NEONATAL ABSTINENCE SYNDROME:

The Ohio Perinatal Quality Collaborative Experience

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April 20, 2018

OPQC
Ohio Perinatal Quality Collaborative

Through collaborative use of improvement science methods, reduce preterm births & improve perinatal and preterm newborn outcomes in Ohio as quickly as possible.

The **NAS Project** is funded by the Medicaid Technical Assistance and Policy Program (MEDTAPP) and administered by the Ohio Colleges of Medicine Government Resource Center.

The views expressed in these presentation are solely those of the authors and do not represent the views of state or federal Medicaid programs. This study includes data provided by the Ohio Department of Health which should not be considered an endorsement of this study or its conclusions.

Objectives

- Identify potentially better practices, including pharmacological and non-pharmacological treatment for infants with NAS

- Describe the statewide Ohio Perinatal Quality Collaborative methodology to improve treatment of infants with NAS

- Discuss the practice of standardized care and the impact on decreasing duration of opioid treatment and length of stay for NAS

- Describe 1-2 Quality Improvement tools utilized in the OPQC NAS Project to support consistent practice
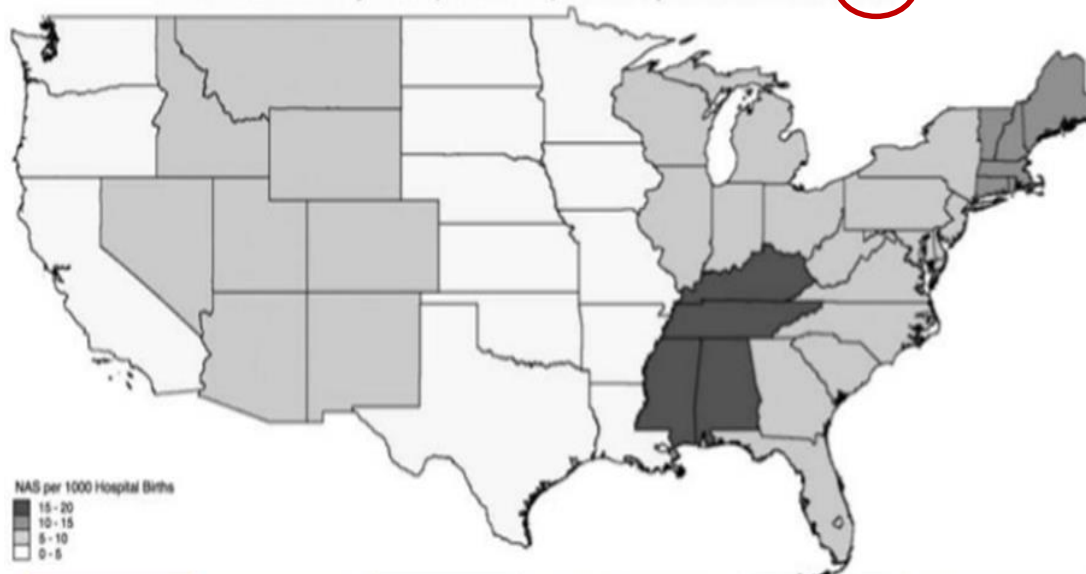
OPQC
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NEONATAL ABSTINENCE SYNDROME:
SCOPE OF THE PROBLEM

Geographic Variation of NAS in the US

Maternal Opiate/Opioid Use and NAS

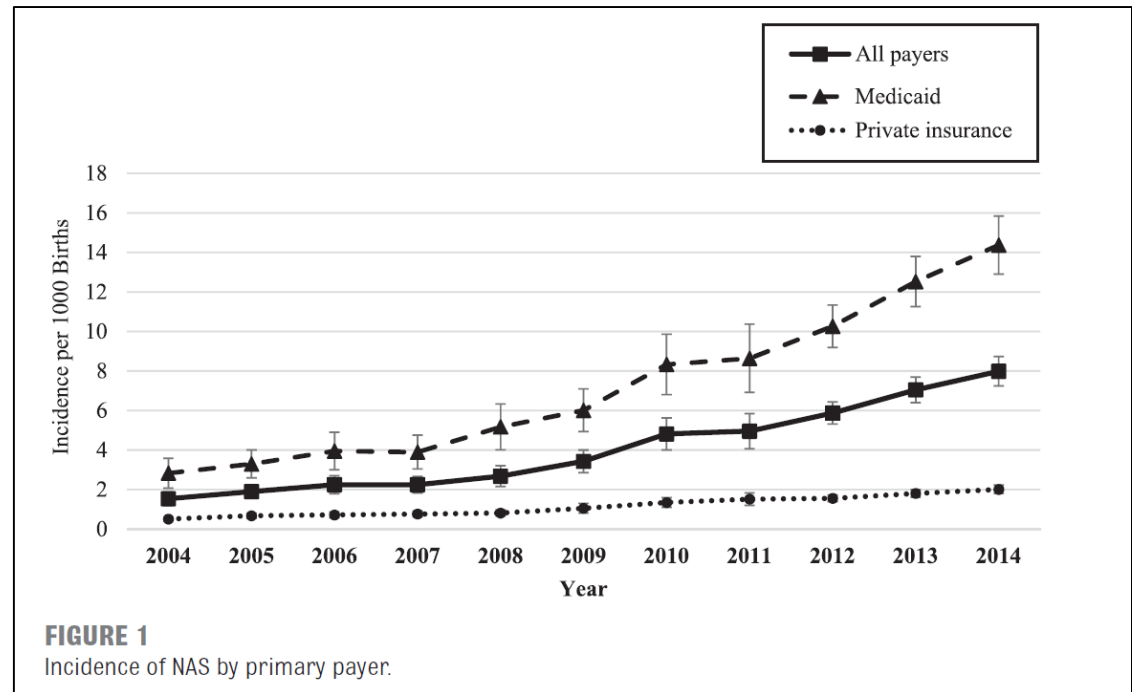Neonatal Abstinence Syndrome per 1000 Hospital Births by US Census Division, 2012

NAS per 1000 Hospital Births
- 15 - 20
- 10 - 15
- 5 - 10
- 0 - 5

Division	SE Central	New England	NE Central South Atlantic Middle Atlantic	Mountain	NW Central Pacific SW Central
NAS Rate	16.2	13.7	6.8 – 6.9	5.1	2.6 – 3.4

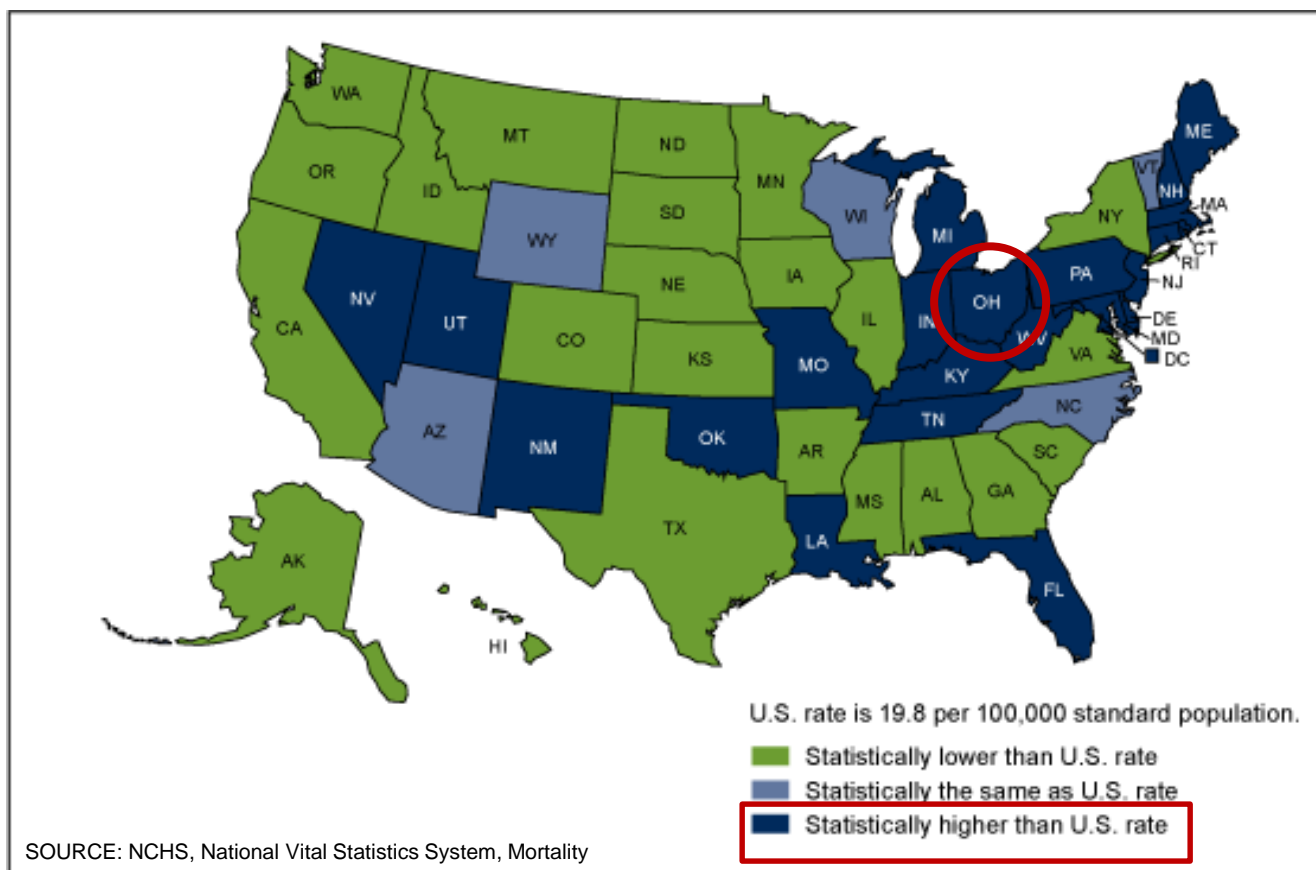Patrick SW et al. J Perinatol, 2015, in press.

Incidence of Maternal Opiate Use and NAS Since 2004

- From 2004 to 2014, the rate of U.S. infants diagnosed with opioid withdrawal symptoms, known as neonatal abstinence syndrome (NAS), **increased 433%**, from 1.5 to 8.0 per 1,000 hospital births.

- However, the increase was even more stark in state Medicaid programs -- rising from 2.8 to 14.4 per 1,000 hospital births. Medicaid, a public health insurance program, covered more than 80% of NAS births nationwide in 2014.
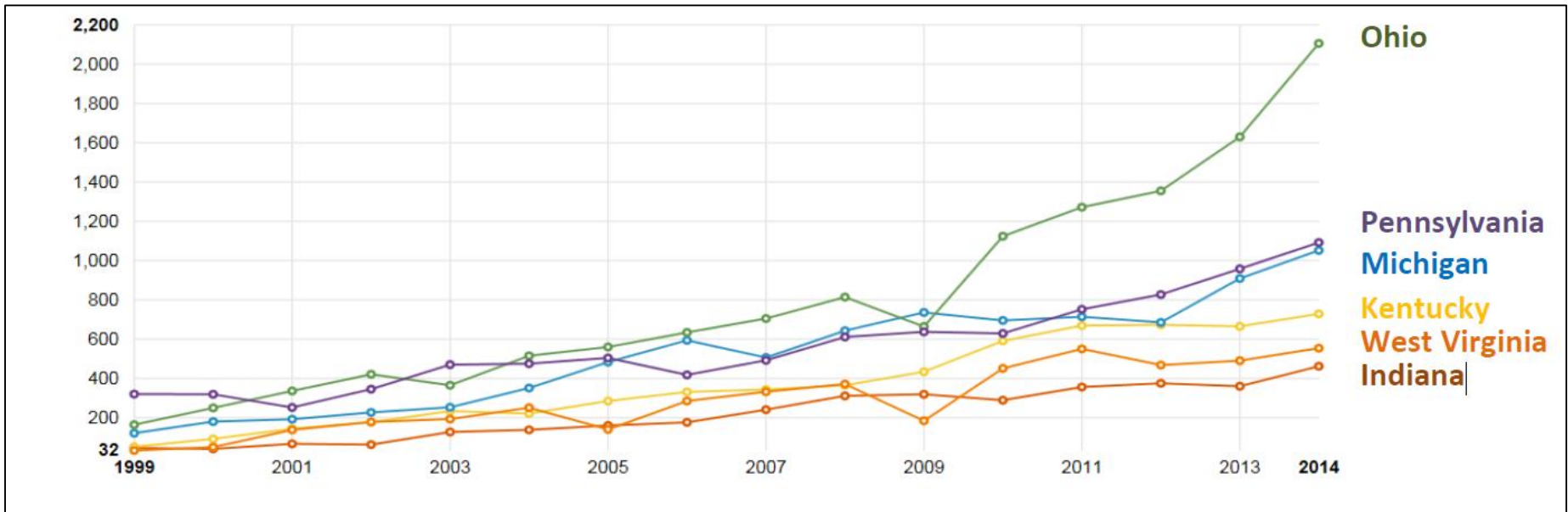
FIGURE 1
Incidence of NAS by primary payer.

Winkelman, Tyler NA, et al. "Incidence and Costs of Neonatal Abstinence Syndrome Among Infants With Medicaid: 2004–2014." *Pediatrics* 141.4 (2018): e20173520.

Age-adjusted drug overdose death rates, by state: United States, 2016

U.S. rate is 19.8 per 100,000 standard population.

- Statistically lower than U.S. rate
- Statistically the same as U.S. rate
- Statistically higher than U.S. rate

SOURCE: NCHS, National Vital Statistics System, Mortality

NOTES: Deaths are classified using the International Classification of Diseases, Tenth Revision. Drug-poisoning (overdose) deaths are identified using underlying cause-of-death codes X40–X44, X60–X64, X85, and Y10–Y14.

Total Opioid Overdose Deaths

Source: statistics are from the Kaiser Family Foundation State Health Facts Website, including Opioid Overdose Death Rates and Opioid Overdose Deaths by Type of Opioid, and from the 2015 Ohio Department of Health Unintentional Overdose Death Report.

- Ohio's opioid overdose death rate increased 325 percent in five years (2009 to 2014).
- Unintentional opioid overdoses caused 2,590 Ohio deaths in 2015 and accounted for 85% of all drug overdose deaths in the state.
- This is equivalent to six Ohioans dying every day or one Ohioan dying every four hours from an opiate overdose.

