



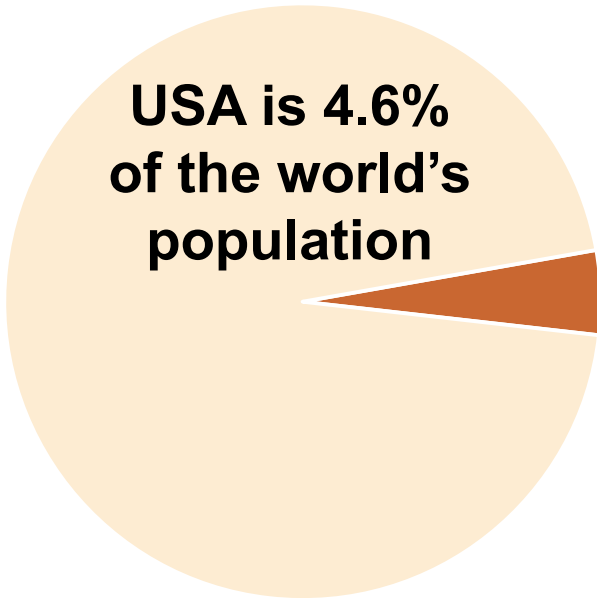
NEONATAL ABSTINENCE SYNDROME

NAS Kickoff
11/8/18

Partnering to Improve Health Care Quality
for Mothers and Babies



OPIOID EPIDEMIC STATISTICS



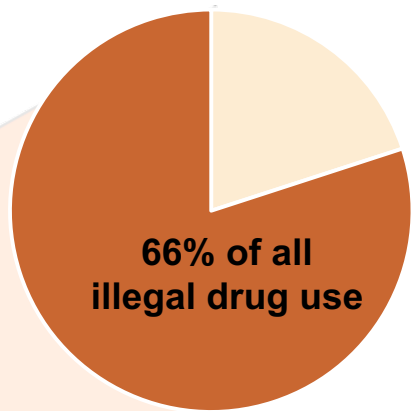
A large light orange circle with a small wedge removed. The wedge is colored dark orange and points towards the central figure.

**USA is 4.6%
of the world's
population**



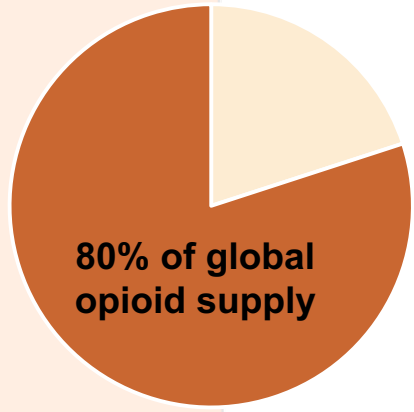
A green silhouette of a person standing with arms at their sides.

**78
Americans die
every day
from opioid overdoses**



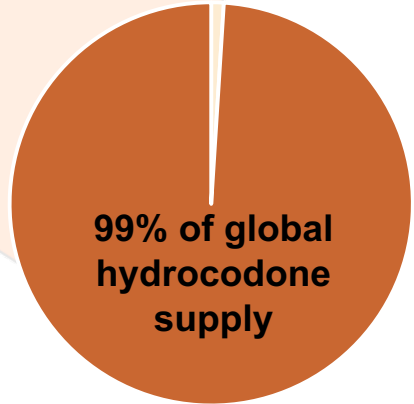
A pie chart with a large dark orange section (66%) and a smaller light orange section (34%).

**66% of all
illegal drug use**



A pie chart with a large dark orange section (80%) and a smaller light orange section (20%).

