

Switch to acetaminophen leads to fewer unplanned intubations and improved mortality in the NICU

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A quality improvement (QI) initiative to standardize care for babies in the NICU following surgery at the University of Rochester Medical

Center (URMC) correlated with fewer unplanned intubations and improved mortality rates.

The study, "Reducing Unplanned Intubations in the Neonatal Intensive Care Unit After Children's Surgery: A Quality Improvement Project," streamlined care following [surgery](#) in 2019 through routine use of acetaminophen (Tylenol) for pain control, rather than opioids, and use of a checklist to ensure patients were ready for extubation. To understand the impact of these changes, the authors observed the rate of unplanned intubations over time using statistical process control charts.

The findings are [published](#) in the *Journal of Pediatric Surgery*.

Following these changes, the number of unplanned intubations decreased more than 75%, resulting in 11 fewer unplanned intubations each year in the NICU. The percentage of infants receiving acetaminophen following surgery increased from 25% to 90%, which resulted in a significant decline in opioid exposure during the post-operative period.

These improvements have been sustained for more than two years, and in addition, the 30-day mortality rate for postoperative patients in the NICU significantly declined from 6.5% to 0.7%, a nearly 90% decrease.

Surgeries for pre-term babies can occur for a variety of reasons, including addressing congenital defects as well as helping the development of systems that are typically immature at the time of delivery.

Using opioids for pain management after neonatal surgery had been standard practice in hospitals, but increases the risk of respiratory depression, which can then lead to unplanned intubations.

"Reducing unplanned intubations matters to patients, because they are

associated with increased length of stay, additional complications, and mortality," said study co-author Jeffrey Meyers, MD, neonatologist and Associate Chief Quality Officer at UR Medicine Golisano Children's Hospital (GCH).

A multidisciplinary team involving surgeons, neonatologists, anesthesiologists, pharmacists, and other improvement experts engaged in this QI project after noticing that a higher number of infants were experiencing unplanned intubations after surgery relative to peer institutions. The team responded by applying a standardized approach, including a post-operative huddle and checklist to document and communicate what happened in each case in order to create best practices.

After applying these standards, it soon became clear that opioid use was highly correlated with the increase in unplanned intubations.

"Babies are already prone to not breathing normally, and opioids can cause apnea and respiratory depression," said Derek Wakeman, MD, co-author and surgeon at GCH. "We transitioned to maximizing non-opioid medication."

Most babies in the NICU need Tylenol to be given through an IV, as alternative routes such as rectal are less effective. IV Tylenol, however, had limited availability until the last 5–10 years, and this improved availability helped facilitate the transition in the GCH NICU.

While there were initial concerns about Tylenol providing the correct amount of [pain management](#), most babies in the NICU responded well to treatment, according to Wakeman.

The GCH NICU has now transitioned to using Tylenol as the first-line option following surgery. This is the first documented QI initiative to

successfully reduce unplanned intubations in neonates, and one of the first to link [opioid](#) stewardship with improved post-operative outcomes. Wakeman and Meyers hope that this will help facilitate a more rapid transition to Tylenol in NICUs across the country.

Wakeman and Meyers credit Peter Juviler, MD, surgical resident, for data compilation, analysis, and drafting the manuscript.

"Opioid stewardship is an important topic across all parts of the health care system, and it's important for these practices to be examined in the NICU," said Meyers.

"Pain management is important, but we should continue to critically examine how and where we use medications that have risks, such as opioids, and seek alternatives that can provide appropriate analgesia. This project speaks to the importance of using self-assessment to improve outcomes."

More information: Peter Juviler et al, Reducing Unplanned Intubations in the Neonatal Intensive Care Unit After Children's Surgery: A Quality Improvement Project, *Journal of Pediatric Surgery* (2023). [DOI: 10.1016/j.jpedsurg.2023.09.029](https://doi.org/10.1016/j.jpedsurg.2023.09.029)

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