Drug Abuse or Dependence Diagnosis at Time of Delivery

Source: Ohio Hospital Association

Number of cases, Ohio, 2004-2015
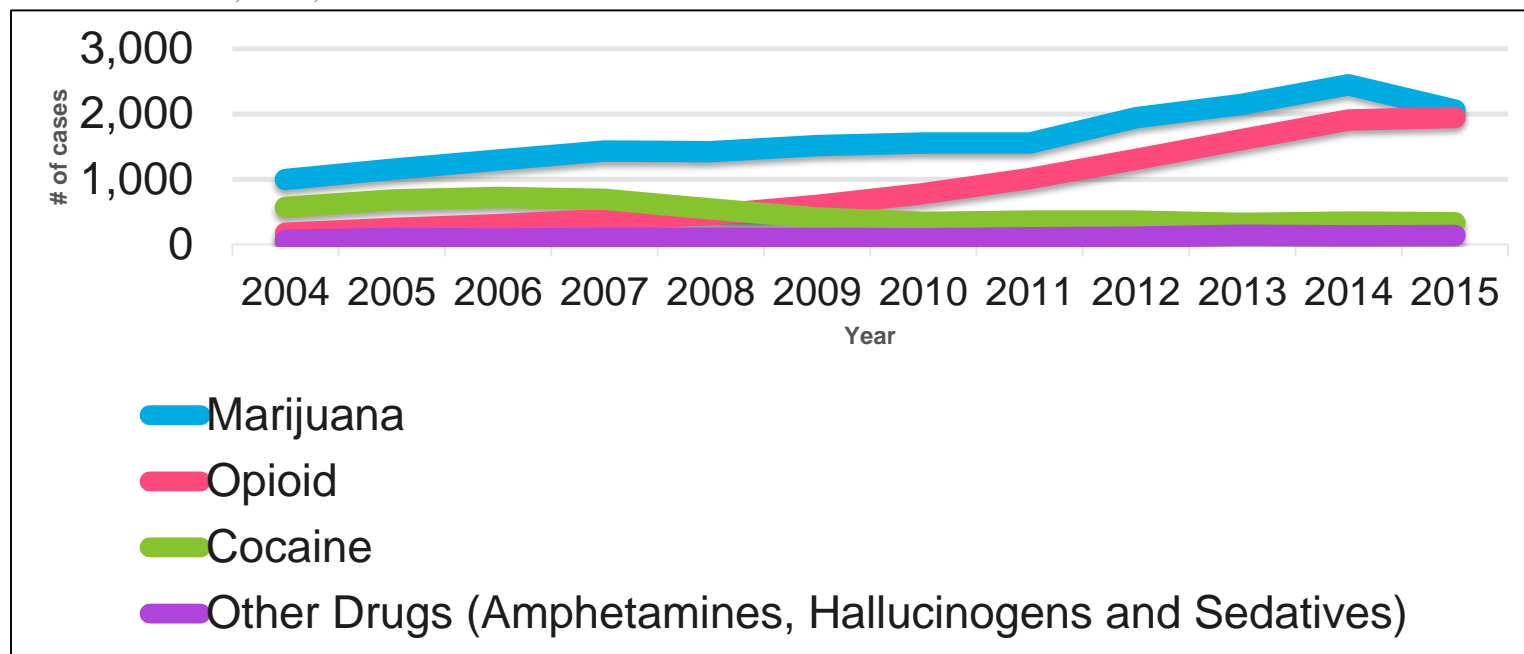
- Women with a marijuana-related dx increased 107% -- from 994 in 2004 to 2,061 in 2015.

- **Dx of opioid abuse or dependence grew 1,039%.**

- Dx of cocaine abuse or dependence fell 41% among delivering mothers.

NAS Statewide Rate per 1,000 Live Births

Source: Ohio Hospital Association
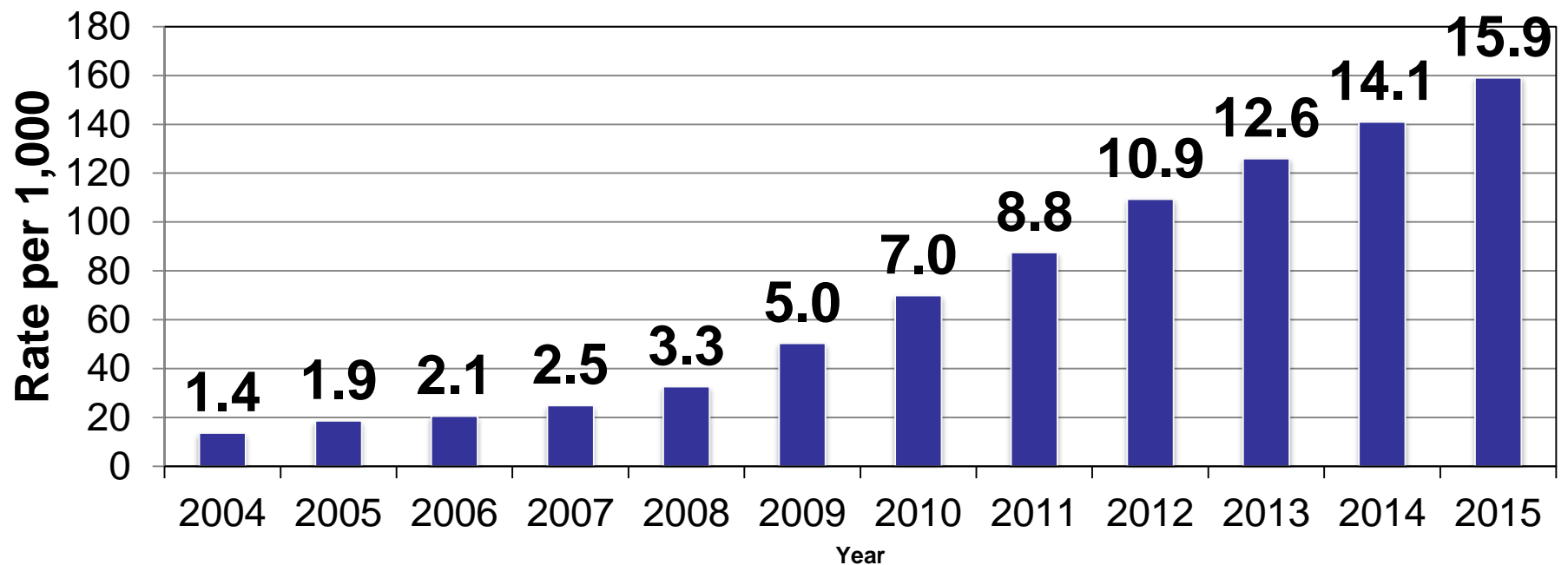
NAS Treatment and Cost

- Cost of Inpatient Hospitalizations
  - In 2015, **Medicaid** was the **payer** for approximately **89.7%** of NAS inpatient hospitalizations.

- Cost of Treating NAS
  - In 2015, **treating** newborns with **NAS** was associated with over **$133 million** in charges and over 30,000 days in Ohio's hospitals.

Discharge Rates for Neonatal Abstinence Syndrome per 1,000 Live Births

Five-year Weighted Average from 2004 to 2008

Legend

☐ ADAMHS Board

Rate per 1,000
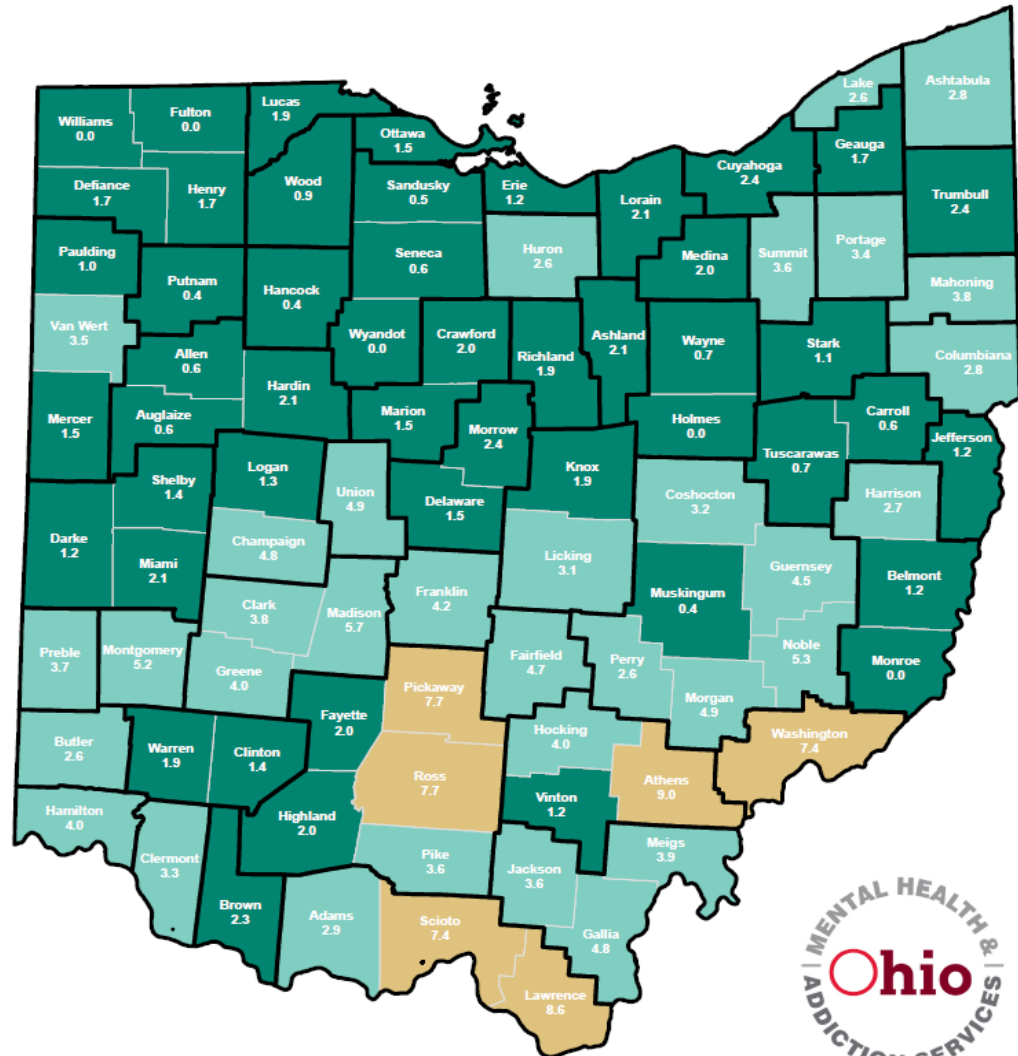
- 0.0 - 2.5
- 2.6 - 5.8
- 5.9 - 6.2

Map Information:

This map examines the discharge rates for neonatal abstinence syndrome (NAS; ICD-9 779.5) per 1,000 live births in Ohio by county of patient residence. On average, there were 2.2 discharges for NAS per 1,000 live births statewide between 2004 and 2008. Counties with the highest rates of NAS discharges were Athens (6.2), Scioto (6.0) and Madison (5.8). NAS discharge rates for 10 counties were at or close to zero during this time.

Note: Alcohol, Drug Addiction and Mental Health Services (ADAMHS) Boards have black borders, and counties have white borders. Borders are black in cases where ADAMHS boards and counties have the same borders.

Data Source:
Data adapted by OhioMHAS from the Ohio Hospital Association & the Ohio Department of Health
Map produced March 2014

County rates shown on map:
Williams 0.0, Fulton 0.0, Lucas 1.4, Ottawa 1.4, Lake 2.0, Ashtabula 1.8, Defiance 2.5, Henry 0.5, Wood 0.3, Sandusky 0.5, Erie 0.9, Lorain 1.8, Cuyahoga 1.9, Geauga 1.8, Trumbull 2.1, Paulding 2.9, Putnam 0.0, Hancock 0.0, Seneca 0.8, Huron 2.1, Medina 2.0, Summit 2.9, Portage 2.8, Mahoning 2.6, Van Wert 1.7, Allen 0.6, Wyandot 0.0, Crawford 1.9, Ashland 3.0, Wayne 0.5, Stark 0.9, Columbiana 2.0, Mercer 0.7, Auglaize 0.6, Hardin 0.5, Richland 1.0, Holmes 0.0, Carroll 0.0, Jefferson 1.2, Marion 1.3, Morrow 1.9, Knox 1.6, Coshocton 1.3, Tuscarawas 0.3, Harrison 2.8, Shelby 1.7, Logan 1.0, Union 3.2, Delaware 0.8, Licking 2.2, Guernsey 4.4, Belmont 0.6, Darke 0.3, Miami 1.5, Champaign 3.9, Clark 3.1, Madison 5.8, Franklin 2.9, Muskingum 0.4, Noble 0.0, Monroe 0.0, Preble 2.5, Montgomery 4.0, Greene 2.7, Fayette 1.0, Pickaway 4.8, Fairfield 3.0, Perry 1.3, Morgan 3.6, Washington 4.3, Butler 1.9, Warren 1.5, Clinton 1.4, Ross 3.7, Hocking 2.8, Athens 6.2, Hamilton 3.4, Highland 2.0, Pike 3.1, Vinton 1.2, Meigs 4.8, Clermont 2.3, Brown 1.5, Adams 2.3, Scioto 6.0, Jackson 2.2, Gallia 3.1, Lawrence 0.0

