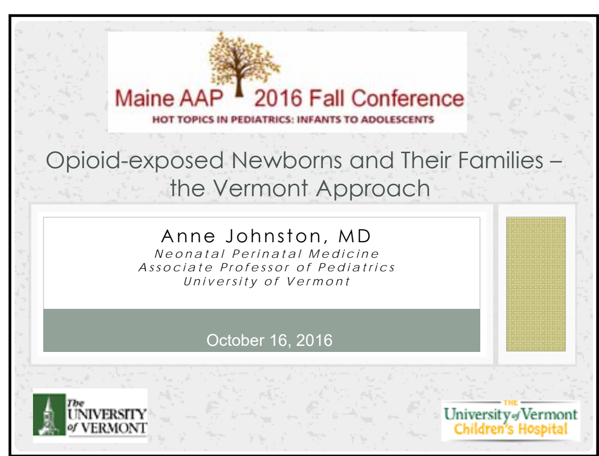
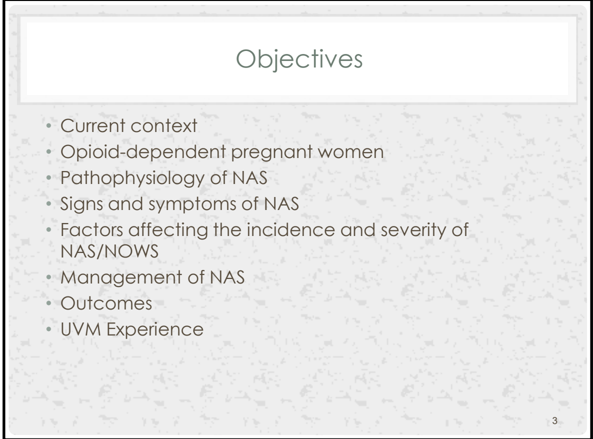
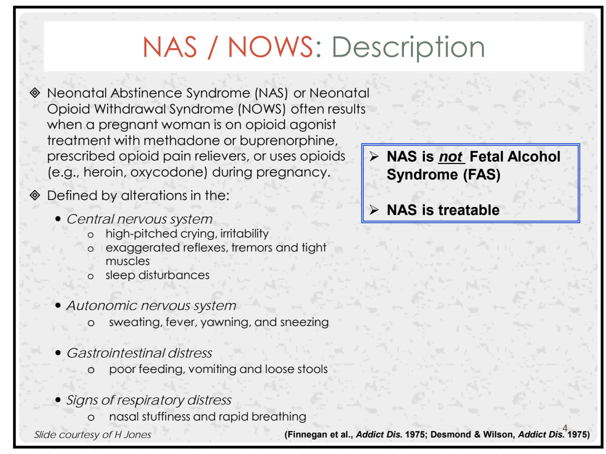
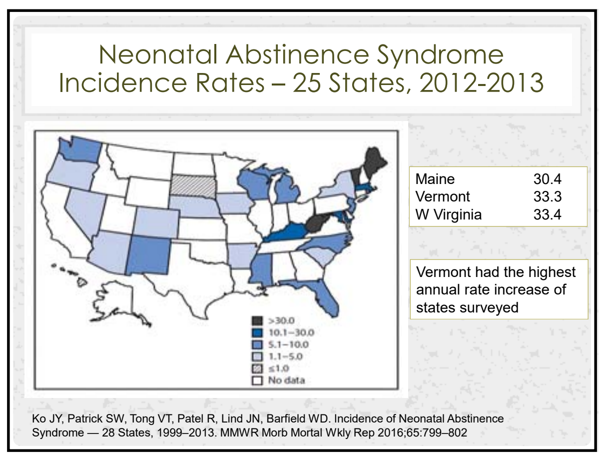

Maine AAP 2016 Fall Conference
HOT TOPICS IN PEDIATRICS: INFANTS TO ADOLESCENTS
Opioid-exposed Newborns and Their Families – the Vermont Approach
Anne Johnston, MD
Neonatal Perinatal Medicine
Associate Professor of Pediatrics
University of Vermont
October 16, 2016
The UNIVERSITY of VERMONT
THE University of Vermont Children's Hospital

Disclosures:
• I will discuss off-label uses of medications
• I have no financial disclosures
However, I am a Canadian, eh?
2

