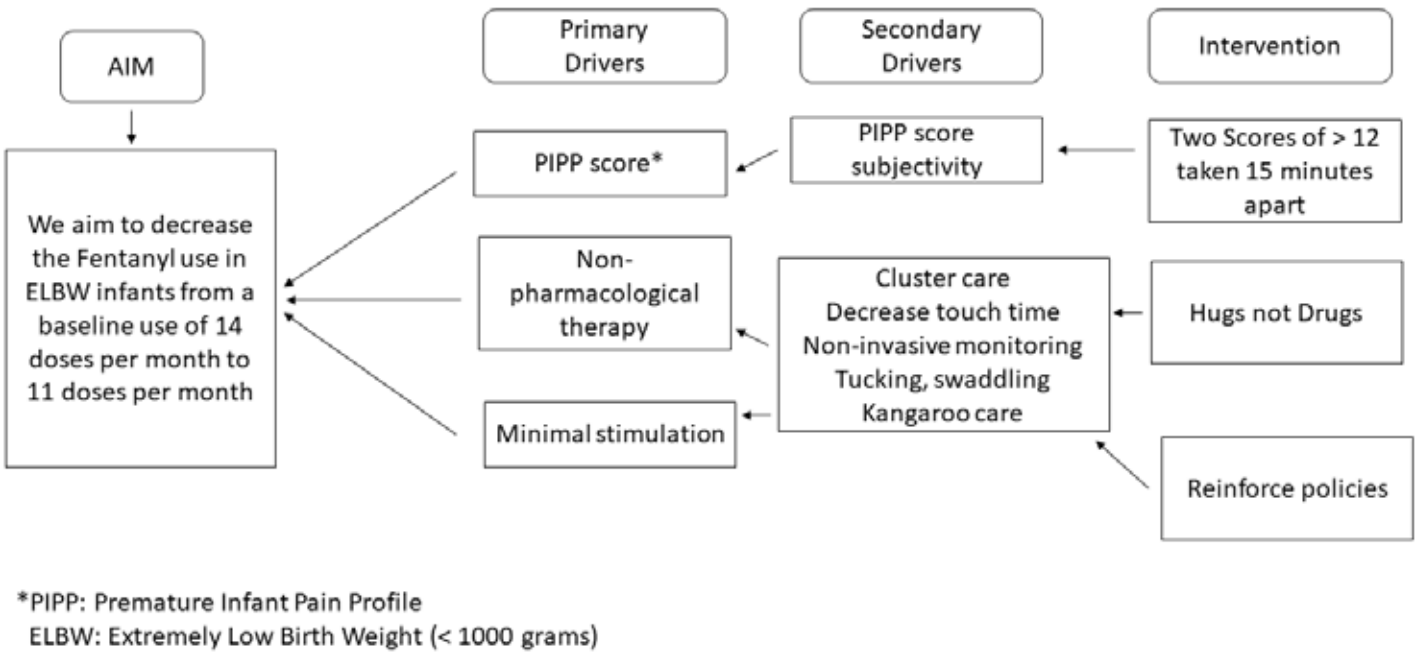

Figure 1: Key Driver diagram

discussed the plan. The information was disseminated to all NICU nursing staff via group emails and handouts. The data was recorded and extracted from Epic Systems, Wisconsin. The data were analyzed for the number of doses used in the following two months.

Results:

There were seven ELBW infants admitted following the QI initiative. The mean gestation age was 27 weeks (range 24 to 31) with the mean birth weight of 818 grams (range 580 to 990 grams). One infant received nine days of continuous drip (infant developed gram-negative septic shock, we eliminated that infant from the analysis as an outlier). Out of the remaining six infants, four (67%) received no fentanyl. One infant received one dose while the other one received two doses. Thus, a total of 3 doses were consumed in 2 months giving a figure of 1.5 doses per month as compared to 14 doses per month in preceding months. By follow our QI initiative, we were able to reduce the fentanyl use by 89% (14 - 1.5 ÷ 14 × 100).

"The decreased fentanyl use observed in our QI project was encouraging. Among primary drivers, the reinforcement of strict PIPP scoring, skin to skin care and nursing understanding of brief oxygen desaturations, helped in our QI. "

Discussion:

The decreased fentanyl use observed in our QI project was encouraging. Among primary drivers, the reinforcement of strict PIPP scoring, skin to skin care and nursing understanding of brief oxygen desaturations, helped in our QI. Among secondary drivers, cluster care and ensuring that residents and medical students follow the touch time was also an important factor. We have described earlier the dilemma of frequent physical examinations in neonates. 5

Fentanyl is mostly used in intubated ELBW infants during mechanical ventilation. We follow early extubation policies and provide non-invasive ventilation. We postulated that concomitantly use of early extubation and minimal handling, might have contributed to the decreased use of fentanyl. As our baseline data were obtained from similar acuity of ELBW infants, we believe that the changes are true reflection of our initiative.
Non-pharmacological management of pain and agitation is gaining popularity in neonatal care. 6 We employed tucking and swaddling for all ELBW infants, which further deterred the medication use. The limitation of our study was the small number of ELBW infants. But this being a preliminary report, we expect to duplicate our findings in the following months of data collection. A larger pool of infants will enhance and further validate our findings.

In conclusion, we were able to demonstrate a reduction in fentanyl use by our QI initiative. We will continue to collect the data prospectively and hope other units to follow our QI. A decreased use of opioids will not only result in cost reduction but also will not risk preterm brain development.

References:

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Disclosure: The authors do not identify any relevant disclosures.

Acknowledgments: Dr. Manzar would like to thank all the members of the NICU staff at LSU Health for their cooperation in the QI project.

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