MENTAL HEALTH & ADDICTION SERVICES
Ohio

Discharge Rates for Neonatal Abstinence Syndrome per 1,000 Live Births

Five-year Weighted Average from 2005 to 2009

Legend

ADAMHS Board

Rate per 1,000

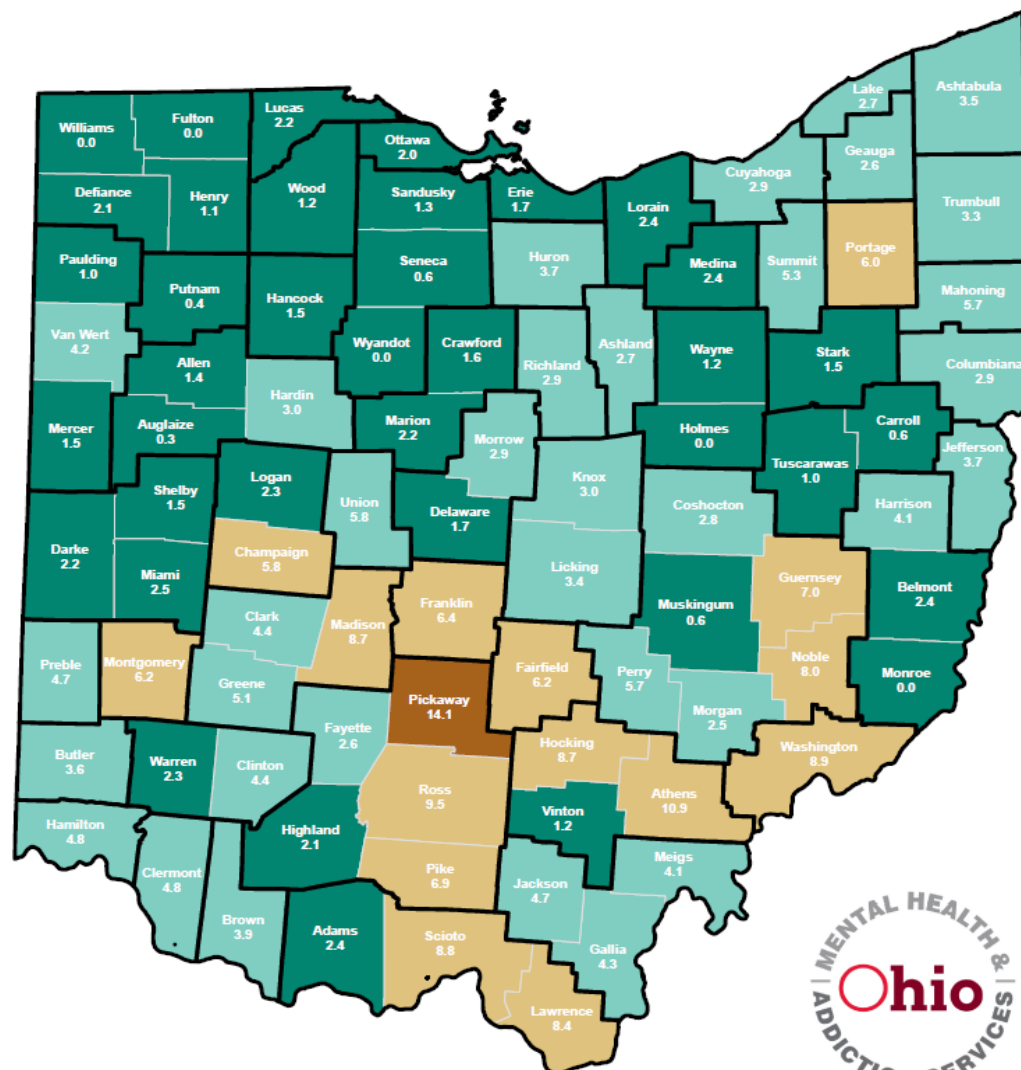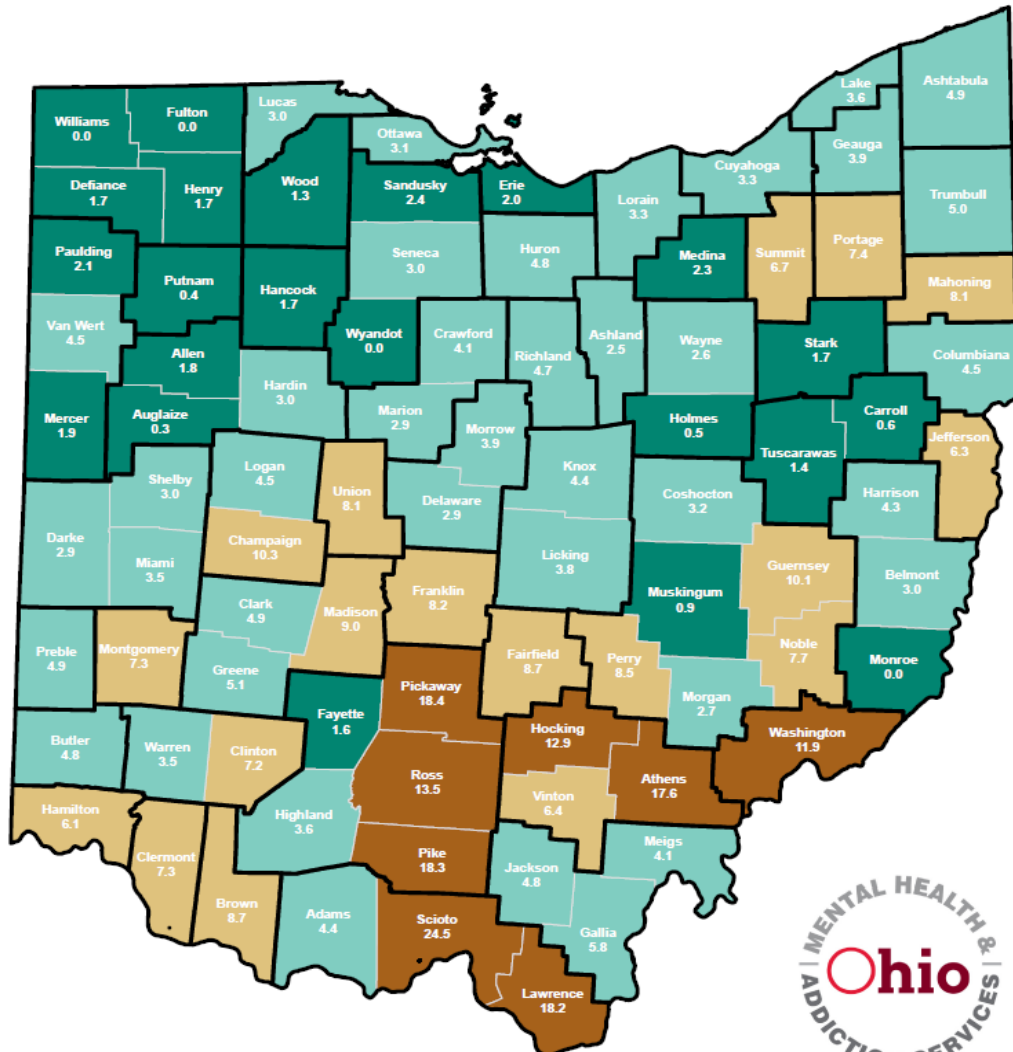- 0.0 - 2.5
- 2.6 - 5.8
- 5.9 - 9.0

Map Information:

This map examines the discharge rates for neonatal abstinence syndrome (NAS; ICD-9 779.5) per 1,000 live births in Ohio by county of patient residence. On average, there were 3.0 discharges for NAS per 1,000 live births statewide between 2005 and 2009. Counties with the highest rates of NAS discharges were Athens (9.0), Lawrence (8.6), Pickaway and Ross (both 7.7). NAS discharge rates for five counties were at or close to zero during this time.

Note: Alcohol, Drug Addiction and Mental Health Services (ADAMHS) Boards have black borders, and counties have white borders. Borders are black in cases where ADAMHS boards and counties have the same borders.

Mental Health & Addiction Services — Ohio

Discharge Rates for Neonatal Abstinence Syndrome per 1,000 Live Births

Five-year Weighted Average from 2006 to 2010

Legend

▭ **ADAMHS Board**
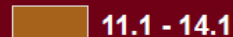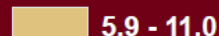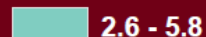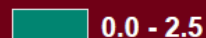
Rate per 1,000

- ■ 0.0 - 2.5
- ■ 2.6 - 5.8
- ■ 5.9 - 11.0
- ■ 11.1 - 14.1

Map Information:

This map examines the discharge rates for neonatal abstinence syndrome (NAS; ICD-9 779.5) per 1,000 live births in Ohio by county of patient residence. On average, there were 3.9 discharges for NAS per 1,000 live births statewide between 2006 and 2010. Counties with the highest rates of NAS discharges were Pickaway (14.1), Athens (10.9) and Ross (9.5). NAS discharge rates for five counties were at or close to zero during this time.

Note: Alcohol, Drug Addiction and Mental Health Services (ADAMHS) Boards have black borders, and counties have white borders. Borders are black in cases where ADAMHS boards and counties have the same borders.

Data Source:
Data adapted by OhioMHAS from the Ohio Hospital Association & the Ohio Department of Health
Map produced March 2014

Map of Ohio counties with NAS discharge rates:

Williams 0.0, Fulton 0.0, Lucas 2.2, Ottawa 2.0, Lake 2.7, Ashtabula 3.5, Cuyahoga 2.9, Geauga 2.6, Trumbull 3.3, Defiance 2.1, Henry 1.1, Wood 1.2, Sandusky 1.3, Erie 1.7, Lorain 2.4, Huron 3.7, Medina 2.4, Summit 5.3, Portage 6.0, Mahoning 5.7, Paulding 1.0, Putnam 0.4, Hancock 1.5, Seneca 0.6, Wyandot 0.0, Crawford 1.6, Ashland 2.7, Wayne 1.2, Stark 1.5, Columbiana 2.9, Van Wert 4.2, Allen 1.4, Hardin 3.0, Richland 2.9, Holmes 0.0, Carroll 0.6, Jefferson 3.7, Mercer 1.5, Auglaize 0.3, Marion 2.2, Morrow 2.9, Knox 3.0, Coshocton 2.8, Tuscarawas 1.0, Harrison 4.1, Logan 2.3, Union 5.8, Delaware 1.7, Licking 3.4, Muskingum 0.6, Guernsey 7.0, Belmont 2.4, Shelby 1.5, Champaign 5.8, Darke 2.2, Miami 2.5, Clark 4.4, Madison 8.7, Franklin 6.4, Fairfield 6.2, Perry 5.7, Noble 8.0, Monroe 0.0, Preble 4.7, Montgomery 6.2, Greene 5.1, Fayette 2.6, Pickaway 14.1, Hocking 8.7, Morgan 2.5, Washington 8.9, Butler 3.6, Warren 2.3, Clinton 4.4, Ross 9.5, Athens 10.9, Vinton 1.2, Hamilton 4.8, Highland 2.1, Pike 6.9, Jackson 4.7, Meigs 4.1, Clermont 4.8, Brown 3.9, Adams 2.4, Scioto 8.8, Gallia 4.3, Lawrence 8.4

MENTAL HEALTH & ADDICTION SERVICES — Ohio

Discharge Rates for Neonatal Abstinence Syndrome per 1,000 Live Births

Five-year Weighted Average from 2007 to 2011
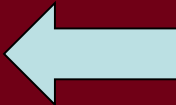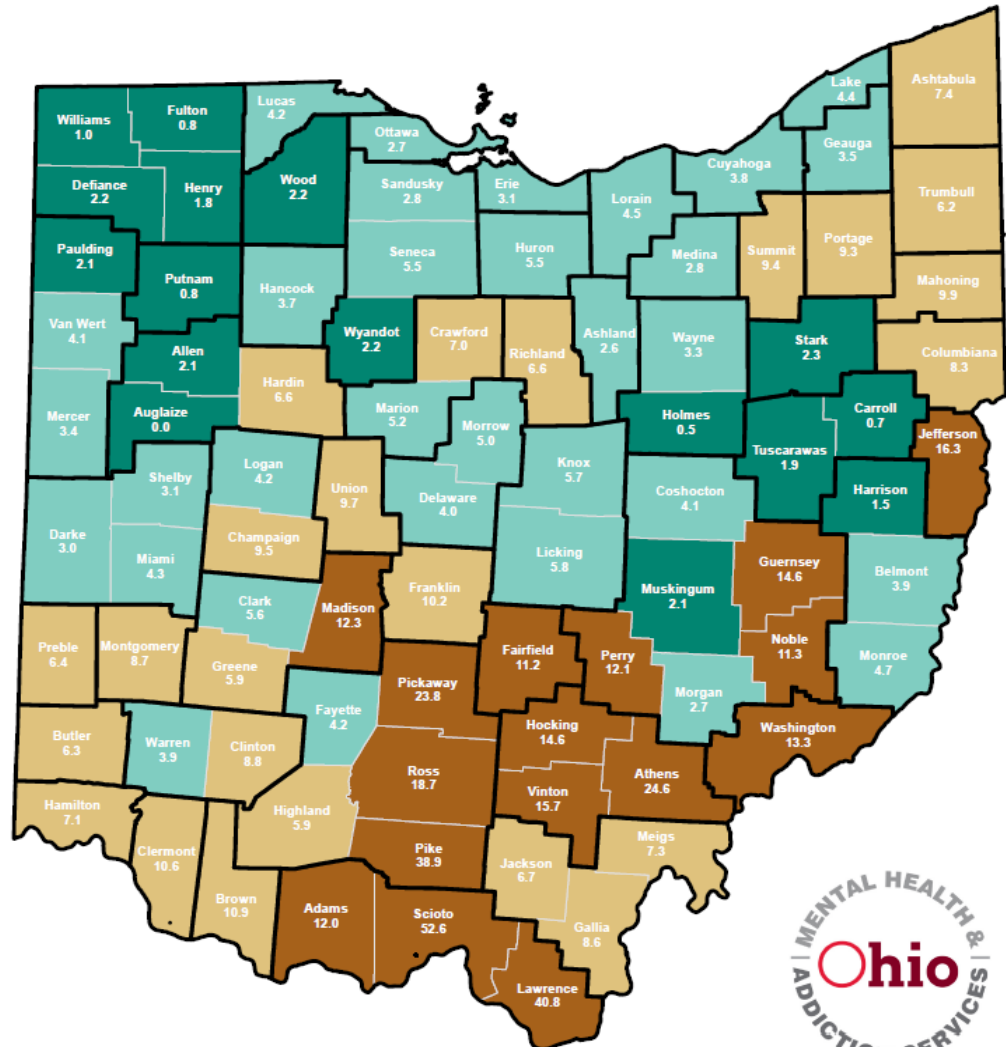
Legend

ADAMHS Board

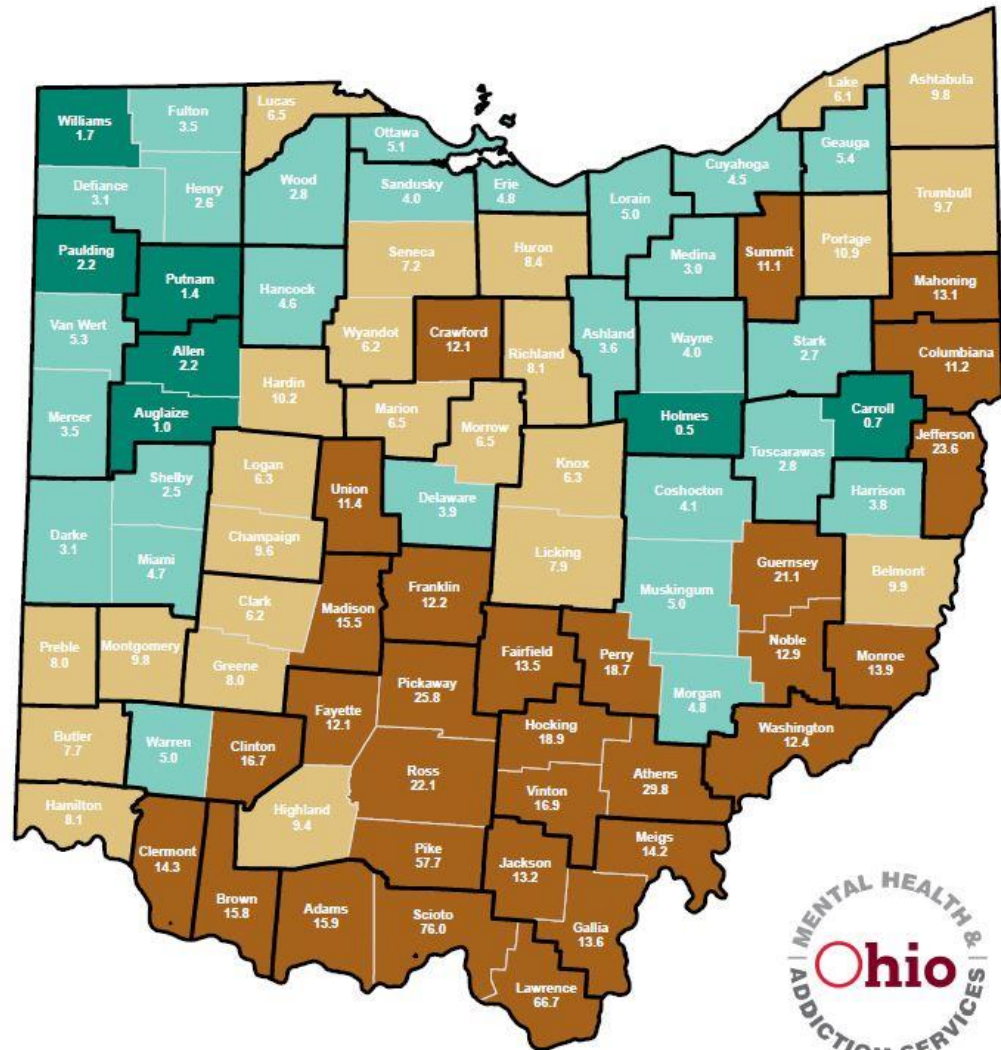### Rate per 1,000

- 0.0 - 2.5
- 2.6 - 5.8
- 5.9 - 11.0
- 11.1 - 24.5

Map Information:

This map examines the discharge rates for neonatal abstinence syndrome (NAS; ICD-9 779.5) per 1,000 live births in Ohio by county of patient residence. On average, there were 5.3 discharges for NAS per 1,000 live births statewide between 2007 and 2011. Counties with the highest rates of NAS discharges were Scioto (24.5), Pickaway (18.4) and Pike (18.3). NAS discharge rates for four counties were at or close to zero during this time.

Note: Alcohol, Drug Addiction and Mental Health Services (ADAMHS) Boards have black borders, and counties have white borders. Borders are black in cases where ADAMHS boards and counties have the same borders.