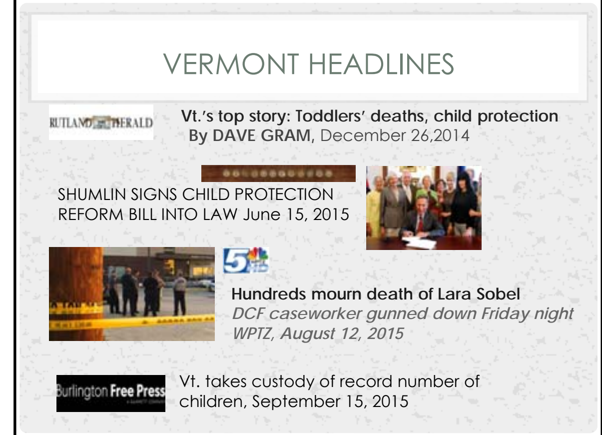

Objectives
• Current context
• Opioid-dependent pregnant women
• Pathophysiology of NAS
• Signs and symptoms of NAS
• Factors affecting the incidence and severity of NAS/NOWS
• Management of NAS
• Outcomes
• UVM Experience
3


NAS / NOWS: Description
Neonatal Abstinence Syndrome (NAS) or Neonatal Opioid Withdrawal Syndrome (NOWS) often results when a pregnant woman is on opioid agonist treatment with methadone or buprenorphine, prescribed opioid pain relievers, or uses opioids (e.g., heroin, oxycodone) during pregnancy.
Defined by alterations in the:
• Central nervous system
o high-pitched crying, irritability
o exaggerated reflexes, tremors and tight muscles
o sleep disturbances
• Autonomic nervous system
o sweating, fever, yawning, and sneezing
• Gastrointestinal distress
o poor feeding, vomiting and loose stools
• Signs of respiratory distress
o nasal stuffiness and rapid breathing
NAS is not Fetal Alcohol Syndrome (FAS)
NAS is treatable
Slide courtesy of H Jones
(Finnegan et al., Addict Dis. 1975; Desmond & Wilson, Addict Dis. 1975)
4

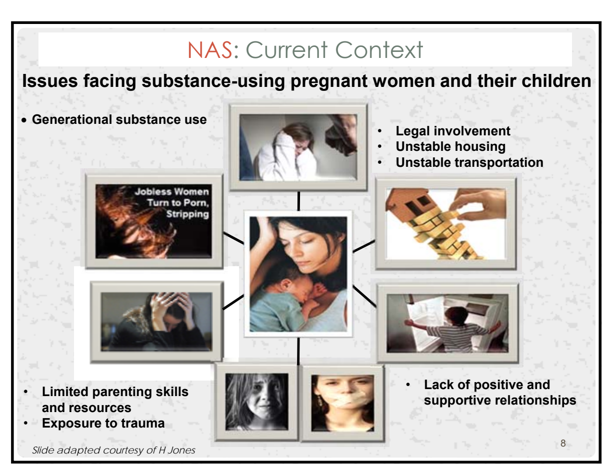


Neonatal Abstinence Syndrome
Incidence Rates – 25 States, 2012-2013
Maine 30.4
Vermont 33.3
W Virginia 33.4
Vermont had the highest annual rate increase of states surveyed
>30.0
10.1–30.0
5.1–10.0
1.1–5.0
≤1.0
No data
Ko JY, Patrick SW, Tong VT, Patel R, Lind JN, Barfield WD. Incidence of Neonatal Abstinence Syndrome — 28 States, 1999–2013. MMWR Morb Mortal Wkly Rep 2016;65:799–802

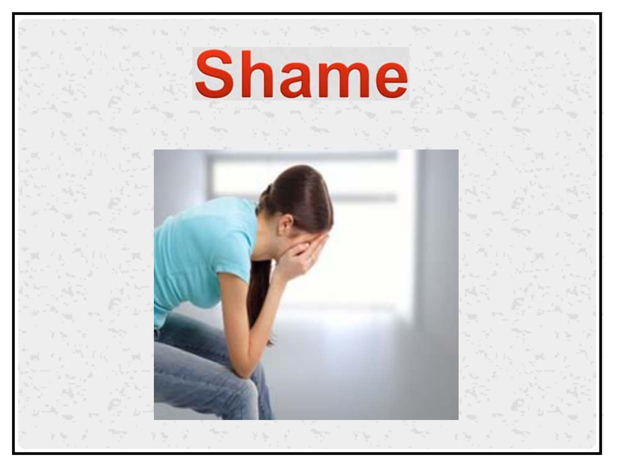
RollingStone
By David Amsden April 3, 2014
The New Face of Heroin
State of Vermont
PURE
HEROIN
6