**80% of global
opioid supply**

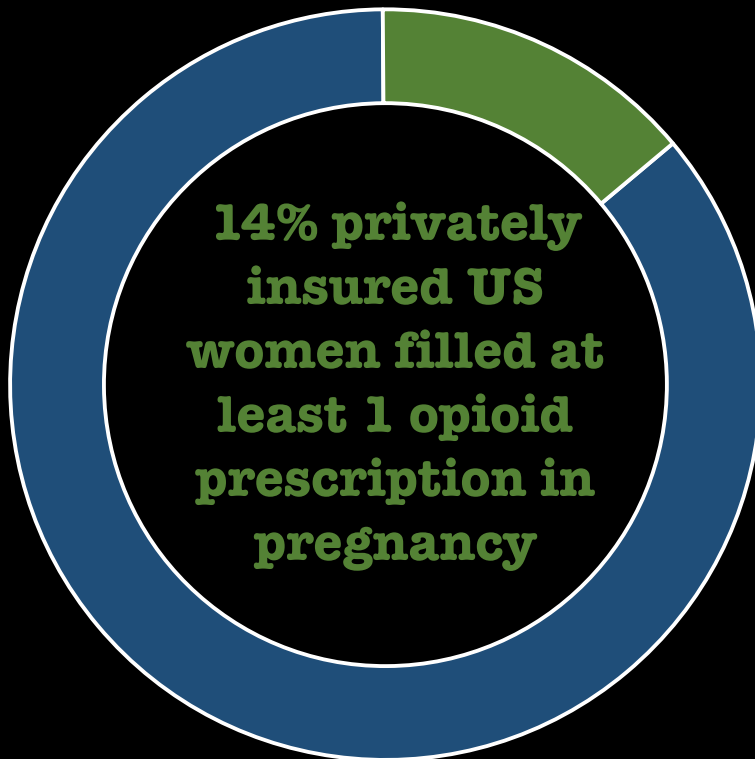


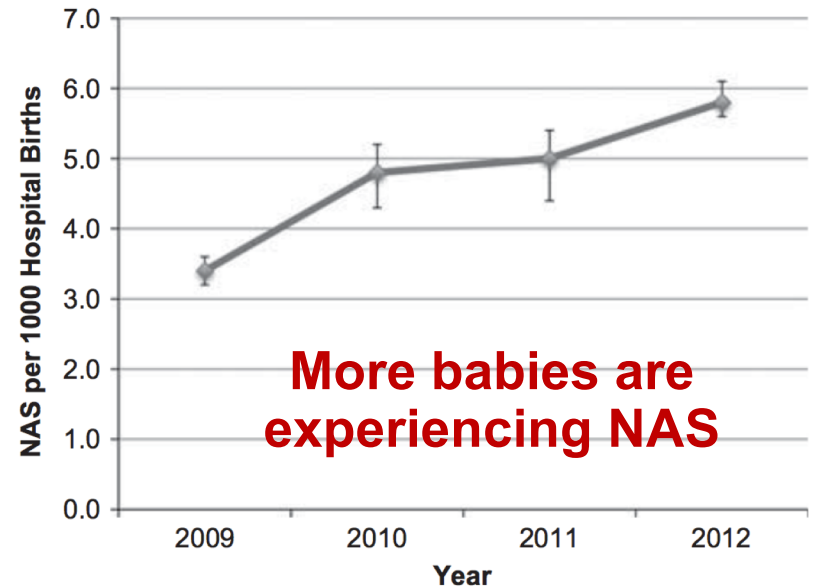
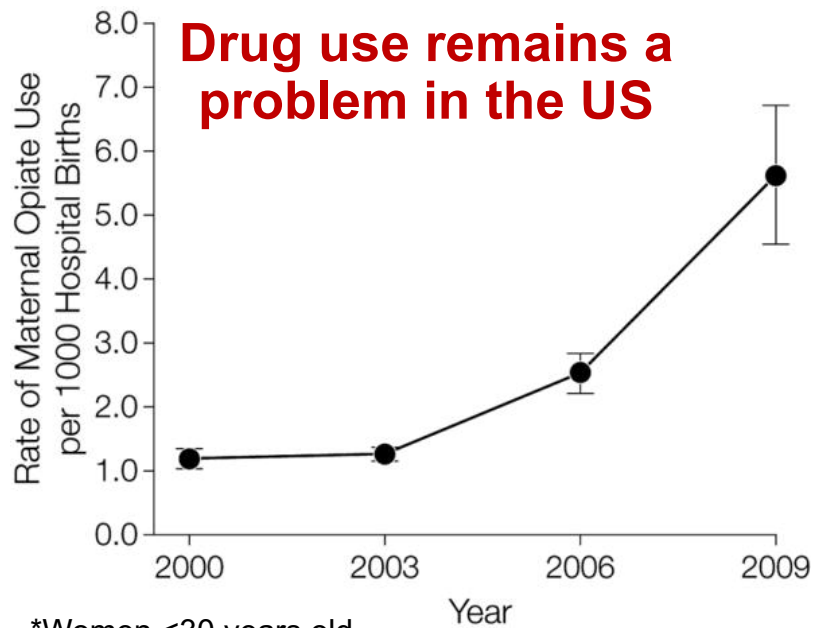
A pie chart with a very large dark orange section (99%) and a very small light orange section (1%).