Data Source:
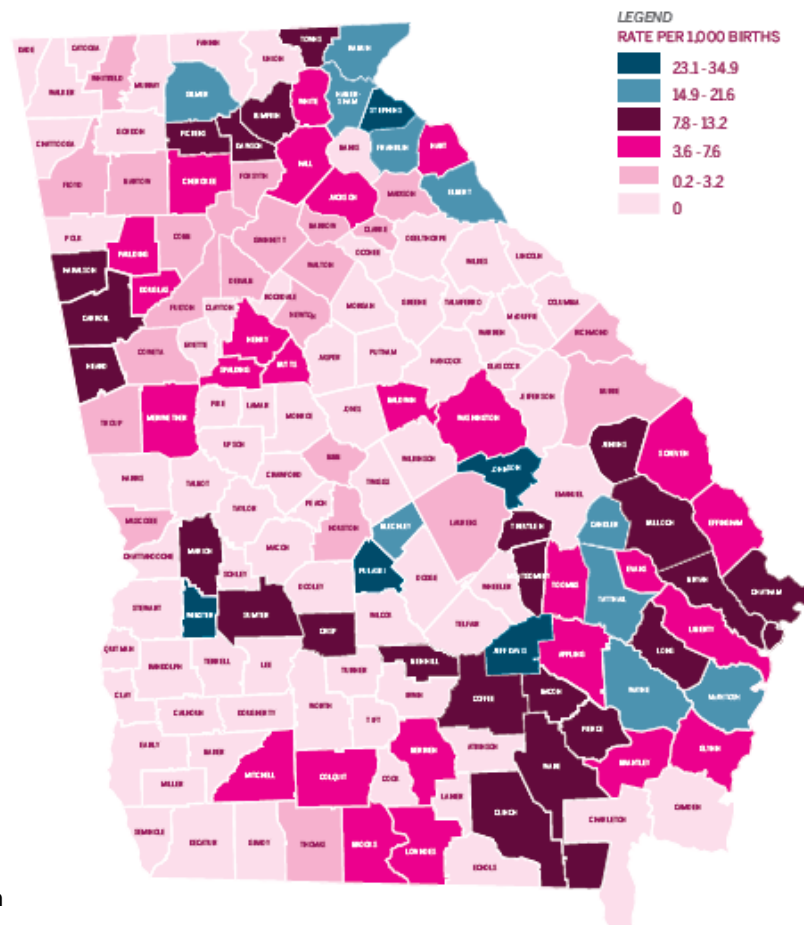Data adapted by OhioMHAS from the Ohio Hospital Association & the Ohio Department of Health
Map produced March 2014

Discharge Rates for Neonatal Abstinence Syndrome per 1,000 Live Births

Five-year Weighted Average from 2008 to 2012

Legend

	ADAMHS Board

Rate per 1,000

- 0.0 - 2.5
- 2.6 - 5.8
- 5.9 - 11.0
- 11.1 - 52.6

Map Information:

This map examines the discharge rates for neonatal abstinence syndrome (NAS; ICD-9 779.5) per 1,000 live births in Ohio by county of patient residence. On average, there were 6.9 discharges for NAS per 1,000 live births statewide between 2008 and 2012. Counties with the highest rates of NAS discharges were Scioto (52.6), Lawrence (40.8) and Pike (38.9). Carroll (0.7), Holmes (0.5) and Auglaize (0.0) counties had the lowest rates of NAS discharges.

Note: Alcohol, Drug Addiction and Mental Health Services (ADAMHS) Boards have black borders, and counties have white borders. Borders are black in cases where ADAMHS boards and counties have the same borders.

County data values shown on map:

County	Rate	County	Rate	County	Rate
Williams	1.0	Fulton	0.8	Lucas	4.2
Defiance	2.2	Henry	1.8	Wood	2.2
Ottawa	2.7	Sandusky	2.8	Erie	3.1
Lorain	4.5	Cuyahoga	3.8	Lake	4.4
Geauga	3.5	Ashtabula	7.4	Trumbull	6.2
Paulding	2.1	Putnam	0.8	Hancock	3.7
Seneca	5.5	Huron	5.5	Medina	2.8
Summit	9.4	Portage	9.3	Mahoning	9.9
Van Wert	4.1	Allen	2.1	Wyandot	2.2
Crawford	7.0	Richland	6.6	Ashland	2.6
Wayne	3.3	Stark	2.3	Columbiana	8.3
Mercer	3.4	Auglaize	0.0	Hardin	6.6
Marion	5.2	Morrow	5.0	Holmes	0.5
Carroll	0.7	Jefferson	16.3	Shelby	3.1
Logan	4.2	Union	9.7	Knox	5.7
Tuscarawas	1.9	Harrison	1.5	Darke	3.0
Miami	4.3	Champaign	9.5	Delaware	4.0
Licking	5.8	Coshocton	4.1	Guernsey	14.6
Belmont	3.9	Clark	5.6	Madison	12.3
Franklin	10.2	Muskingum	2.1	Noble	11.3
Monroe	4.7	Preble	6.4	Montgomery	8.7
Greene	5.9	Fairfield	11.2	Perry	12.1
Morgan	2.7	Washington	13.3	Fayette	4.2
Pickaway	23.8	Hocking	14.6	Athens	24.6
Butler	6.3	Warren	3.9	Clinton	8.8
Ross	18.7	Vinton	15.7	Hamilton	7.1
Highland	5.9	Pike	38.9	Jackson	6.7
Meigs	7.3	Clermont	10.6	Brown	10.9
Adams	12.0	Scioto	52.6	Gallia	8.6
Lawrence	40.8				

MENTAL HEALTH & ADDICTION SERVICES — Ohio

Discharge Rates for Neonatal Abstinence Syndrome per 1,000 Live Births

Five-year Weighted Average from 2009 to 2013

Legend

ADAMHS Board

Rate per 1,000

- 0.5 - 2.5
- 2.6 - 5.8
- 5.9 - 11.0
- 11.1 76.0

Map Information:

This map examines the discharge rates for neonatal abstinence syndrome (NAS; ICD-9 779.5) per 1,000 live births in Ohio by county of patient residence. On average, there were 8.8 discharges for NAS per 1,000 live births statewide between 2009 and 2013. Counties with the highest rates of NAS discharges were Scioto (76.0), Lawrence (66.7) and Pike (57.7). NAS discharge rates were lowest in Holmes (0.5), Carroll (0.7) and Auglaize (1.0) counties.

Note: Alcohol, Drug Addiction and Mental Health Services (ADAMHS) Boards have black borders, and counties have white borders. Borders are black in cases where ADAMHS boards and counties have the same borders.

Data Source:
Data adapted by OhioMHAS from the Ohio Hospital Association & the Ohio Department of Health
Map produced June 2015

What a difference 5 years makes…

2004-2008

Discharge Rates for Neonatal Abstinence Syndrome per 1,000 Live Births
Five-year Weighted Average from 2004 to 2008

2009-2013

Discharge Rates for Neonatal Abstinence Syndrome per 1,000 Live Births
Five-year Weighted Average from 2009 to 2013

NAS Rates in Georgia by County, 2016

NAS DISTRIBUTION IN GEORGIA

NAS RATES BY COUNTY, GEORGIA, 2016

LEGEND
RATE PER 1,000 BIRTHS
- 23.1 - 34.9
- 14.9 - 21.6
- 7.8 - 13.2
- 3.6 - 7.6
- 0.2 - 3.2
- 0

Source: Georgia Department of Public Health

NEONATAL ABSTINENCE SYNDROME: ADDRESSING THE PROBLEM IN OHIO

Ohio Children's Hospital Association NAS Consortium

- September 2012 –September 2014
- Six children's hospitals and their affiliates (20 total hospitals)
- Funded by Office of Governor John Kasich
- Goals:
  - Understand epidemiology of mothers and infants with NAS by following longitudinal cohort
  - Determine the "potentially better practice" for NAS treatment
  - Identify variation and areas for future research

Descriptors: 553 neonates (2012 - 2013)

- Young, white and single
- 80% mothers public insurance
- 85% had pregnancy complications
- 26% Hepatitis C positive
- 82% used tobacco products

Hall et. al. *Pediatrics.* 2014;134(2):e527

Infant Treatment Characteristics

Symptoms Started (mean)	46.1 hours
Opioid Treatment Days (mean)	20.5 days
DOL at discharge (mean)	22.4 days
Number of Drugs Used (mean)	1.5

Drugs used
  Morphine only
  Methadone only
	50.8%
	41%

Hall et. al. *Pediatrics.* 2014;134(2):e527

Impact of Ohio OCHA Weaning Protocol

- In July 2013 a standard "Potentially Better" weaning protocol was adopted by all six groups.
- We documented management of 462 infants prior to statewide adoption of the weaning protocol, and 392 infants after adoption.
  - We removed infants who completed therapy as an outpatient, as this center did not adopt the protocol.
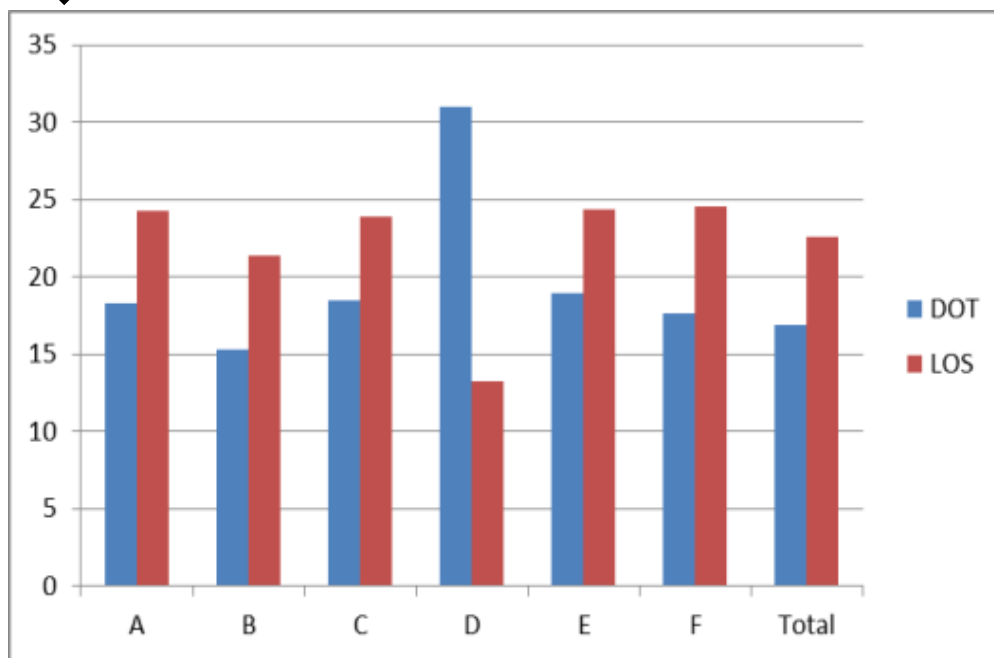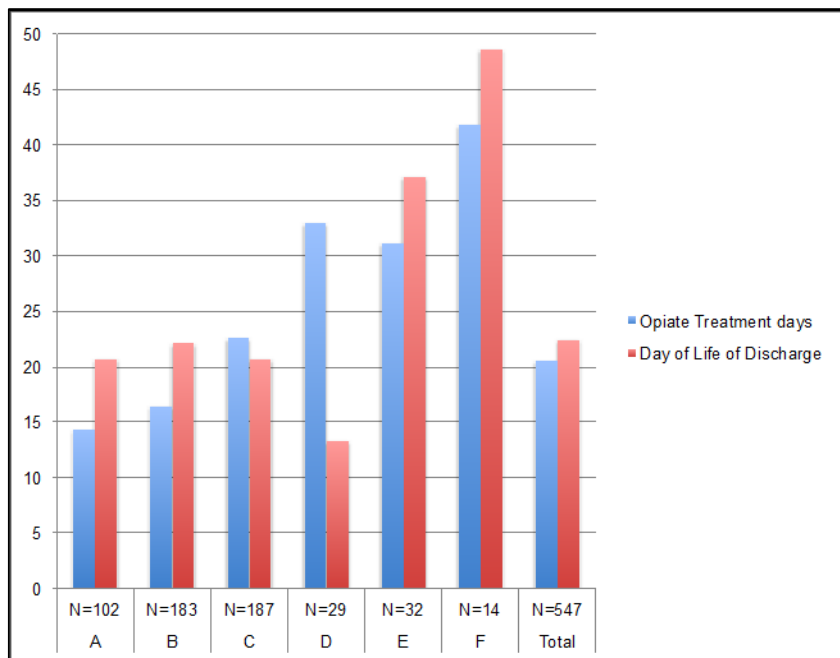
Impact of Standardization at a participating OCHA Site

Neonatal Abstinence Syndrome Length of Stay 2012-2014
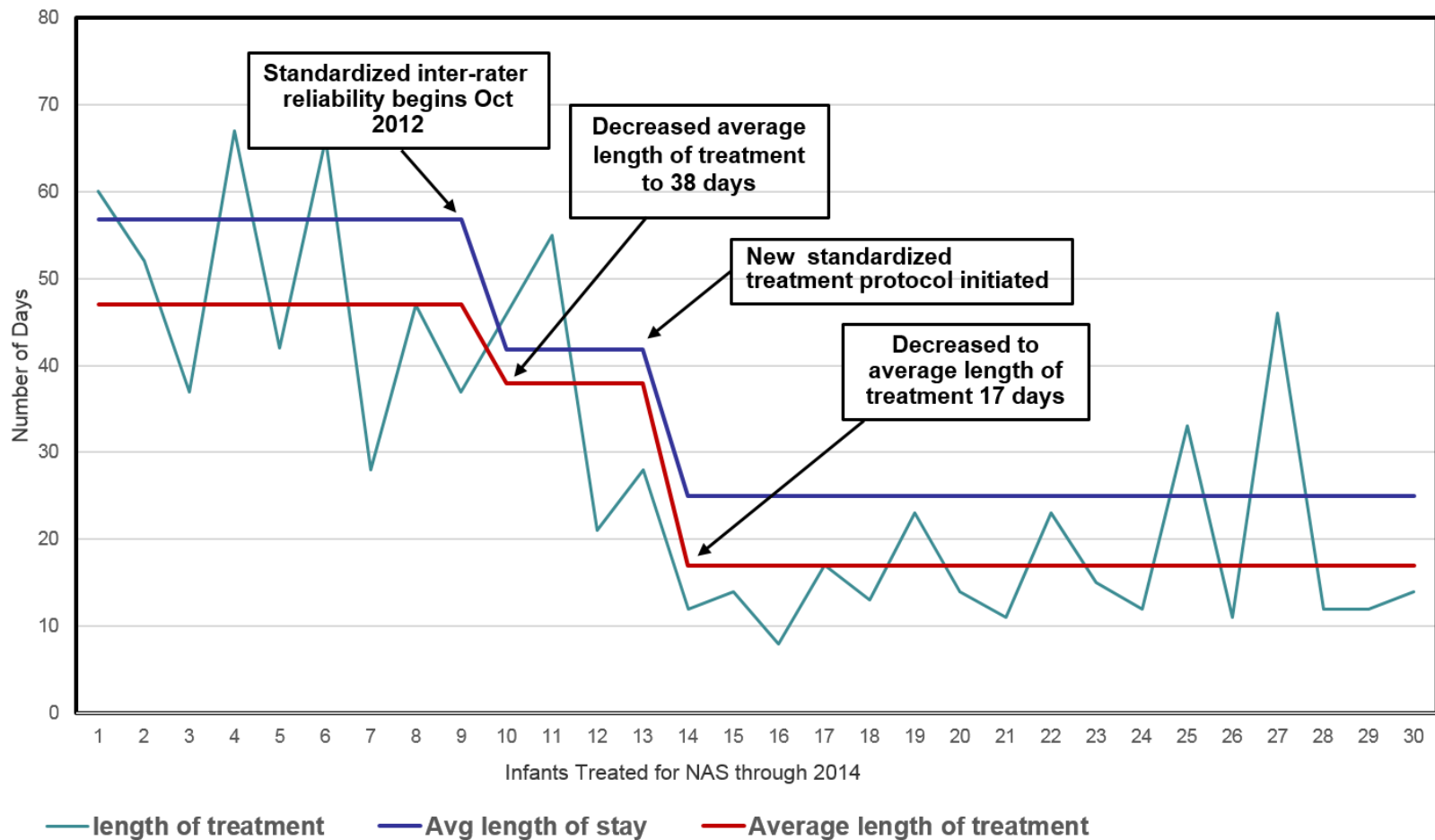
Spreading OCHA learnings through Ohio