VERMONT HEADLINES
RUTLAND HERALD
Vt.'s top story: Toddlers' deaths, child protection
By DAVE GRAM, December 26,2014
SHUMLIN SIGNS CHILD PROTECTION
REFORM BILL INTO LAW June 15, 2015
Hundreds mourn death of Lara Sobel
DCF caseworker gunned down Friday night
WPTZ, August 12, 2015
Burlington Free Press
Vt. takes custody of record number of children, September 15, 2015



NAS: Current Context
Issues facing substance-using pregnant women and their children
Generational substance use
Legal involvement
Unstable housing
Unstable transportation
Jobless Women Turn to Porn, Stripping
Limited parenting skills and resources
Exposure to trauma
Lack of positive and supportive relationships
Slide adapted courtesy of H Jones
8



The untreated woman with opioid-use disorder who becomes pregnant: neonatal effects

- Neonatal opioid withdrawal
- Neonatal complications
  - Meconium aspiration, transient tachypnea
  - Feeding difficulty, seizures, jaundice
- If recognized that mother is opioid-dependent
  - Child protective services involvement
  - Challenge of taking care of newborn and starting treatment for addiction
- If unrecognized and infant exhibits no withdrawal
  - After discharge infant may be particularly irritable
  - Family's ability to cope and seek help impeded by fear of discovery
  - Mother will probably remain active in her addiction
  - Exposure of infant to unsafe situations
  - Mother continuously "flying under the radar" and hiding her addiction
  - Mother often unwilling to come forward for fear of losing her child / children

www.thefix.com

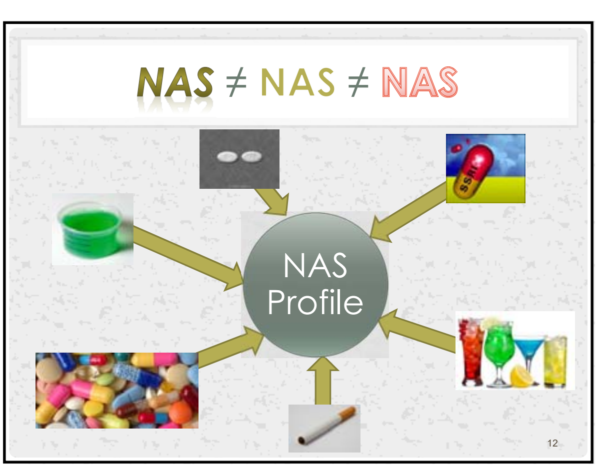
10

Medication Assisted Treatment (MAT): Standard of Care for Pregnancy

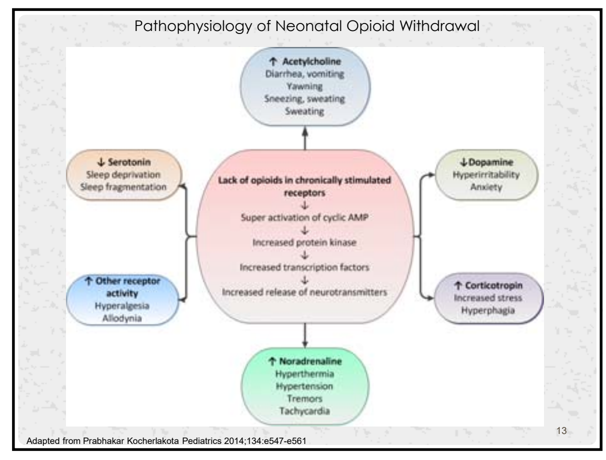
- WHO 2014: "Pregnant women dependent on opioids should be encouraged to use opioid maintenance treatment…rather than…attempt opioid detoxification."
- Facilitates retention of mothers/infants with decreased use of illicit substances when compared to no medication
- MAT results in NAS / NOWS which needs Rx in 50-60% patients (Jones et al, 2010)
- The severity of NAS does not appear to differ according to the dose of methadone maintenance therapy mothers received during pregnancy"(Cleary et al, 2010; Jones et al., 2013)