**99% of global
hydrocodone
supply**

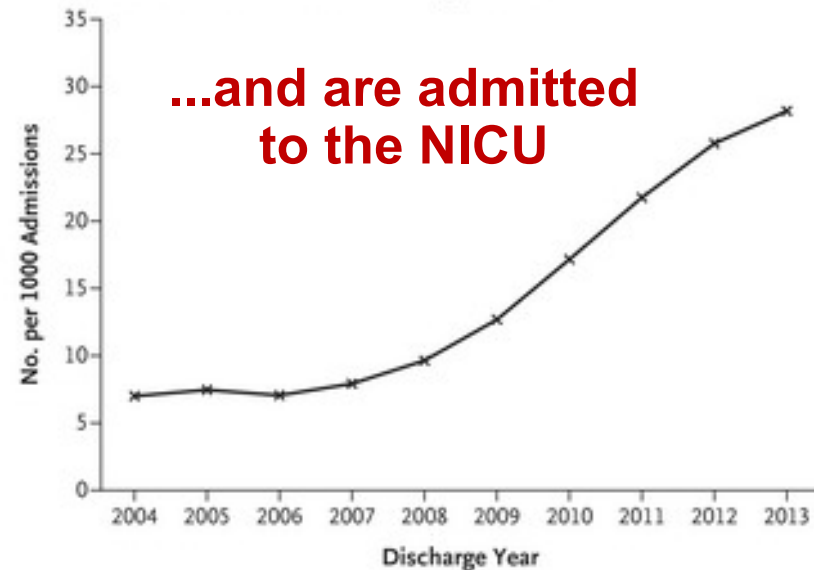
Birnbaum HG, et al. Societal costs of prescription opioid use, dependence, and misuse in the United States. Pain Med 2011; 12:657-67; 2. CDC Vital signs: overdoses of prescription opioid pain relievers and other drugs among women-United States, 1999-2010. MMWR Morb Mortal Wkly Rep 2013; 62: 537-42; 3. Lee J, Hulman S, Musci M, Stang E. Neonatal abstinence syndrome: Influence of a combined inpatient/outpatient methadone treatment regimen on the average length of stay of a Medicaid NICU population. Popul Health Manag 2015; 18: 392-7; 4. <https://www.surgeongeneral.gov/priorities/opioids/>

No change in
overall amount of pain reported
4x as many opioid prescriptions written
since 1999





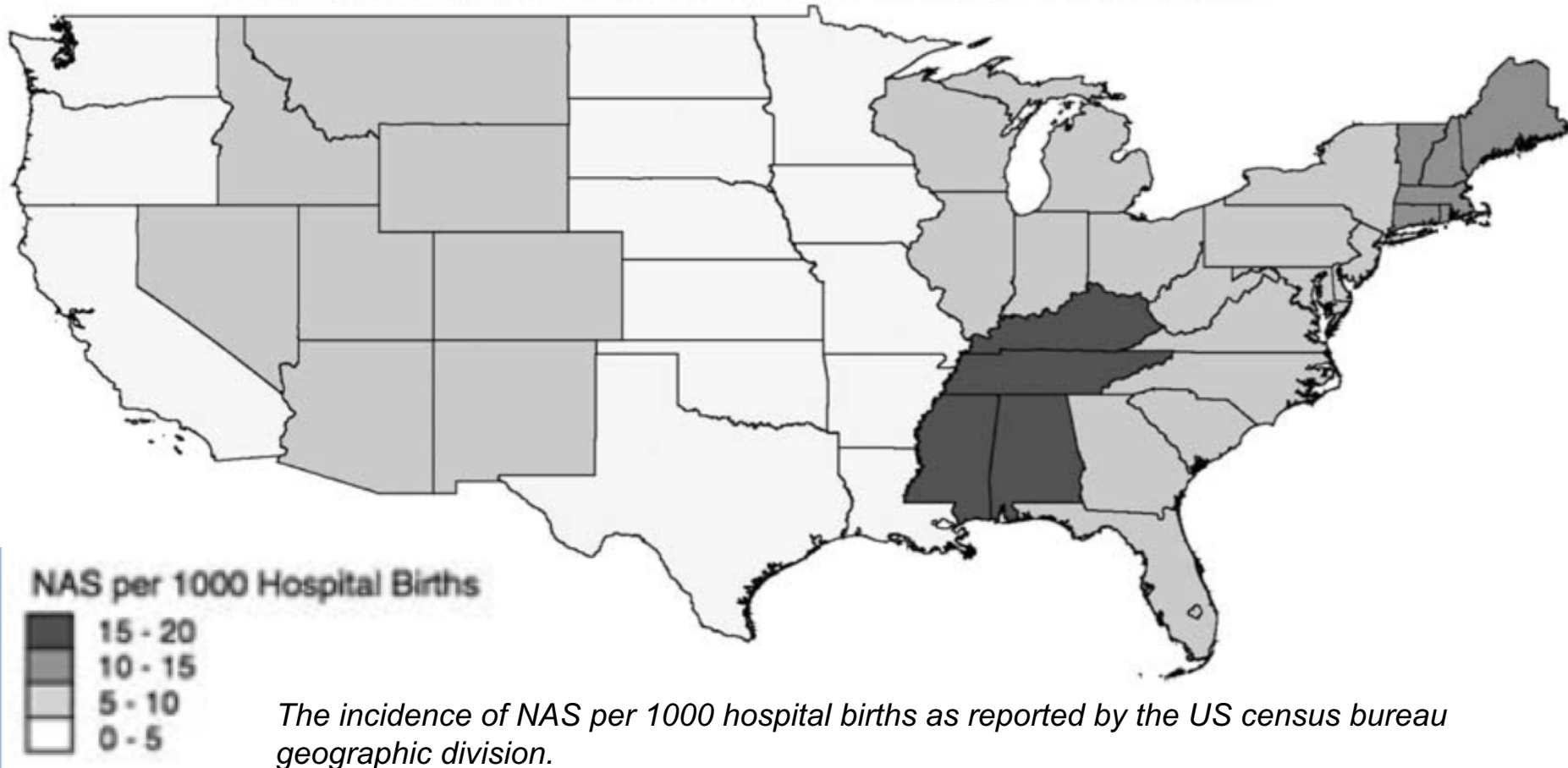
1
NAS infant born
every 25 minutes
(2012)