- 54 sites:
  - 26 Level III NICU's
  - 26 Level II Special Care Nurseries
  - 2 Normal Newborn Nurseries
- Funded by Ohio Dept. of Medicaid to start January 2014
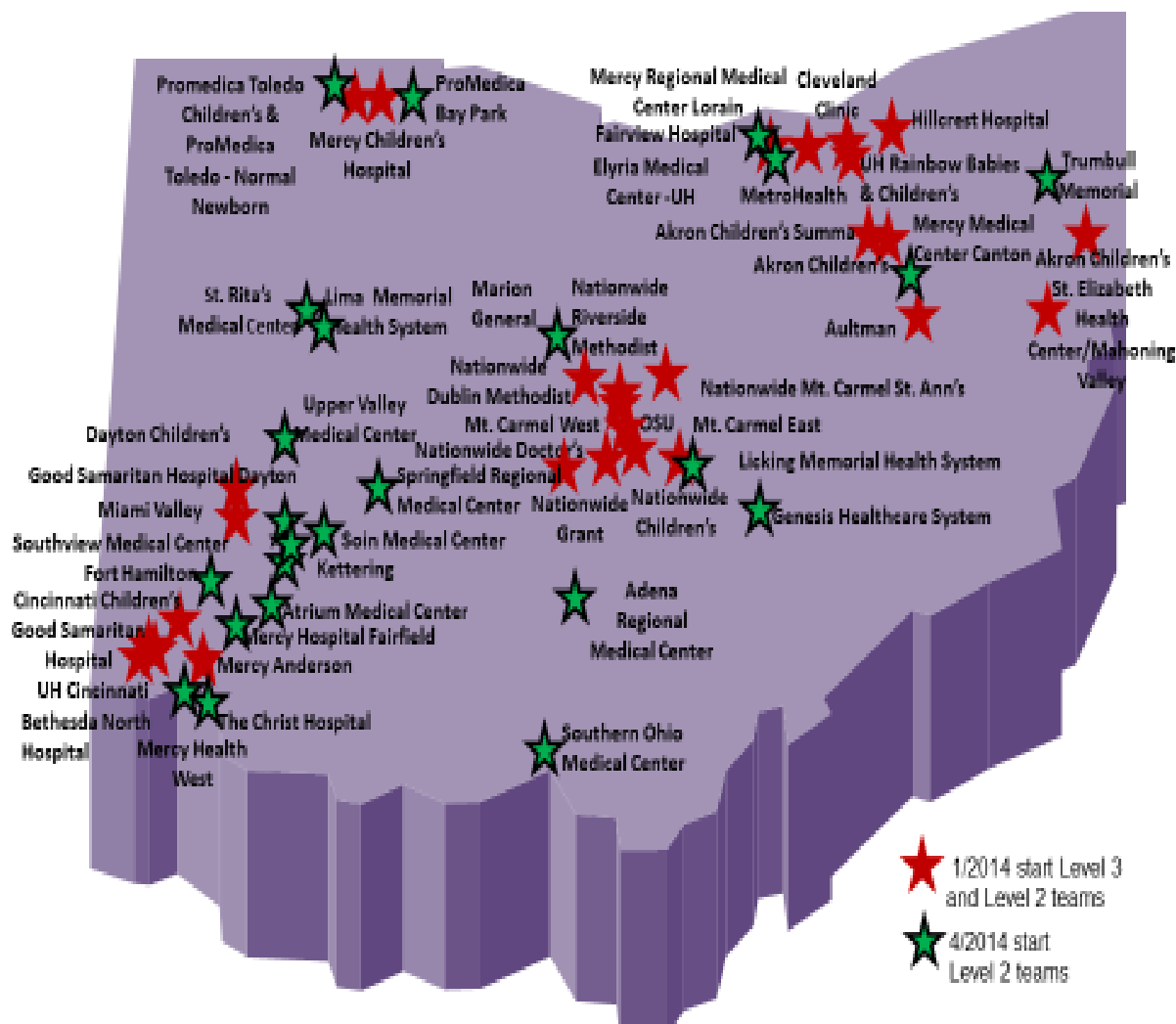
Key Driver Diagram
Project Name: OPQC Neonatal NAS

GLOBAL AIM

To reduce the number of moms and babies with narcotic exposure, and reduce the need for treatment of NAS.

SMART AIM

By increasing identification of and compassionate withdrawal treatment for full-term infants born with Neonatal Abstinence Syndrome (NAS), we will reduce length of stay by 20% across participating sites by June 30, 2015.

KEY DRIVERS

- Prenatal Identification of Mom Implement Optimal Med Rx Program
- Improve recognition and non-judgmental support for Narcotic addicted women and infants
- Attain high reliability in NAS scoring by nursing staff
- Optimize Non-Pharmacologic Rx Bundle
- Standardize NAS Treatment Protocol
- Connect with outpatient support and treatment program prior to discharge
- Partner with Families to Establish Safety Plan for Infant
- Partner with other stakeholders to influence policy and primary prevention.

INTERVENTIONS

- All MD and RN staff to view "Nurture the Mother- Nurture the Child" Vermont Oxford Network's DVD
- Monthly education on addiction care.

- Fulltime RN staff at Level 2 and 3 to complete D'Apolito NAS scoring training video and achieve 90% reliability.

- Swaddling, low stimulation.
- Encourage kangaroo care
- Feed on demand- MBM if appropriate or lactose free, 22 cal formula

- Initiate Rx If NAS score > 8 twice.
- Stabilization/ Escalation Phase
- Wean when stable for 48 hrs by 10% daily.

- Establish agreement with outpatient program and/or Mental Health
- Utilize Early Intervention Services

- Collaborate with DHS/ CPS to ensure infant safety.

- Engage families in Safety Planning.

- Provide primary prevention materials to sites.

OPQC
Ohio Perinatal Quality Collaborative

Key Strategies to Accomplish our AIM?

- Develop and implement *standardized processes* for the identification, evaluation, treatment and discharge management of an infant with neonatal abstinence syndrome.
  - Standardization of Finnegan Scoring—improve consistency in use of Modified Finnegan Tool with D'Apolito video
  - Standardization of pharmacologic and non-pharmacologic care

- Create a culture of compassion, understanding, and healing for the mother infant dyad affected by the problem of neonatal abstinence syndrome.
  - Addiction as a chronic illness
  - Nurture the Mother-Nurture the Child video
  - Attitudes Survey

Attain high reliability in NAS scoring

- All sites use same tool

- Train RN staff to 90% reliability in scoring using D'Apolito Training System

- In Pilot work, we were able to see drop in max score when training completed

- OPQC has sent out DVD/workbook's to each site

Patient Sticker:

Inter-Rater Reliability Scoring Sheet

Date	Time	1st RN score	SuperUser Score	# of discrepancies	Areas of discrepancies	Reliability Score	RN Names
							1. 2.
							1. 2.
							1. 2.
							1. 2.
							1. 2.

Reliability Table

# Items in Agreement	# Items in Disagreement	Percentage Score
21	0	100
20	1	95
19	2	90
18	3	85
17	4	80
16	5	75
15	6	70
14	7	65
13	8	60
12	9	55
11	10	50

*Shaded area denotes target scores

Scoring Interval	Sneezing	Yawning	Sleep times

Standardize Pharmacological Treatment Bundle
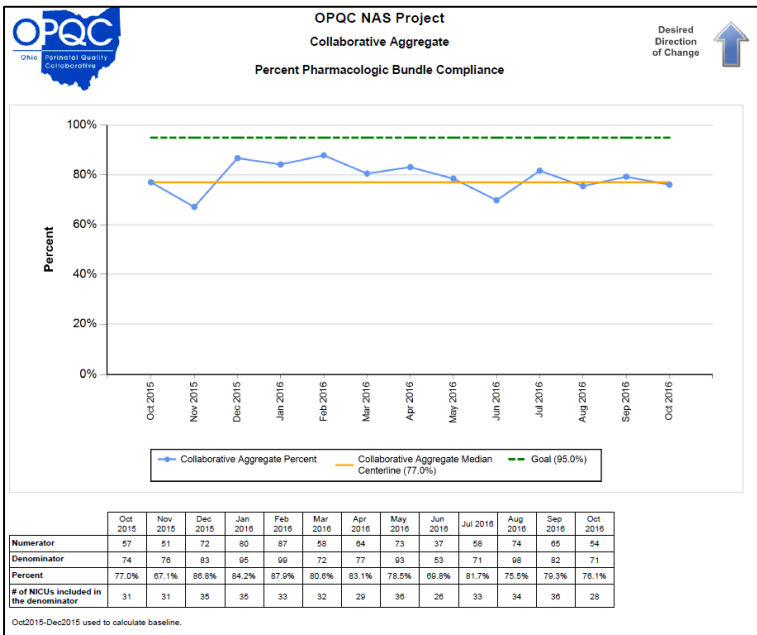
Ohio Potentially Better Protocol

Initiate	Treatment should be initiated if infant has: • 2 consecutive scores > 8 *or* • 1 score > 12
	Drug: Morphine/ Methadone 0.05 mg/kg PO
Escalate	If ≥ 12, increase dose
Stabilize	No increase for 48 hrs
Wean	10% of max dose daily Discharge • 48 hours off Morphine • 72 hours off Methadone

Standardize Non-Pharmacological Treatment Bundle

Parent/Caregiver Education
Developmentally Supportive Care

- **Awaken gently AND only when necessary**
  - Protect sleep

- **Apply the 5-Second Rule**
  - Before touching the infant, speak to them
  - Containment hold for at least 5 seconds
  - Safe human touch 1st and ALWAYS

- **Provide 2-person care whenever possible**
  - 1 to support the infant, 1 to complete the task at hand
  - Ideally this is a nurse/therapist AND a parent/caregiver

The Role of the De...
the Non-Pharm...

Cleveland Clinic Children's

Are We Making a Difference?

Data is currently being analyzed on time and interventions that **NAS Volunteer Specialists** have documented.

- LOS has decreased

- Pre/Posttests results
  - Pretest Score - Range 60-90; Mean 75
  - Posttest Score – 100

- Positive feedback from nursing staff on program

- Volunteers are asking to be part of program.

NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.

"Steal Shamelessly/ Share Seamlessly"

CAUSE

Akron Children's Hospital
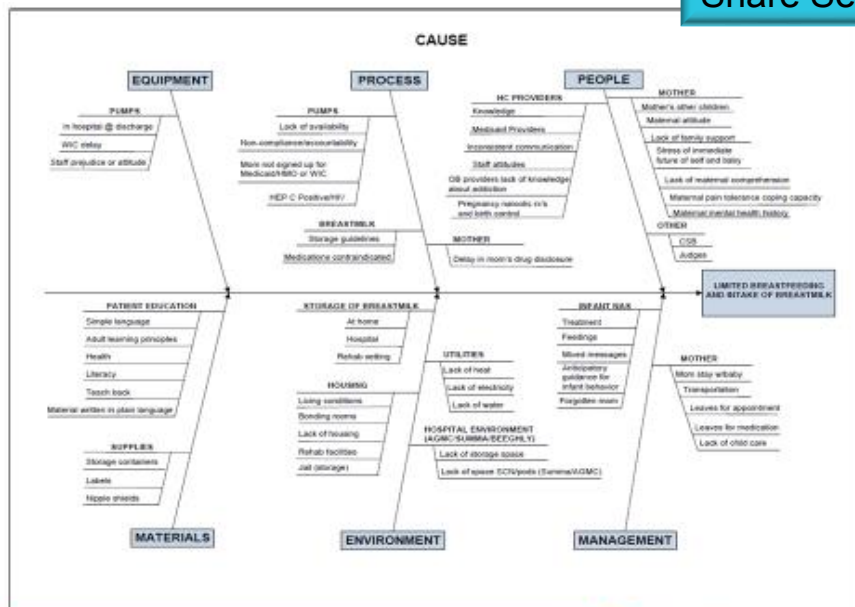
KEY DRIVER DIAGRAM

Project Title: The Provision of Human Milk for Babies with Neonatal Abstinence Syndrome (NAS)

Akron Children's Hospital

Improve recognition and non-judgmental support for Narcotic addicted women and infants

- ## Addiction = Chronic Illness

  - ➢ Addiction is a chronic and treatable disease
  - ➢ Opioid maintenance therapy with methadone or buprenorphine may play an important role in treatment of pregnant women struggling with addiction
  - ➢ Opioid maintenance therapy improves outcomes for both pregnant women and their infants
  - ➢ Providing non-judgmental, compassionate care can be rewarding and beneficial for the patients and the providers

Relapse Rates: Similar for Drug Addiction And Other Chronic Illnesses

Percentage of patients whose symptoms reoccur

Drug addiction	60%
Type 1 diabetes	30 to 50%
Hypertension	50 to 70%
Asthma	50 to 70%

Source: "Drug dependence, a chronic medical illness: implications for treatment, insurance and outcomes evaluation," *Journal of the American Medical Association*, 2000.

- ## Attitude Measures Survey

Health Professionals' Attitudes Towards Licit and Illicit Drug Users

A Training Resource

National Centre for Education and Training on Addiction
Flinders University, Adelaide Australia
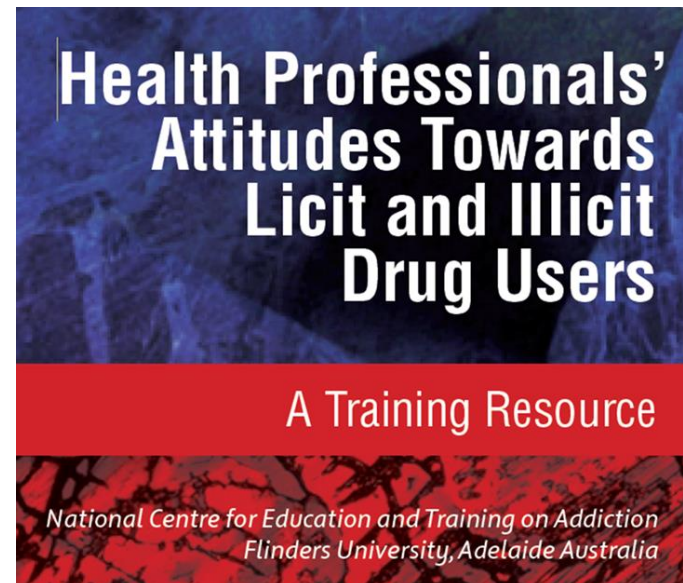
This resource is focused on people's attitudes towards alcohol and other drug use and is designed to encourage health professionals to explore and evaluate their attitudes towards drug users - particularly perceptions about a client's or patient's deservingness of medical care.

