HiMSS *Analytics*

HIMSS Analytics Stage 7 Case Study

Children's Hospital of Orange County (CHOC Children's Hospital)

Profile

CHOC Children's regional healthcare network includes two inpatient facilities, four centers of excellence (Heart, Neuroscience, Orthopaedics and Hyundai Cancer Institutes), five primary care clinics, over twenty specialty care clinics/centers, a research institute, and a wide variety of community education and outreach programs. CHOC Children's Hospital in Orange is a 279-bed tertiary care facility with 11,500 annual admissions offering a range of medical and surgical services as well as pediatric, cardiovascular, and neonatal intensive care units. The 67-bed NICUs include a 12 bed Extremely Low Birth Weight (ELBW) Baby Unit which has seen significant improvements in outcomes for these preterm infants since opening in 2010. CHOC Children's is among the best children's hospitals in various specialties identified by *U.S. News and World Report* and is a Leapfrog Top Hospital. CHOC earned the Gold Level CAPE Award from the California Council of Excellence, the only children's hospital in the state to ever earn this distinction and for the second time, the PICU earned the Pediatric Beacon Award for Critical Care Excellence. CHOC was also pleased to be validated as HIMSS Analytics EMR Adoption Model^{SM} Stage 7 on January 7, 2015.

The Challenge

Between May 2010 and May 2012, CHOC Children's reported 45 breast milk handling errors: 3 where the wrong breast milk reached the wrong baby; 16 labeling errors where the error was detected prior to administration to the patient; and 26 storage errors where correctly labeled milk was stored in the wrong patient's bin. As a result, a multi-disciplinary team reviewed the entire breast milk handling process, identifying 282 potential failure points and determining the root causes for the top 85 potential failure points. Primary concerns were that the process was unclear and cumbersome for the bedside nurse; that there were inadequate double checks at key points in the process; and that, due to the frequency of breast milk handling, there was risk of human error and confirmation bias. Furthermore, of the 85 targeted potential failure points, 55% were unlikely to be detected.

CHOC Children's administers approximately 7,000 individual breast milk feeds per month. As a children's hospital, breast milk may be administered on any inpatient unit; however, the NICU is the largest user of breast milk within the facility. A NICU nurse could handle breast milk 12 times per shift creating the risk of confirmation bias and reduced sensitivity to the potential risks.

Implementation Overview

To improve patient safety and reduce breast milk administration errors, CHOC Children's implemented centralized breast milk handling and breast milk bar code scanning. It was determined that these efforts alone would address 75 of the top 85 potential failure points (88%).

Three bar code scanning systems were evaluated by a multi-disciplinary team. The system selected allowed for the greatest degree of customization and several months were spent making the system specific to the very

intricate breast milk handling program that had been initiated during the 10 months prior. Direct interface with the hospital EMR was planned to reduce risk and improve patient safety through three primary areas. First, the system would automatically calculate the exact amounts of breast milk and additives for each 12 hour batch eliminating the need to manually calculate, thus decreasing the risk of human calculation error. Second, the bar code scanning would replace the two person double check at the time of preparation, feeding, and discharge, again reducing the risk of human error and improving efficiency. Finally, it would automate the labeling process reducing the risk of error with regards to the handwritten expiration dates and times. In addition to improving safety, the interface was also designed to provide a real time inventory for the staff to share with mothers so that more milk could be brought in from home before running out.

Resulting Value / ROI

PATIENT SAFETY: As noted in the original assessment, the vast majority of potential failure points were unlikely to be detected with the prior systems. The centralization of breast milk handling and use of bar code scanning provided a framework for closer scrutiny to breast milk handling processes and allowed for tracking of breast milk administration errors and near misses. Error rates dropped to 5: there were no incidents where breast milk reached the wrong patient; 1 labeling error which was detected prior to administration to the patient; and 4 breast milk storage errors where correctly labeled breast milk was stored in the wrong patient's bin. However, during the first year, the system recorded 110 wrong milk to wrong baby near misses. Bar code scanning also improved safety by eliminating manual calculations of additives. In addition, bar code scanning prevented 193 incidents of expired breast milk from being fed during the first year. Prior to bar code scanning, there were no reported incidents of expired breast milk being administered; however, there were no monitoring systems in place to detect such issues. Thus, implementation of bar code scanning highlighted a potential problem area that was not adequately monitored under previous processes.

PATIENT SATISFACTION: The bar code scanning system improved patient satisfaction by providing a real-time breast milk inventory to help avoid either running out of milk or a mother having to make a last minute extra trip home to bring more milk to the hospital. The system sends the inventory data outbound to the EMR where the nurse can easily access it and share with the family. In addition, mothers can sign up for automatic text messaging where the bar code system sends a text in both English and Spanish alerting them to bring more breast milk to the hospital when inventory reaches a designated level.

STAFF TIME SAVINGS: Bar code scanning resulted in a statistically significant reduction in staff time spent directly handling breast milk. The total time saved for preparation was reallocated for other direct patient care duties. In addition, scanning eliminated the need to staff two technicians at all times to be able to do a two person double-check to confirm identify on each breast milk bottle. By staffing with one technician at non-peak times, a 20 hour per week shift was eliminated resulting in direct yearly savings of ~$30,000 in salary, benefits, and related costs.

In addition to the direct time savings for the technicians, scanning resulted in other noticeable improvements in efficiency. The bedside RN was able to save time by not having to locate a second RN when the parent was not available for the double check. Furthermore, the interface between the bar code system and the EMR resulted in data automatically being charted upon scanning instead of the RN having to manually enter providing further time savings.

Lessons Learned

- The biggest lesson learned from this project was that breast milk administration errors are likely much more common than organizations realize. At the onset of the project, the team recognized that 55% of errors were unlikely to be detected by the previous systems in place; however, 110 wrong milk to wrong baby near misses and 193 expired breast milk near misses during the first year of scanning, far exceeded the suspected numbers. Discussions with other hospitals suggest that those organizations also estimate their breast milk administration errors to be 1-2 per year (similar to the number reported at CHOC prior to this project). Concrete data supporting the fact that errors are likely more common (and that without automated systems, such as bar code scanning, are unlikely to be detected), should prove very helpful to the industry as a whole and help improve the safety for all babies. Our outcome data has been published and presented via lectures and posters at professional meetings with the hopes of encouraging other facilities to take a critical look at their own safety processes in place.

- Likewise, it was suspected that the bar code system would improve efficiency; however, the amount of time and cost savings exceeded expectations.

- Approximately four months were spent customizing the system to meet the needs of the organization and the highly specialized handling practices already in place. That time was critical in the success of the implementation resulting in a very smooth go-live and very few modifications required after initiation.