1. Wiles JR, Isemann B, Mizuno T, Tabangin ME, Ward LP, Akinbi H, et al. Pharmacokinetics of Oral Methadone in the Treatment of Neonatal Abstinence Syndrome: A Pilot Study. *J Pediatr.* 2015; 2. Patrick SW, Davis MM, Lehman CU, Cooper WO. Increasing incidence & geographic distribution of neonatal abstinence syndrome: United States 2009 to 2012. *J Perinatol.* 2015;35(8):667; 3. Patrick SW, Schumacher RE, Bennyworth BD, Krans EE, McAllister JM, Davis MM. Neonatal Abstinence Syndrome & Associated Health Care Expenditures, United States, 2000-2009. *JAMA* 2012. 307 (18): 1934-40; 4. Hall ES, Wexelblatt SL, Crowley M, Grow JL, Jasin LR, Klebanoff MA, et al. A multicenter cohort study of treatments & hospital outcomes in neonatal abstinence syndrome. *Pediatrics.* 2014;134(2):e527-534. 5. Tolia VN, Patrick SW, Bennett MM, Murthy K, Sousa J, et al. Neonatal Abstinence Syndrome: A Systematic Review of the Literature. *Neonatology.* 2013;104(4):371-381.

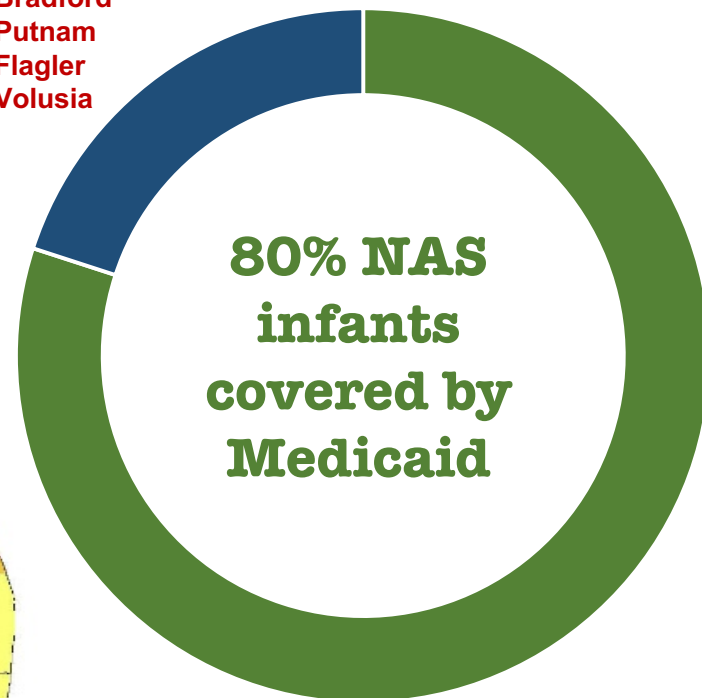
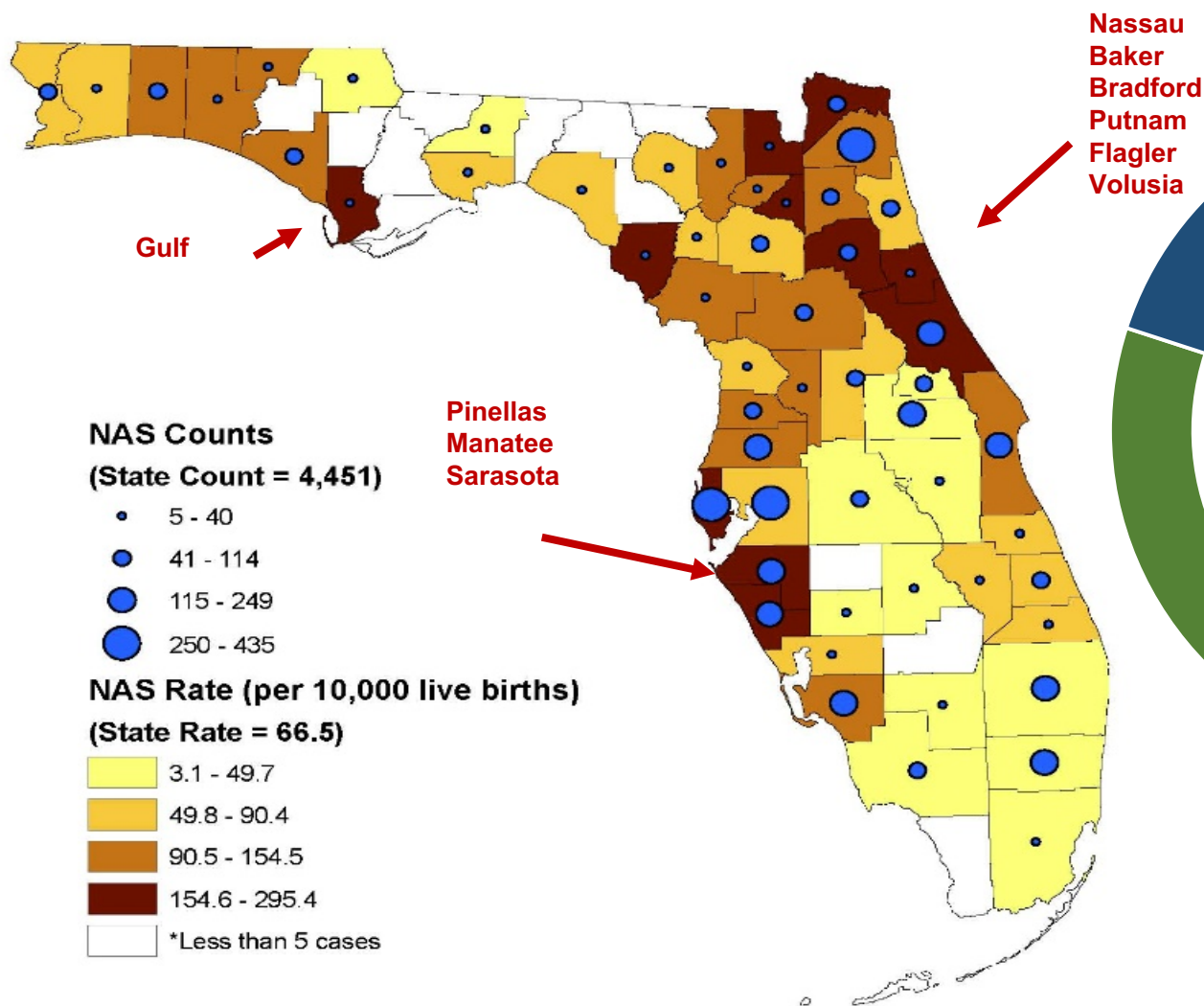
Where is the NAS problem?