OPQC Interventions Focused on Attitude Change

- Unit wide training for all NICU staff about living with OUD—"Nurture the Mother-Nurture the Child" video

- Sharing stories of pregnant women with SUD—session with panel of mother of infants with NAS

- Education about addiction as a chronic disease—lectures by addiction specialist

- Community resources outreach—NICU teams identified community resources available to support mother-infant dyad and examined barriers to accessing resources

Survey Question	Desired Direction of Change	Adjusted Mean Time point 1	Adjusted Mean Time point 2	Adjusted Mean Time point 3
To what extent do you feel angry towards people using drugs?	Down	2.41	2.27[*]	2.29[*]
To what extent is an individual personally responsible for their problematic drug use?	Down	4.21	4.02[*]	3.98[*]
To what extent do you feel disappointed towards people using drugs?	Down	3.11	2.92[*]	2.95[*]
To what extent are adverse life circumstances likely to be responsible for a person's problematic drug use?	Up	3.65	3.71	3.72
To what extent do you feel sympathetic towards people using drugs?	Up	2.95	3.13[*]	3.14[*]
To what extent do people who use drugs deserve the same level of medical care as people who don't use drugs?	Up	4.49	4.56	4.57[*]
To what extent do you feel concerned towards people using drugs?	Up	4.15	4.13	4.19

*Denotes a significant difference from the mean of timepoint 1 after adjusting for site and multiple comparisons

Partner with other stakeholders to influence policy and primary prevention

All available for download on our website at **https://opqc.net**

Phase I Results

After 9 months of improvement work, **length of treatment decreased by 9% from 13.4 to 12 days**

…and **LOS decreased by 9% from 18.3 to 17 days** in September 2014
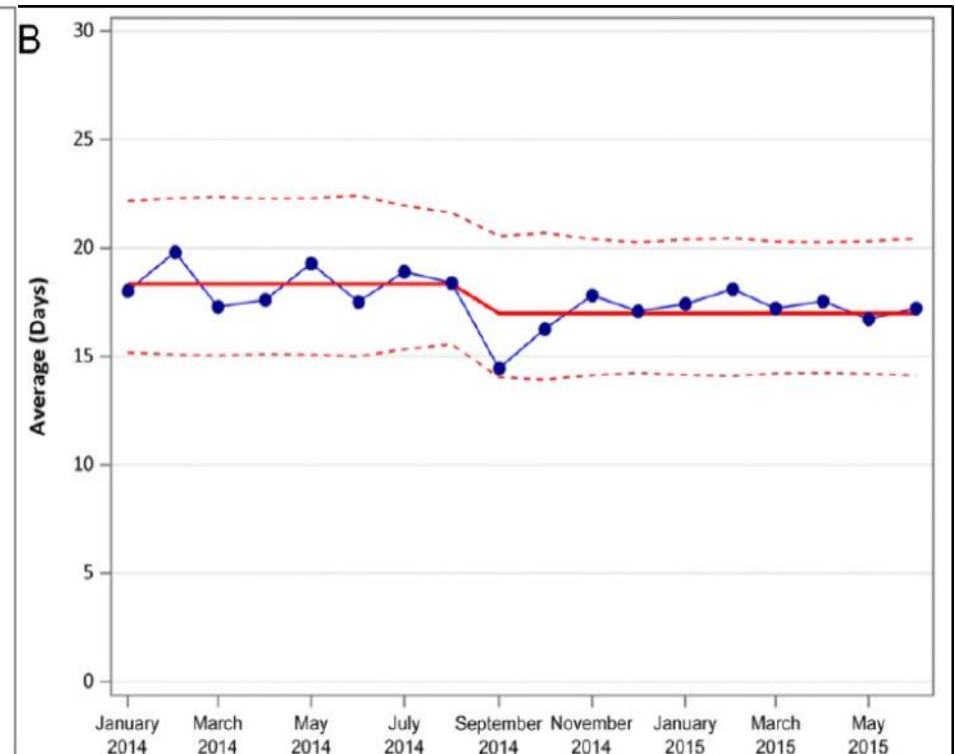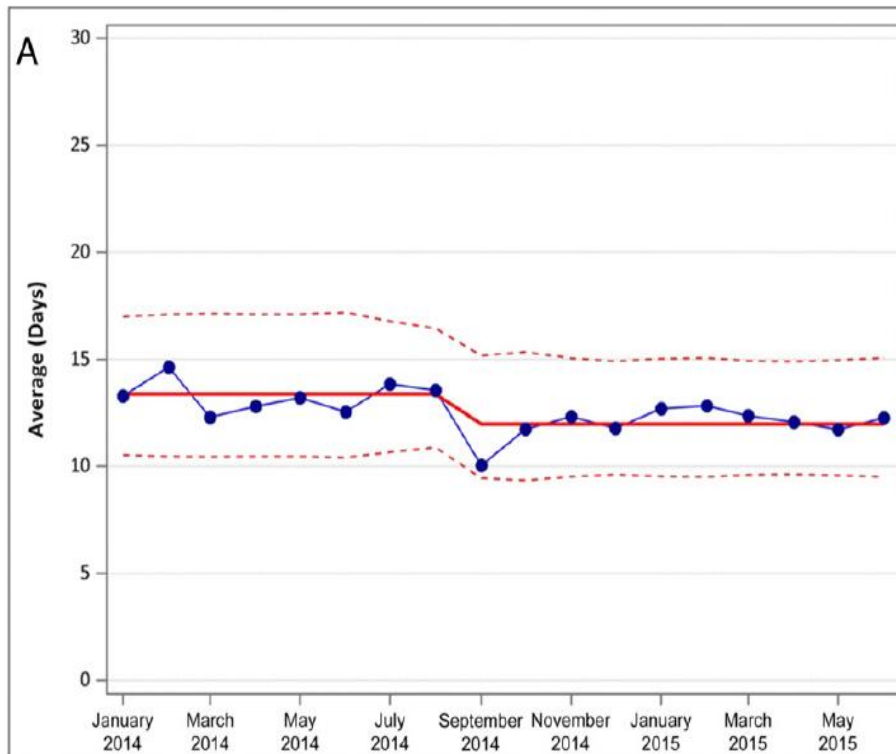
OPQC NAS
Phase 1 Publication

PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Ohio Perinatal Quality Collaborative Improves Care of Neonatal Narcotic Abstinence Syndrome
Michele C. Walsh, Moira Crowley, Scott Wexelblatt, Susan Ford, Pierce Kuhnell, Heather C. Kaplan, Richard McClead, Maurizio Macaluso, Carole Lannon and for the Ohio Perinatal Quality Collaborative
Pediatrics originally published online March 7, 2018;

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://pediatrics.aappublications.org/content/early/2018/03/05/peds.2017-0900

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Pediatrics
March 2018

Ohio Perinatal Quality Collaborative Improves Care of Neonatal Narcotic Abstinence Syndrome

Michele C. Walsh, Moira Crowley, Scott Wexelblatt, Susan Ford, Pierce Kuhnell, Heather C. Kaplan, Richard McClead, Maurizio Macaluso, Carole Lannon, for the Ohio Perinatal Quality Collaborative

| Article | Figures & Data | Supplemental | Info & Metrics | Comments |

Download PDF

Abstract

OBJECTIVES: Neonatal abstinence syndrome (NAS) after an infant's in-utero exposure to opioids has increased dramatically in incidence. No treatment standards exist, leading to substantial variations in practice, degree of opioid exposure, and hospital length of stay.

METHODS: The Ohio Perinatal Quality Collaborative conducted an extensive multi-modal quality improvement initiative with the goal to (1) standardize identification, nonpharmacologic and pharmacologic treatment in level-2 and 3 NICUs in Ohio, (2) reduce the use of and length of treatment with opioids, and (3) reduce hospital length of stay in pharmacologically treated newborns with NAS.

RESULTS: Fifty-two of 54 (96%) Ohio NICUs participated in the collaborative. Compliance with the nonpharmacologic bundle improved from 37% to 59%, and the pharmacologic bundle improved from 59% to 68%. Forty-eight percent of the 3266 opioid-exposed infants received pharmacologic treatment of symptoms of NAS, and this rate did not change significantly across the time period. Regardless of the opioid used to pharmacologically treat infants with NAS, the length of treatment decreased from 13.4 to 12.0 days, and length of stay decreased from 18.3 to 17 days.

CONCLUSIONS: Standardized approaches to the identification and nonpharmacologic and pharmacologic care were associated with a reduced length of opioid exposure and hospital stay in a large statewide collaborative. Other states and institutions treating opioid-exposed infants may benefit from the adoption of these practices.

- Accepted December 4, 2017.
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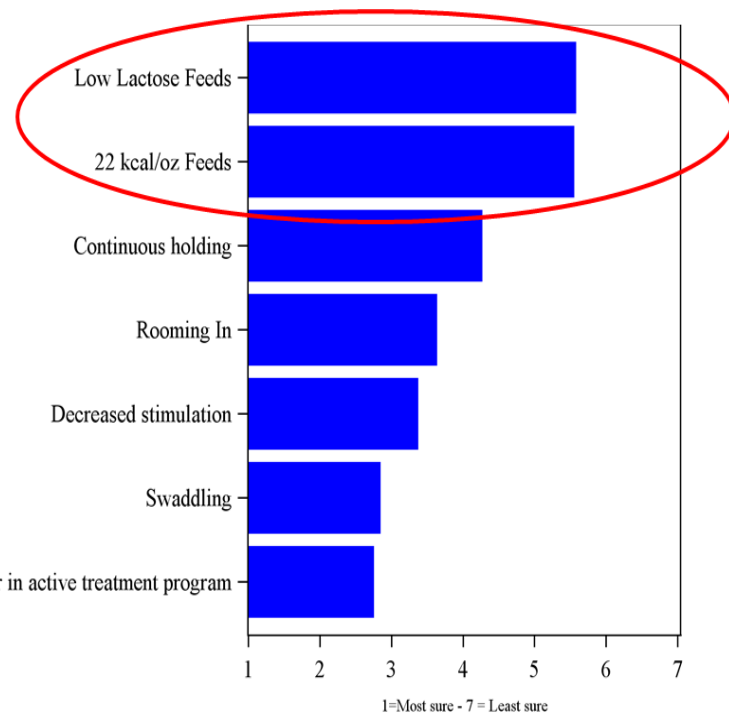Permissions   Print
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Table of Contents

OPQC
Ohio Perinatal Quality Collaborative

Variation and Uncertainty in Non-Pharmacologic Care

Distribution of Compliance with Non-Pharmacologic Bundle Components
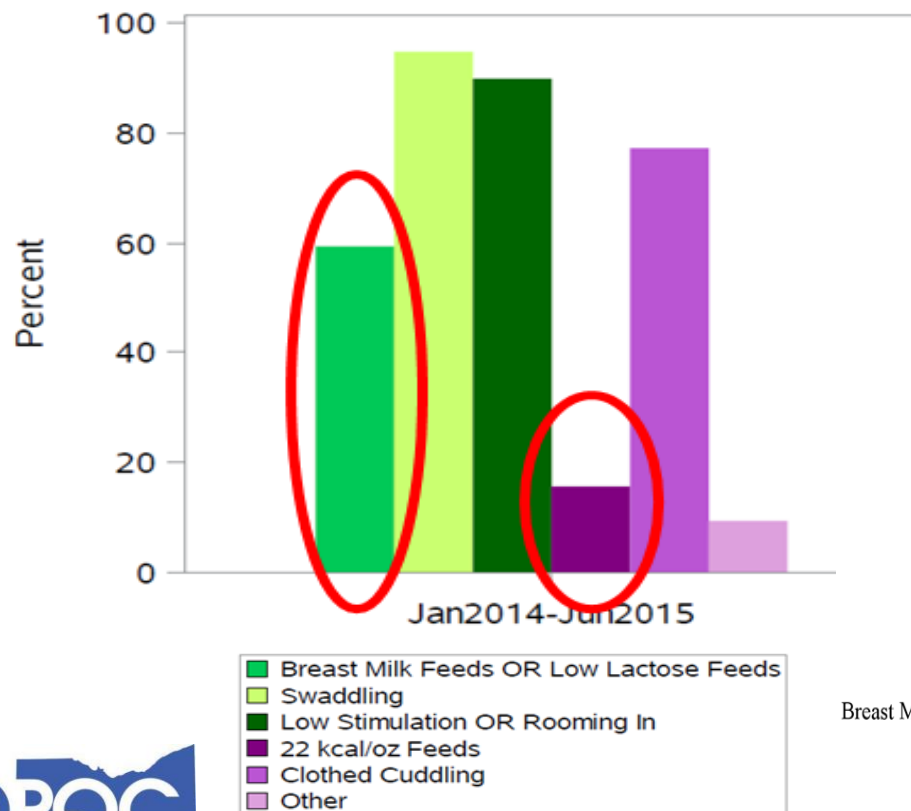
Survey Responses Regarding Certainty in Non-Pharmacologic Bundle Components (7= Least Sure)

Orchestrated Testing (OT)

- OT involves planned testing across multiple sites (within or across institutions)

- Can use factorial design to…
  - Be more systematic about simultaneous testing of different change ideas
  - Look at the independent and combined effects of different changes

- Standardization of practices and reliable implementation is necessary

- Can result in faster and more efficient learning

OPQC OT Phase II
October 2015-June 2016

- Wide scale test of change examining the role of formula in non-pharmacologic care across 54 NICU/SCN sites

- Two change ideas (factors):
    - Type of formula
    - Calorie content of formula

- Two "levels" of each factor
    - Standard Lactose vs. Low-Lactose
    - Standard Calorie vs. Higher Calorie

Factorial Design

OPQC Factorial Design (2^2)

Group	Low Lactose Standard	22 kcal/oz Standard
1	Yes	Yes
2	No	Yes
3	Yes	No
4	No	No

Sites self-selected into 1 of 4 formula groups based on their practice culture

Measures

- LOS (pharmacologically treated infants)

- Treatment failure—percent infants requiring dose escalation, failed wean, and/or secondary medication

- Weight Loss >10%

Formula Choice based on Orchestrated Testing Results

Overall, the Orchestrated Testing data suggest that **use of 22 kcal/oz could be a beneficial practice** for NAS non-pharmacologic support

- Consistent benefit of 22 kcal/oz feeds on weight loss, treatment failure, and length of stay
  - **22 kcal/oz formula is associated with less treatment failure and shorter length of stay**, though only explains a very small amount of the variation

- Benefit of LLF is not consistent across outcome measures--possible synergistic effect with 22 kcal/oz on weight loss and length of stay, but not on treatment failure

OPQC NAS Recommendations
Non-Pharmacologic Treatment

- All infants are treated with decreased stimulation, swaddling, continuous holding, and frequent feedings.

- Encourage breastfeeding if mother is in treatment program.

- If breast milk not used, give 22 kcal/oz formula. Low-lactose formula may be used at the discretion of the unit.

Updates to Recommended NAS Protocol

Ohio Children's' Hospitals Neonatal Research Consortium
Enteral Morphine or Methadone Protocol for
Neonatal Abstinence Syndrome (NAS) from Maternal Exposure

Introduction:
The protocols are a synthesis of the best available, although limited evidence, and an analysis of practice variation across the state of Ohio in a cohort of 553 term infants with maternal narcotic exposure. These are viewed as potentially better protocols that humanely and safely wean infants off narcotics over a 2-3 week period.

Each center should pick either Morphine or Methadone as their standard and use this for ALL NAS infants treated in that center.

Overview of Stages of treatment

Potentially Better Protocol

Non-Pharmacologic	Swaddle, Comfort, 22 Calorie
Initiate	NAS score > 8 q3h two times
	Drug: Morphine/ Methadone 0.05 mg/kg PO
Escalate	If > 12, increase by 0.02 mg/kg/dose
Stabilize	Maintain dose for 48 hrs
Wean	10% of stabilization dose daily
	Discharge 48 hours off drug

1. **Scoring:** All Infants will be scored every 3 hours prior to a feeding with the modified Finnegan Scoring System. Begin scoring at every 3 hrs, when weaning phase begins, if not waking to feed until 4 hrs may score every 4 hrs.
   1a. Some experts recommend using the *average* of NAS scores over a 24 hour period in the stabilization and weaning phase to minimize the impact of minor variations on dosing.
   1b. **Adjust trigger scores when > 3 weeks old:** Research has shown that NAS scores increase over time as the infant matures so > 21 days all Trigger thresholds should be increased by 2. (For example: now would wean if average of scores in 24 hours are < 11). (REF: Zimmerman-Bauer U et al. Finnegan neonatal abstinence scoring system: normal values for the first 3 days and weeks 5-6 in non-addicted infants. Addiction 2010 March. 105: 524-528.)
   1c. Centers should develop a plan for periodic refresher training for all nurses on NAS modified scoring system using the D'Apolito Reliability Training system, and a training system for on-boarding new nursing staff.