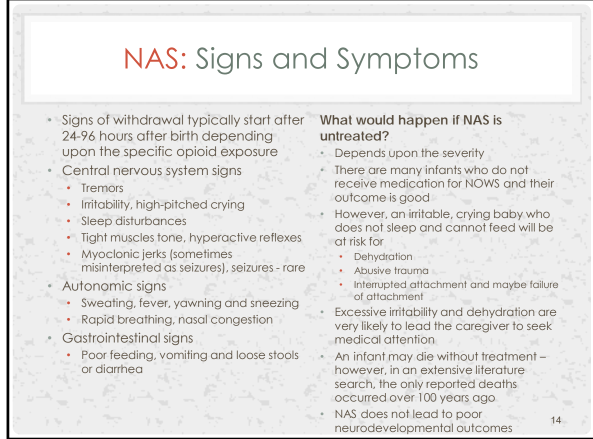
11

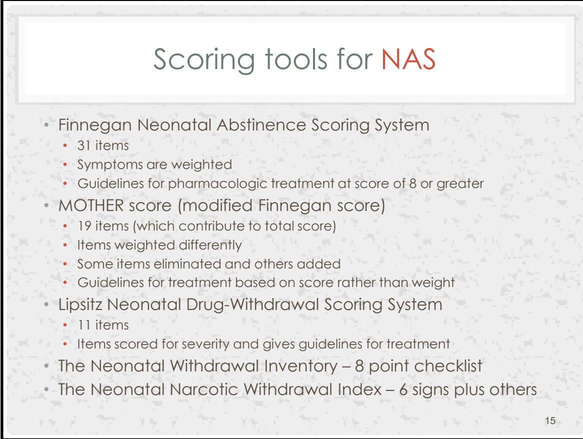
NAS ≠ NAS ≠ NAS



12





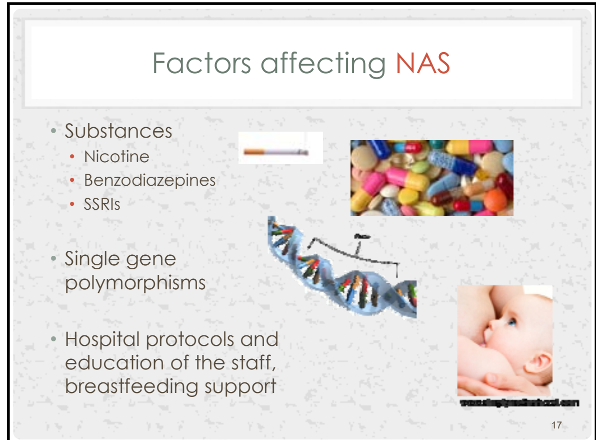


NAS Assessment: MOTHER NAS Scale

- NAS score is not the sole determining factor in the decision to start starting Rx
- Score can be affected by
  - State of infant
  - Painful stimuli
  - Order of score
  - "Motive" of scorer

Courtesy of H Jones

16



NAS: Management

- Admit to Mother/Baby Unit – rooming-in if possible
- Minimum stay of 4-5 days to allow for symptoms to peak (onset of withdrawal in buprenorphine exposed infants is later than with methadone exposed infants)
- Utilize non-pharmacologic treatment as available
- Encourage breastfeeding
- Encourage mother to participate in the assessment of the newborn
- Role of drug testing in the infant (?)
- Crucial: excellent multidisciplinary communication

18

NAS: Non-pharmacologic Treatment

- Breastfeeding is associated with reduced severity of withdrawal, delayed onset, decreased need for Rx (Abdel-Latif et al, 2006)
- Rooming-in decreased the need for Rx, length of Rx, and LOS (Abrahams et al, 2007)
- Water beds decreased amount of medication needed (Oro et al, 1988)
- Acupuncture (Filippelli et al, 2012)
- Kangaroo therapy or skin to skin
- Decreased environmental stimuli
- Frequent small demand feeds
- Pacifiers
- Swaddling, containment, holding, vertical rocking
- Provider, nursing attitudes