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

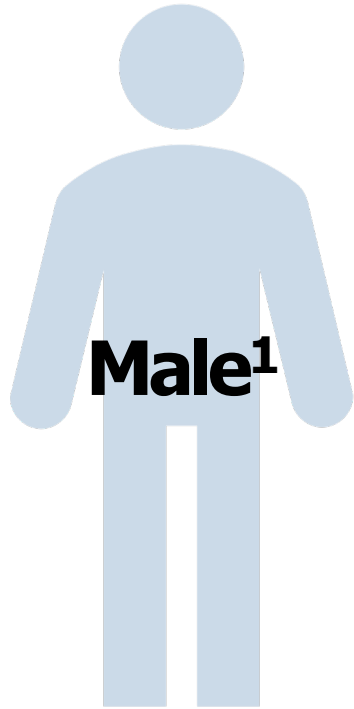


Patrick SW, Davis MM, Lehman CU, Cooper WO. Increasing incidence & geographic distribution of neonatal abstinence syndrome: United States 2009 to 2012. *J Perinatol.* 2015;35(8):667.

Neonatal Abstinence Syndrome (NAS) Counts and Rates, by County, 2014-2016, Florida



Characteristics of NAS infants



55-94%
have NAS
symptoms²

50-80%
have NAS
requiring
meds³



COMMON DIAGNOSES¹

Jaundice
~33%

**Respiratory
complications**
~19%

Sepsis
~15%

**Feeding
problems**
~17%

¹Patrick SW, Davis MM, Lehman CU, Cooper WO. Increasing incidence & geographic distribution of neonatal abstinence syndrome: United States 2009 to 2012. *J Perinatol.* 2015;35(8):667 ; 2. Devlin LA, Lau T, Radmacher PG. Decreasing Total Medication Exposure and Length of Stay While Completing Withdrawal for Neonatal Abstinence Syndrome during the Neonatal Hospital Stay. *Front Pediatr* 2017;5:216; 3. Raffaelli G, Cavallaro G, Allegaert K, et al. Neonatal Abstinence Syndrome: Update on Diagnostic and Therapeutic Strategies. *Pharmacotherapy* 2017;37:814-23

Consequences of substance exposure



More likely to experience

- Abuse or neglect
- Sudden infant death, Shaken baby syndrome
- Adverse neurodevelopmental outcomes
- Re-hospitalization after birth hospitalization
- Child removals

Why focus on length of hospital stay?

Often used as an indicator of efficiency

Hospitals
care

- Medication errors

- Adverse events

- Increased financial burden on families & society

Patients
care

- Impaired parent-infant attachment

- Increased stress on families

Healthcare burden of NAS

Table 2. Mean length of stay and inflation-adjusted hospital charges for all infants with neonatal abstinence syndrome, infants with neonatal abstinence syndrome with a length of hospital stay >6 days and uncomplicated term infants, 2009–2012

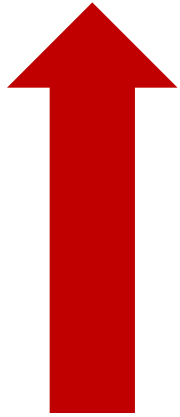
Year	2009 N (95% CI)	2010 N (95% CI)	2011 N (95% CI)	2012 N (95% CI)
<i>Neonatal abstinence syndrome</i>				
Mean length of stay (days)	16.5 (15.9–17.2)	17.2 (15.8–18.5)	16.6 (15.1–18.1)	16.9 (16.0–17.7)
Mean hospital charges (2012 US\$)	53 800 (49 400–58 300)	59 000 (49 600–68 400)	62 300 (52 900–71 700)	66 700 (61 800–71 600)
<i>Pharmacologically treated neonatal abstinence syndrome</i>				
Mean length of stay (days)	22.7 (21.9–23.4)	22.9 (21.6–24.1)	22.8 (21.5–24.2)	23.0 (22.2–23.8)
Mean hospital charges (2012 US\$)	75 700 (69 500–82 000)	80 500 (68 000–93 100)	87 700 (76 300–99 100)	93 400 (86 900–100 000)
<i>Uncomplicated term infant</i>				
Mean length of stay (days)	2.1 (2.1–2.1)	2.1 (2.1–2.1)	2.1 (2.1–2.1)	2.1 (2.1–2.1)
Mean hospital charges (2012 US\$)	2800 (2700–2900)	3500 (3300–3800)	3700 (3400–3900)	3500 (3400–3600)

Abbreviation: CI, confidence interval. All US\$ inflation adjusted to 2012 and rounded to nearest hundred.