2. **Non-Pharmacologic Treatments:**

Final Aug 22 2013
Walsh
1

- "Potentially Better Practices Protocol" came from the pilot work of the OCHA NAS Project based on cohort of 553 infants in 20 participating sites

- Updating recommendations based on OPQC NAS Project cohort of 6819 infants in 54 participating sites

  - Including feeding recommendations based on Orchestrated Testing results

  - Updates to the Methadone protocol are based upon testing of the pharmacokinetic-driven protocol that resulted in both a shorter length of treatment and hospitalization

  - Changes to initiation of treatment:
    - >8 x3 or >12 x2

  - Morphine escalation doses to be score dependent.

OPQC
Ohio Perinatal Quality Collaborative

OPQC NAS Recommendations
Pharmacologic Treatment

Overview of Stages of treatment:

Non-pharmacologic bundle:	Swaddle, skin to skin, decreased stimulation breast feed or 22kcal formula
Pharmacologic bundle:	
• Initiate	• Select Methadone or Morphine PO • Finnegan scores >8 q3hrs THREE times or scores ≥ 12 TWO times in a row
• Escalate	• If Finnegan scores remain elevated, increase dosage based on infant's score
• Stabilize	• Maintain dose for 24 hrs (Methadone) • Maintain dose for 48 hrs (Morphine)
• Wean	• Wean every 24 hrs based on Finnegan scores • Wean by step daily (Methadone) • Wean by 10% stabilizing dose daily (Morphine)
• Discharge	• Discharge 48 hrs off of Methadone or Morphine

Phase II Improvement

We saw increases in the use of 22 kcal/oz and low lactose feeding

OPQC NAS Project
Collaborative Aggregate
Percent of Infants Receiving 22 Kcal Formula Most Frequently

55%
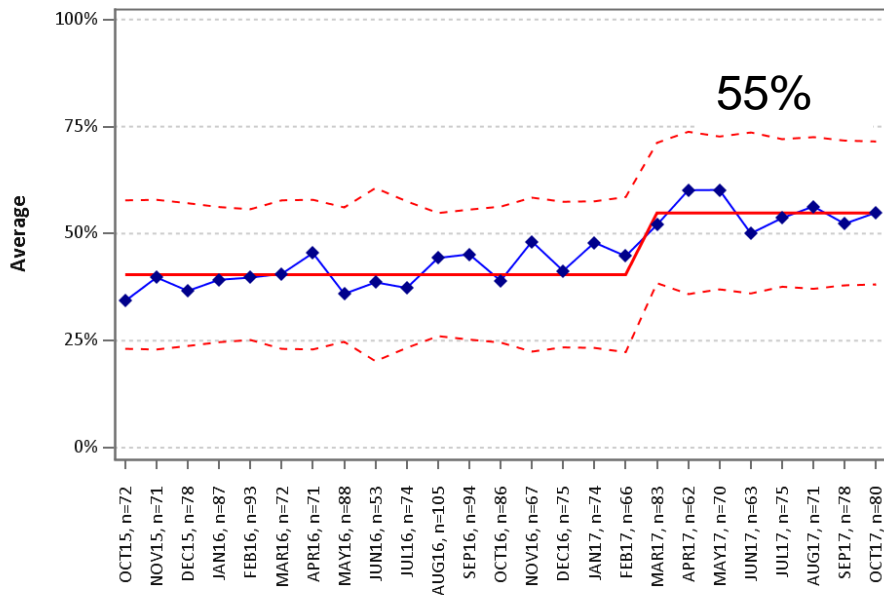
OPQC NAS Project
Collaborative Aggregate
Percent of Infants Receiving Low Lactose Formula Most Frequently

74%
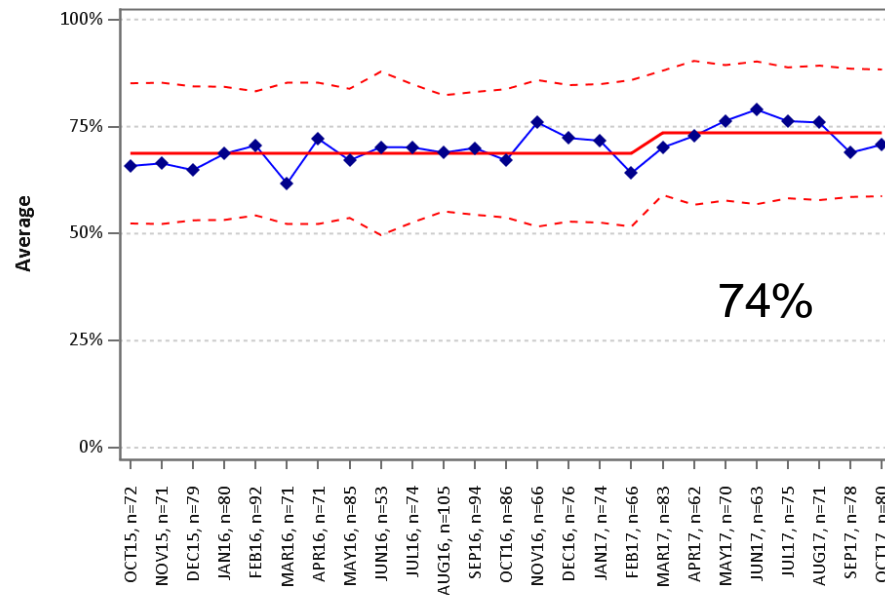
Phase II Improvement (cont'd)

Further reductions in LOS were seen with implementation of findings from OT

OPQC NAS Project
Collaborative Aggregate
Average Length of Stay for Pharmacologically Treated Babies
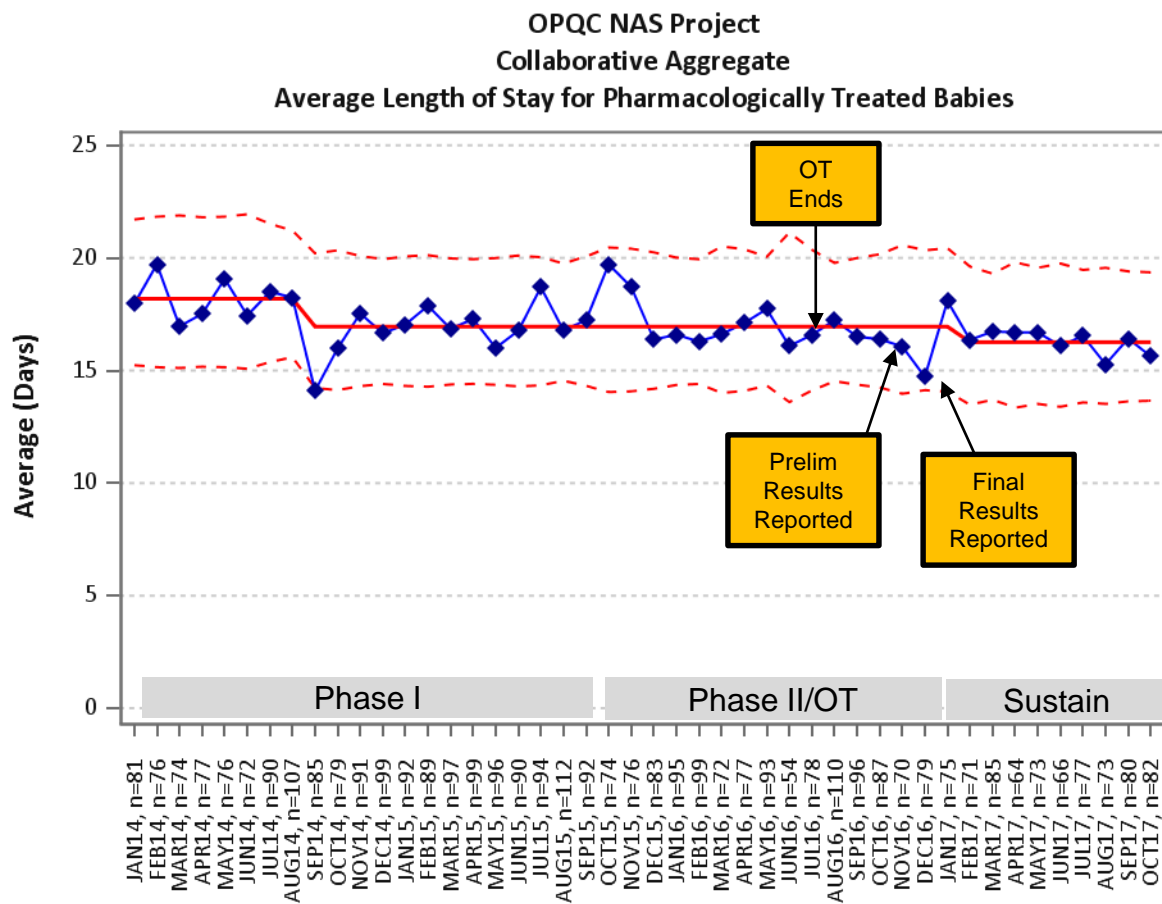
Reductions in LOS

18.3→17 days (Phase I)

17→16.3 days (Phase II)

Total reduction of 2 days!

Ohio Perinatal Quality Collaborative

*Through **collaborative** use of **improvement science** methods, reduce **preterm births** & **improve perinatal and preterm newborn outcomes** in Ohio as quickly as possible

Senior Leadership Buy-In and having the right people on your team

UC Health

University of Cincinnati Medical Center
234 Goodman Street - Cincinnati, Ohio 45219

HOSPITAL H →

Our NAS Team:
- James Van Hook MD – OB Physician
- Christina Wilder MD – Addiction Physician
- Jennifer McAllister MD- Physician Lead
- Marie Wise RN, MSN, IBCLC – NICU Manager
- Sharon Harvey RN, BSN – Nurse Lead
- Elizabeth Adu-Gyamfi - L&D Team Lead
- Beverly Stephenson RN, BSN – Perinatal Quality and Safety Coordinator
- Stacie Chapman MS, RD, CDE- Dietitian
- Kristina Cagle MSW, LSW – Social Worker
- Barbara Isemann RPH- Pharmacist
- Charlotte Pearson RN, MSN – Postpartum Educator

Improvement team

- M. David Yohannan
  Neonatologist
- Lisa Jasin
  Neonatal Nurse Practitioner
- Mari Jo Rosenbauer
  Lactation Consultant
- Karen Beekman
  Resource Nurse
- Jennifer Morris
  Shift Coordinator
- Michelle Begley
  Social Services
- Kerri Scott, RN, Kara Pierce, RN,
- Erin Kichline, RN, Brittany Scott, RN

Pictured L to R: Jen Morris, Michelle Begley, Lisa Jasin
Mari Jo Rosenbauer, Karen Beekman, Alicia Link

DAYTON CHILDREN'S

Dear Hospital Administrator,

Subject: *Invitation to participate in a project to improve outcomes for babies born with Neonatal Abstinence Syndrome*
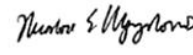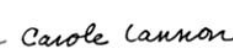
In recognition of the work your hospital does to improve the health of all Ohioans, the Ohio Department of Medicaid, the Ohio Department of Health and the Ohio Perinatal Quality Collaborative (OPQC) encourage you to join an initiative to improve the health of Ohio's pregnant women and their newborns. OPQC (www.opqc.net) is a statewide, multi-stakeholder network founded in 2007 with a goal of making sure every Ohio mother and baby gets the best available care. Your NICU may have participated in improvement initiatives with OPQC before, and this project is an opportunity for you to participate in new and exciting efforts that will improve care and outcomes for infants across the state of Ohio.

This quality improvement initiative is designed to increase identification of and compassionate withdrawal treatment for full-term infants born with Neonatal Abstinence Syndrome (NAS). Work with a pilot group of 6 Ohio Children's hospitals has resulted in improved health outcomes and a 20% reduction in length of hospital stay for these babies. These infants experience withdrawal hours after being born, and if unidentified and untreated, can experience excessive weight loss, grand mal seizures, and even death. The epidemic is steadily increasing, overwhelming social service systems and public payers, and our preliminary data suggests that up to 50% of neonates with NAS are not receiving optimal care. Increasing identification of and improving care for these infants will greatly impact safety and costs associated with treatment.

OPQC will begin by working with all Level 3 NICUs in Ohio, with a plan to reach all nurseries in Ohio. **You are invited to identify a team from your hospital to participate in activities that will begin in January 2014.** We recognize the key role your hospital plays in your community and your commitment to provide the highest quality perinatal care. We believe that participation in this initiative will allow your hospital to build a more effective perinatal team and improve your service to the patients and communities you serve.

During a time of increasing focus on quality and performance metrics, we are pleased to include your hospital in this initiative. If you have questions, please contact the OPQC Project Manager, Lakshmi Prasad via email at info@opqc.net and or by phone at 513-803-7264. We look forward to working with you to improve care and outcomes for infants in Ohio!

