Improving the Quality of Care of Neonatal Abstinence Syndrome in a Complex Neonatal Service Line
Nationwide Children’s Hospital
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**Smart Aim:** To decrease the length of hospital stay at Nationwide Children’s Hospital for patients with NAS from 19.5 days to 17 days by December 31, 2014 without increasing the 30 day readmission rate for this population.

**Setting:** Nationwide Children’s Hospital is an academic, free standing, tertiary care pediatric referral facility located in Columbus, Ohio. The Neonatal Service Line (NSL) consists of 3 NICUs on the main campus and 5 NICUs in Columbus area community delivery facilities (with an additional NICU in a large academic facility added in September 2014), bringing the total number of neonatal beds to 254. With more than 2300 admissions to NSL annually, NAS patients comprise over 7% of the NICU discharges per year.

Three Neonatology medical groups admit and care for patients in the Main Campus NICUs- the in-house academic neonatology group, Central Ohio Newborn Medicine (CONM) and Pediatrix Medical Group (PMG). Additionally, CONM provides medical care and leadership at two of the community NICUs (NCH NICU at Doctor’s Hospital and NCH NICU at Grant Medical Center), and PMG provides medical care and leadership at three of the community NICUs (NCH NICU at Riverside Methodist, NCH NICU at Mount Carmel Saint Ann’s, NCH NSCU at Dublin Methodist).

All staff are directly employed or leased by NCH and follow all NCH patient care policies and guidelines.

**Mechanisms:** Key challenges are listed in the Key Driver Diagram (KDD):

1. Inconsistent staff competency with the Finnegan Neonatal Abstinence Syndrome Scoring Tool (FNAST) led to inaccurate scoring and challenges in appropriate pharmacologic weaning
2. Provider irregularity in pharmacologic management of NAS led to wide variability of medication doses and wean schedules with every Attending physician rotation
3. Inadequate knowledge and suboptimal attitudes of staff regarding NAS and substance use disorders negatively impact the ability to engage and partner with families to provide optimal care
4. Staff variability in nonpharmacologic approaches to the care of the patient with NAS contributed to increased stress for the patient and family as well as impact the consistency of NAS scores

**Methods:** This QI initiative utilizes the Institute for Healthcare Improvement (IHI) quality improvement methods, including key driver diagrams and PDSA cycles, listed below:

1. **Education and Competency Training in Assessment and Scoring:**
   a. “Train the Trainer” sessions with a nationally recognized expert were conducted to educate and train attendees on accurate assessment, scoring and documentation of signs and symptoms of NAS using the FNAST
   b. This training is now provided for new employees, and ongoing competency maintenance for staff has been implemented
   c. Each NICU/NSCU is working toward achieving 90% inter-rater reliability by December 31, 2014

2. **Development and Implementation of standard opioid weaning program:**
   a. All three independent Neonatology medical groups developed and implemented opioid weaning programs for NAS
b. Monitoring of adherence to established protocols is performed and communicated back to the providers

3. Development and Implementation of NAS Taskforce:
   a. An interdisciplinary NAS Taskforce was developed, which serves as a central location for information, resources, and ideas for best practices
   b. The meetings are held monthly and are very well attended
   c. The Taskforce is currently focused on outreach education and support for the maternal care providers in the NCH perinatal referral region and is actively engaged and leading efforts in the Ohio Perinatal Quality Collaborative (OPQC)
   d. Staff participate in OPQC learning sessions, including bias/empathy training and completed pre and post attitudes surveys

4. Development and implementation of evidence based guidelines for the care of the NAS patient:
   a. Using current evidence and potentially better practice models, the NAS Taskforce developed patient care guidelines to standardize the care of the patient and family struggling with NAS, which includes anti-bias training as well as standardized non-pharmacologic bundles of care

Measures:

1. Actual and Average Length of Stay (ALOS) for the NSL and for each NICU
2. 30 day readmissions for patients discharged from NCH with NAS
3. Unit-specific staff attitudes surveys as administered through the Ohio Perinatal Quality Collaborative
4. Unit based staff inter-rater reliability rates for Finnegan scoring

Data / Results:

1. Length of Stay is measured each month (see control charts below):
   a. The ALOS for the entire NSL for patients with NAS is 20.6 days as of September 1, 2014.
   b. The main campus ALOS decreased from 36.6 days in 2009 to a low of 23 days in 2013, but has experienced an increase in both ALOS (28 days) in 2013-2014 as indicated on the control chart. This change is probably multifactorial and related to physical space changes, provider staff changes, decreased support from the Clinical Pharmacists, and competing initiatives. Efforts are underway to re-focus energy and support
   c. Conversely, the offsite delivery centers have noted decreased ALOS and decreased variability in recent months.
   d. Efforts to understand differences between main campus and the offsite delivery centers are underway, and include review of protocol adherence, patient demographics, staff attitudes and fetal exposures when maternal history allows for detailed information
2. 30 day readmission rate is measured each month:
   a. From 2010 through September 30, 2014, 614 neonates with the primary diagnosis of NAS were discharged from an NCH NICU or NSCU.
   b. From 2013-2014, 261 neonates with primary diagnosis of NAS were discharged from an NCH NICU or NSCU. Of those, 3 were readmitted to NCH within 30 days of discharge.
   c. 1/1/2013-9/30/14 readmission rate = 1.1%
3. Pre and post training Staff Attitudes Survey Results
   a. Cohort results pending and should be available for poster
4. Unit based Inter-rater reliability rates
   a. Year end results are pending and should be available for poster
**Discussion:** The quality of care for patients with NAS care can be improved by 1) standardized, ongoing education and competency training using the FNAST; 2) decreasing variability of medical and non-pharmacologic treatment of NAS; 3) supporting staff involvement regarding quality improvement initiatives and change; and 4) the development and implementation of evidence based practices to care for the patient and family with NAS. However, unit-specific, microsite differences exist leading to variable ALOS.

Additionally, past positive gains in decreasing the ALOS on the main campus NICU were reversed related to multiple factors, including physical space changes, provider and support staff changes and competition with other important quality initiatives. Hopefully, refocusing energy and support on this quality initiative will reverse this trend.

**Key Driver Diagram**
Average Length of Stay for NAS patients in the Neonatal Service Line

Neonatal Services Length of Stay
Neonatal Abstinence Syndrome

X-Bar Chart

| Month   | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2013    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 2014    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

Note: A sqrt transformation was used to calculate appropriate control limits. These limits may not be equidistant from the centerline.

Actual Lengths of Stay of patients with NAS for Individual Units:

MAIN CAMPUS NAS LOS 2013-2014 (ytd)

Overview of the charts and data provided in the document.
NCH NICU at Grant Medical Center (GMC)

Color codes: Blue= morphine only; Yellow= morphine, clonidine and phenobarbital; Red= morphine and clonidine; Green= morphine and phenobarbital

NCH NICU at Doctor’s Hospital West (DHW)

Color codes: Blue= morphine only; Yellow= morphine, clonidine and phenobarbital; Red= morphine and clonidine; Green= morphine and phenobarbital
NCH NICUs at Riverside Methodist (RMH), Mount Carmel Saint Ann’s (MCSA), and Dublin Methodist Hospitals (DMH)

Color codes: Blue= NCH NICU at Riverside Methodist; Yellow= NCH NSCU at Dublin Methodist Hospital; Green= NCH NICU at Mount Carmel St. Ann’s Hospital