Hospital charges for NAS continue to increase

1. Patrick SW, Schumacher RE, Bennywort BD, Krans EE, McAllister JM, Davis MM. Neonatal Abstinence Syndrome & Associated Health Care Expenditures, United States, 2000–2009. *JAMA* 2012. 307 (18): 1934–40; 2. Patrick SW, Davis MM, Lehman CU, Cooper WO. Increasing incidence & geographic distribution of neonatal abstinence syndrome: United States 2009 to 2012. *J Perinatol*. 2015;35(8):667; 3. Patrick SW. The Triple Aim for Neonatal Abstinence Syndrome. *J Pediatr*. 2015.

Healthcare burden of NAS



Incidence of antenatal drug use

Incidence of NAS

Healthcare expenditures

Increase public health measures

- Reduce antenatal exposures
- Improve NAS management strategies

“We have to stop
treating addiction as a moral
failing,
and start seeing it for what it is:
a chronic disease
that must be treated
with urgency and compassion.”

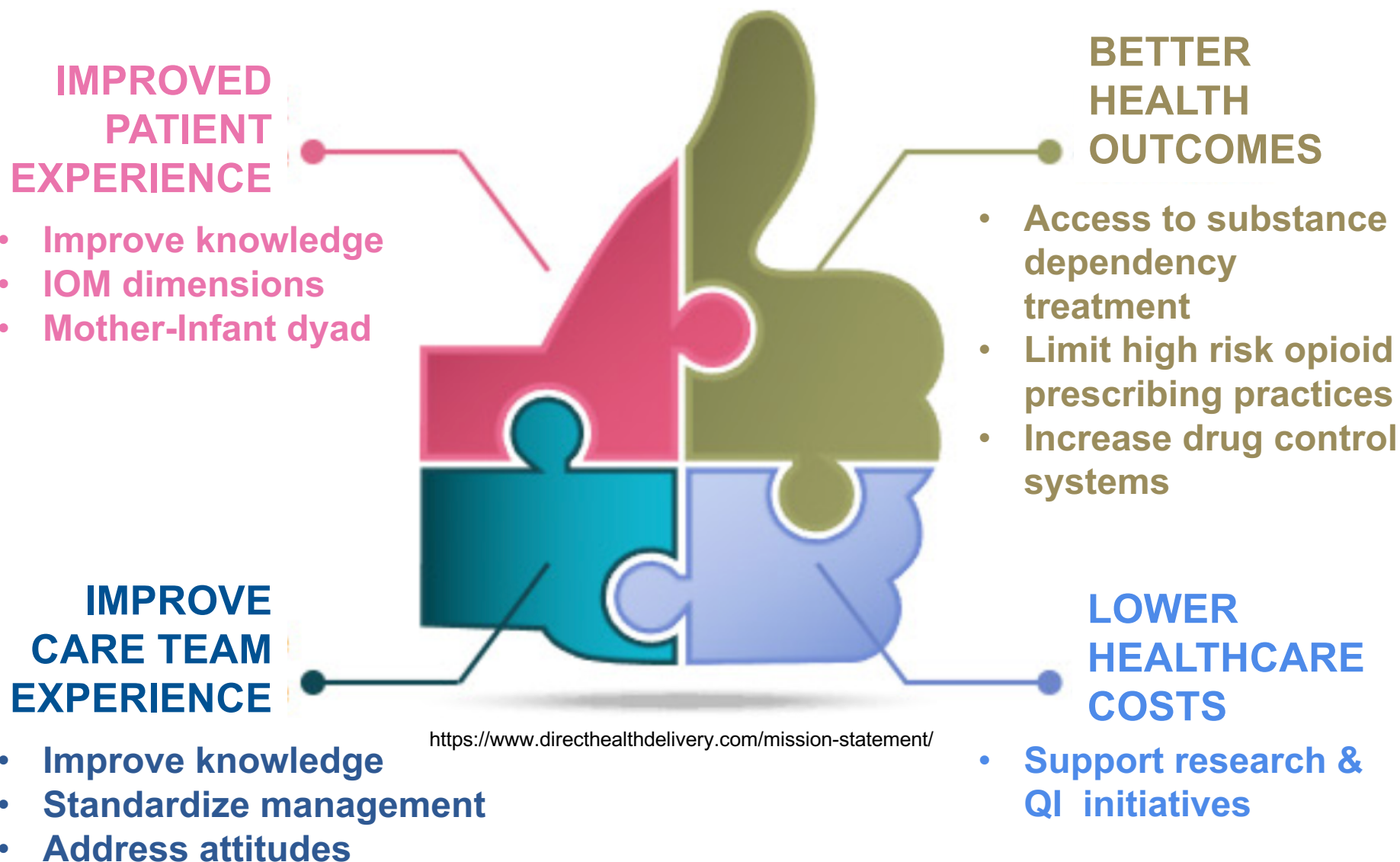
Dr. Vivek H. Murthy.
US Surgeon General.