Sincerely,

Mary Applegate	Theodore Wymyslo	Michele Walsh	Carole Lannon
Medical Director	Director	Neonatal Lead	QI Lead
Ohio Dept. of Medicaid	Ohio Dept. of Health	OPQC	OPQC

# AIM Statement and Systems Inventory

GLOBAL AIM

To reduce the number of moms and babies with narcotic exposure, and reduce the need for treatment of NAS.
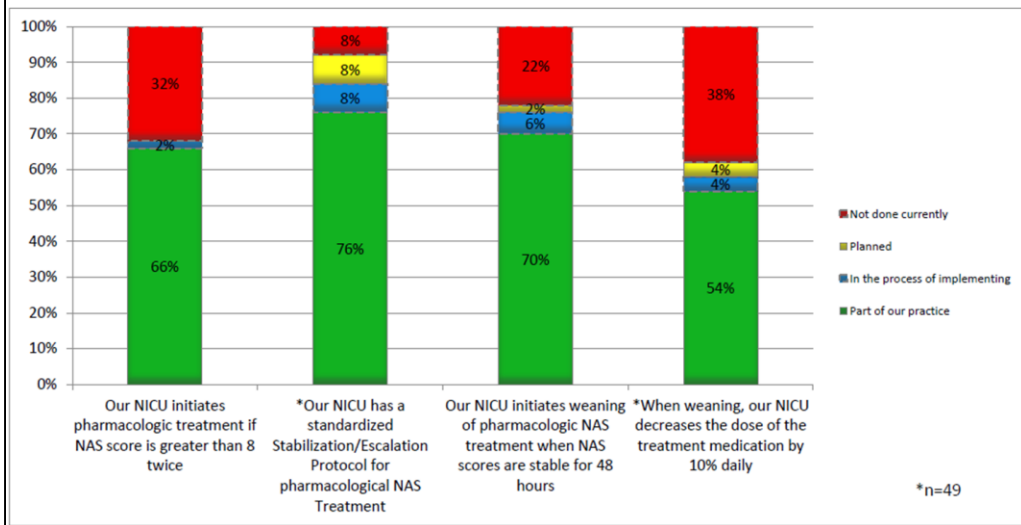
SMART AIM

By increasing identification of and compassionate withdrawal treatment for full-term infants born with Neonatal Abstinence Syndrome (NAS), we will reduce length of stay by 20% across participating sites by June 30, 2015.
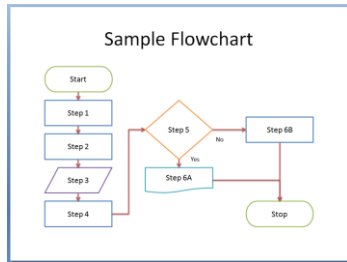

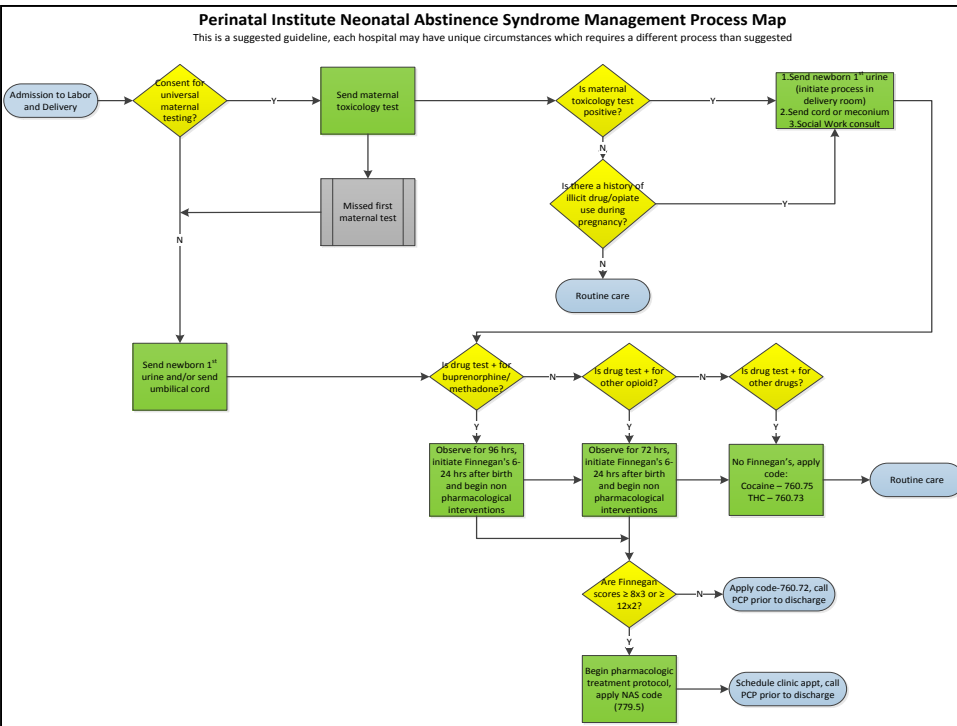Section III: Non-Pharmacologic Rx (n=50)
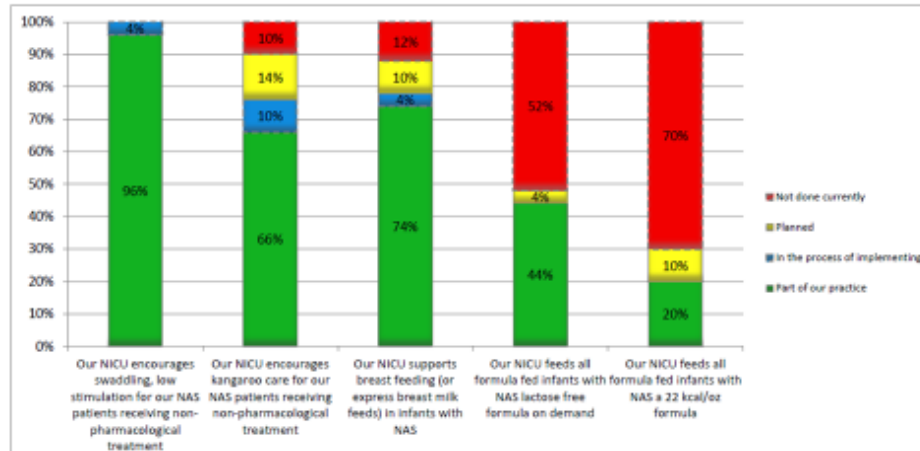
Section IV: Pharmacologic Rx (n=50)

Process Flow Charts

Sample Flowchart

Perinatal Institute Neonatal Abstinence Syndrome Management Process Map
This is a suggested guideline, each hospital may have unique circumstances which requires a different process than suggested

UCMC Process Flow Chart: 22 Calorie Per Ounce Low-Lactose Formula for NAS Infants
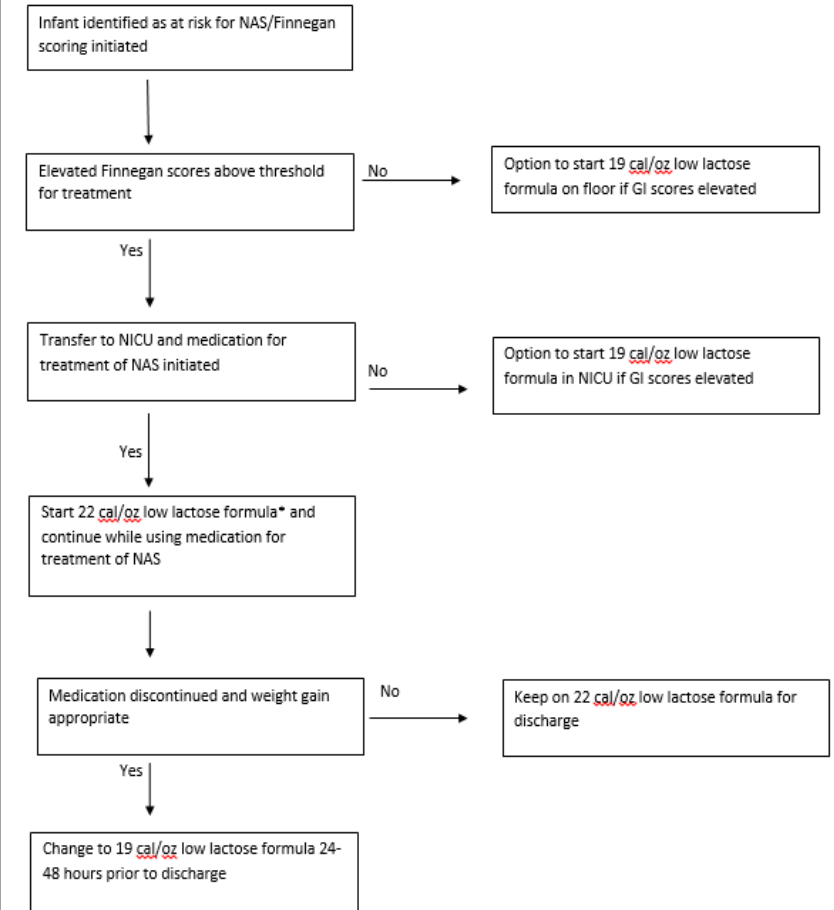
*22 cal/oz low lactose formula is available to be ordered and made by 12 pm every day of the week. Monday through Friday formula can also be made between 12- 3 pm if NICU RD notified. If formula is ordered outside of these times 19 cal/oz low lactose formula will be substituted until the following day.

FMEA
(Failure Mode Effects Analysis)

The Failure Mode Effects Analysis is a systematic, proactive method for evaluating a process to identify *__where and how it might fail__* and to *__assess the relative impact of different failures__*, in order to *identify the parts of the process that are most in need of change*.

Measurement

PDSA: Plan-Do-Study-Act

Test the change: Was the cycle carried out as planned?

☐ Yes ☐No
What did you observe that was not part of the plan?

STUDY:
Did the results match your prediction?

☐ Yes ☐ No
Compare the results of your test to your previous performance:

ACT:

Decide to Abandon, Adapt, or Adopt

- **Abandon: Discard change idea and try a new one.**

- **Adapt: Improve the change and continue testing. Describe what you will change in your next PDSA cycle.**

- **Adopt: Select changes to implement on a large scale and develop an implementation plan for sustainability.**

  If you plan to adapt or adopt, what plans do you have for your next 2-3 PDSA cycles for follow-up tests and implementation:
      1.
      2.
      3.
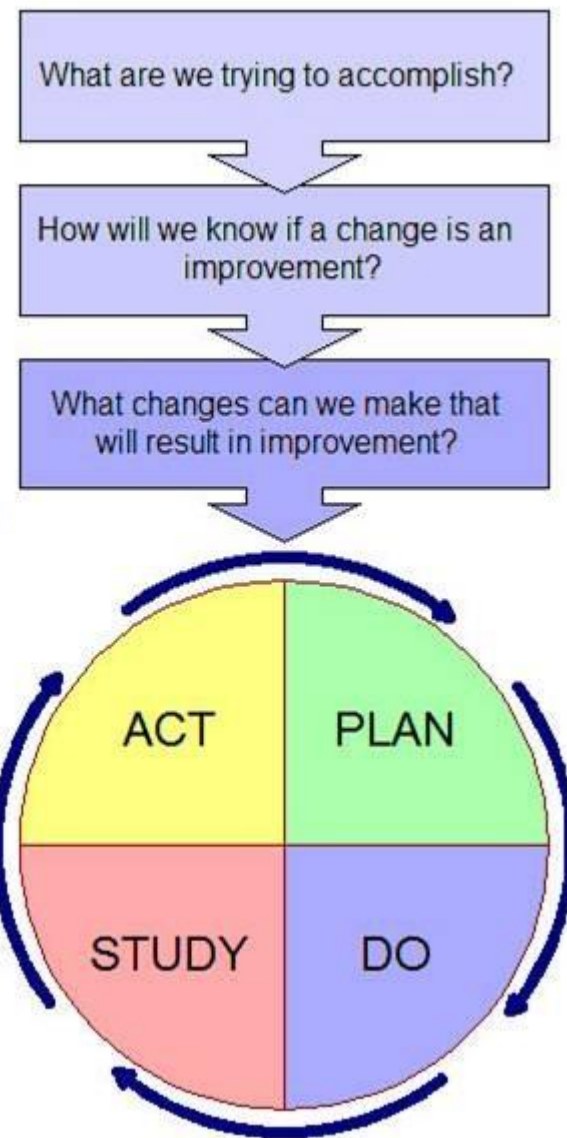
PDSA Cycle Worksheet

Date of Test: 8/28/2015: meet with Geauga staff	Date of Completion:	Site: Geauga Hospital

Overall Project Aim: Decrease the LOS for NAS babies thru identification of and non-judgmental care for this population in addition to standardization of non-pharmacological and pharmacological bundle adherence.
What is the objective of the test? Objective is to increase accuracy and communication of patient information for NAS babies transferred from Geauga Hospital to Rainbow Babies and Children's for NAS treatment.

PLAN:

Brief description of the test:
OPQC/RBC staff will meet with Geauga Maternity Nursing Leadership to discuss OPQC NAS Project. A draft "handoff tool" that captures needed information regarding care of NAS infant will be reviewed. Plan for 1 RN at Geauga to test the form on 1 baby and provide feedback.

How will you know that the change is an improvement?
Increase in amount and accuracy of information regarding NAS patient's care prior to transfer to RB&C.

What driver does the change impact?
Optimize Non-Pharmacologic Rx Bundle

What do you predict will happen?
The staff will find the handoff tool easy to use. Inclusion of this information will result in increased accuracy of data submissions for RB&C infants transferred from Geauga Hospital.

List of Tasks Needed to Complete	Person Responsible	When	Where
1. Leslie & Susan meet with Nora & Robyn at Geauga and review draft handoff tool.	Leslie	8/28/15	Geauga Hospital
1. Nora or Robyn will select a RN to test the form	Nora or Robyn		Geauga Hospital
1. RN will test the form on 1 baby	Designated RN		Newborn Nursery
1. Nora will report feedback to Leslie & Susan	Nora		Via phone or email

Plan for collecting data:

- Leslie will review draft handoff tool with Nora and Robyn. They will select a RN to test 1 baby, explaining tool and needed feedback.
- Selected RN will test handoff tool with 1 baby and document feedback regarding the tool.
- Nora will contact Leslie regarding RN feedback.

Storyboard Walk

Storyboard Notes

Ideas to investigate

_____

_____

_____

Follow up contacts (name, email, and site)

_____

_____

_____

_____

Specific to our region

_____

_____

_____

Additional notes

_____

_____

_____

All NAS Teams — **Describe 1-2 interventions implemented by regional teams in the NAS Project regarding OB collaboration**
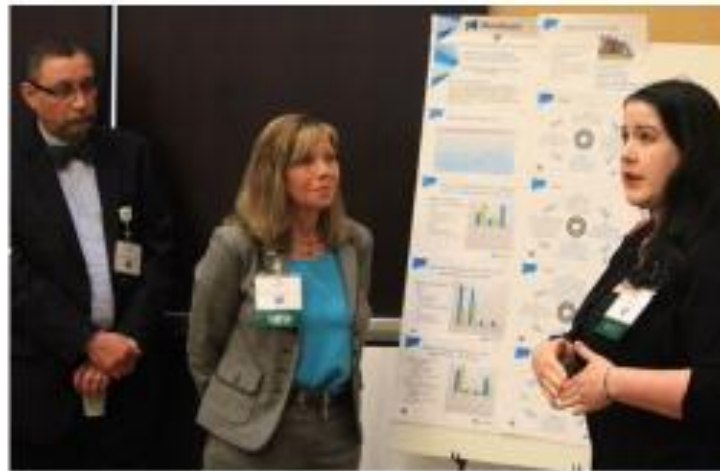
Can your team sustain your gains?

What if your entire project team decided to retire by July 31, 2018?

- Would the changes you've made continue to be used?

- What could make your organization revert to the old system?

Questions to address….

- Was your collaborative team successful?

- Is it your team's intention to hold the gains?

- Is it an organizational priority?

- Is the leadership responsibility clear?

- Is the appropriate infrastructure in place?

- Do you plan to attend to *measures*?
  - Will there be ongoing measurement?
  - Will you ensure reliability by identifying and understanding 'failures'?

OPQC — Ohio Perinatal Quality Collaborative

Participating Centers

Adena Regional Medical Center	Cleveland Clinic	Kettering Medical Center	Mercy Regional Lorain	NCH Grant Medical Center	Springfield Regional
Akron Children's Hospital	Dayton Children's Hospital	Licking Memorial Hospital	MetroHealth Medical Center	NCH Ohio State University NICU	St Rita's Medical Center
Akron Children's Summa Health	Elyria Medical Center	Lima Memorial	Miami Valley Hospital	NCH Riverside Methodist	St Joseph's Hospital
St Elizabeth/ Mahoning Valley	Fairview Hospital	Marion General	Mt Carmel East	ProMedica Bay Park Hospital	The Christ Hospital
Akron Children's General	Fort Hamilton Hospital	Mercy Anderson Hospital	Mt Carmel West	ProMedica Toledo Normal Newborn	OSU Wexner Well Baby Unit
Atrium Medical Center	Genesis Healthcare	Mercy Children's Hospital	Nationwide (NCH) Children's Hospital	ProMedica Toledo Children's	Trumbull Memorial Hospital
Aultman Hospital	Good Samaritan Tri-Health	Mercy Health West	NCH Mt Carmel St Ann's	Soin Medical Center	UH Rainbow Babies & Children's
Bethesda North Hospital	Good Samaritan Premier/Dayton	Mercy Fairfield	NCH Doctor's Hospital	Southern Ohio Medical Center	UC University Hospital Cincinnati
Cincinnati Children's Hospital	Hillcrest Hospital	Mercy Medical Canton	NCH Dublin Methodist	Southview Medical Center	Upper Valley Medical Center

OPQC — Ohio Perinatal Quality Collaborative

It takes a village...