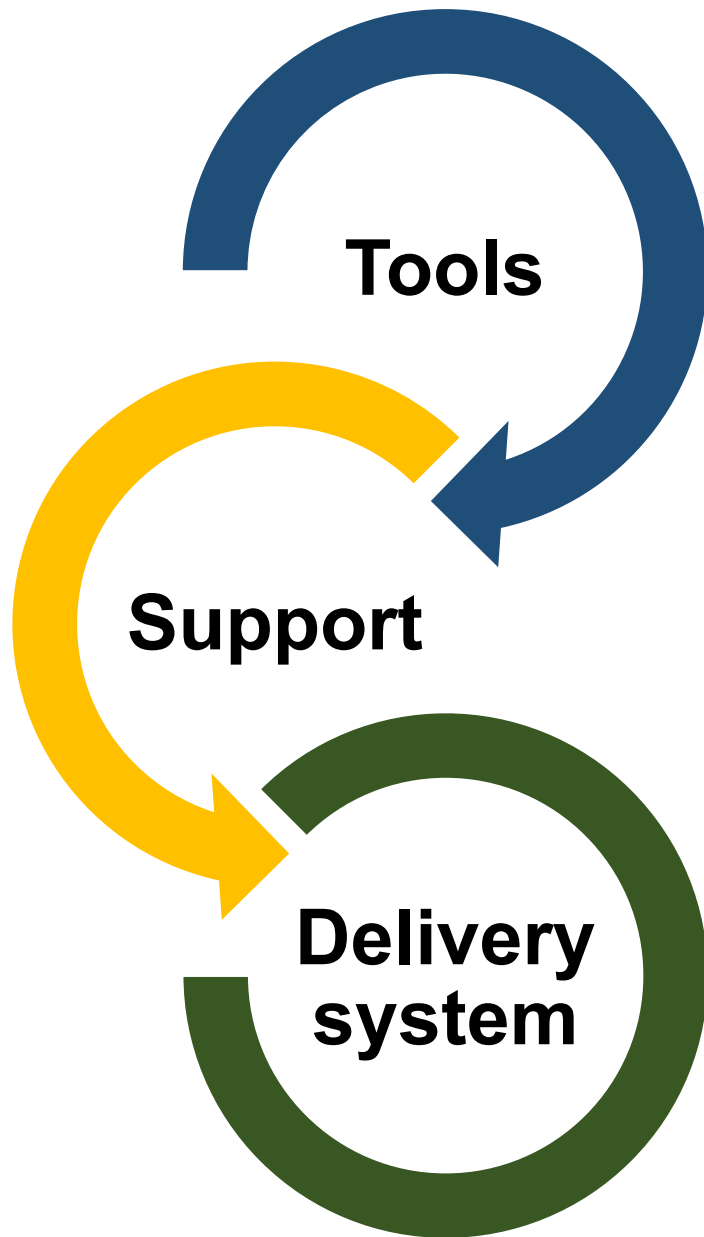
...and a team approach

Table. Applying *Crossing the Quality Chasm* improvement aims for improving care to infants with NAS

Crossing the Quality Chasm aim	NAS example
Safe	Minimizing risk from opioid administration, including decreasing total administration and appropriate monitoring.
Effective	Ensuring that all care practices are evidenced-based and eliminate practices not likely to yield benefit.
Patient-centered	Ensuring that, when possible, the maternal/infant dyad remains intact.
Timely	Ensuring that infants needing treatment (nonpharmacologic and pharmacologic) receive it without delay, minimizing exacerbation of their clinical signs.
Efficient	Reducing waste by eliminating unnecessary pharmacotherapy and excess length of hospital stay.
Equitable	Ensuring that infants with NAS and their families are treated just as other families in the neonatal intensive care units.

Quadruple aim in healthcare





Spreading change

- Accepted & evidence-based change package or toolkit
- QI methodology
- Education
- Collaboration
- Infrastructure able to deliver tools & support (e.g. FPQC)

Tools & Support only work if there is a good Delivery system