www.susquehannahealth.org

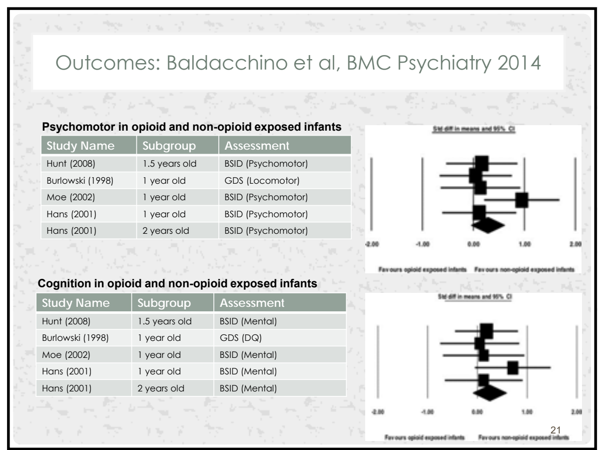
www.simplymotherhood.com

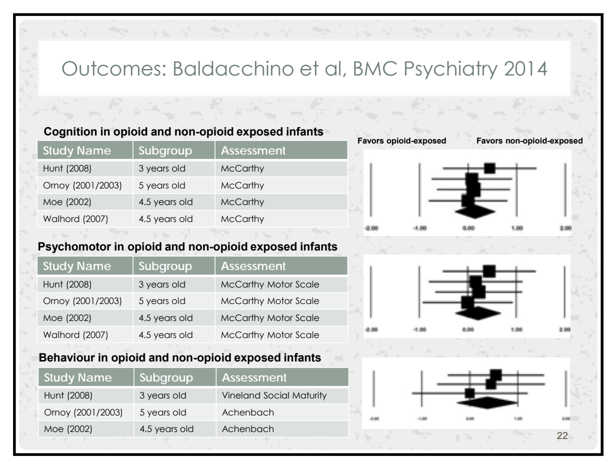
19

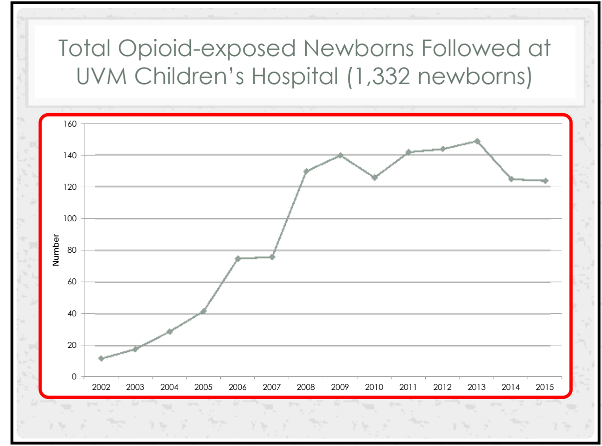
NAS: Pharmacologic Treatment

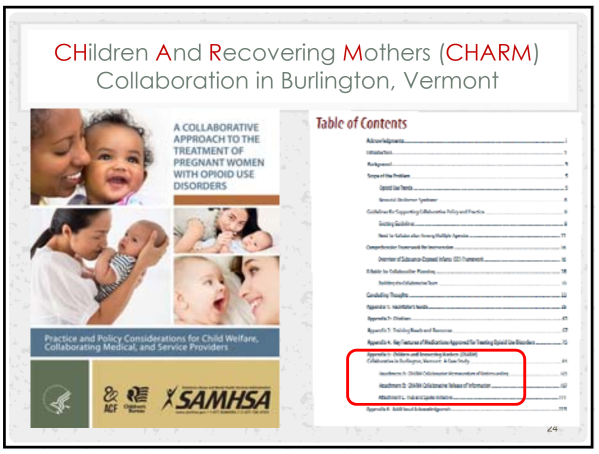
- Short-acting opioids (morphine sulfate, dilute tincture of opium)
  - Inpatient treatment
  - "standard of care"
  - Symptom based versus weight based
  - Endorsed by the AAP (2012)
- Methadone
  - Inpatient treatment and inpatient to outpatient treatment
  - Symptom versus weight based
  - Allows for shorter length of stay (with outpatient treatment)
  - Endorsed by the AAP (2012)
  - (Several studies including MS Brown et al (2015) which revealed shortened duration of treatment with methadone)
- Dilute tincture of opium and phenobarbital (Coyle et al, 2002)
  - Decreased severity of withdrawal, decreased length of stay
- Buprenorphine (Kraft et al, 2011)
  - Shorter length of stay in buprenorphine treated infants
  - Well tolerated
- Clonidine (Agthe et al, 2009)
  - Oral clonidine alone or as adjunct to short-acting opioids
  - Shortens the duration of therapy, no short-term cardiovascular side effects were observed

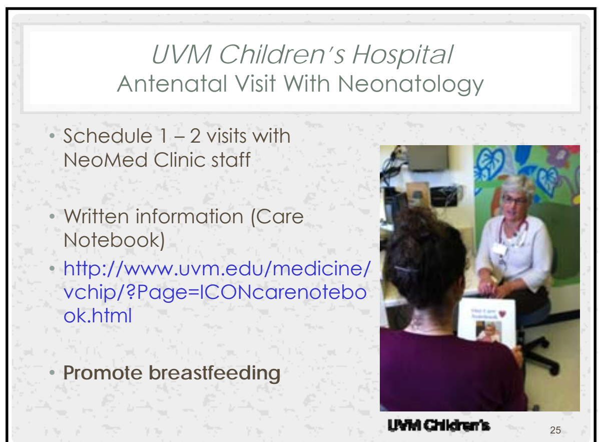
20

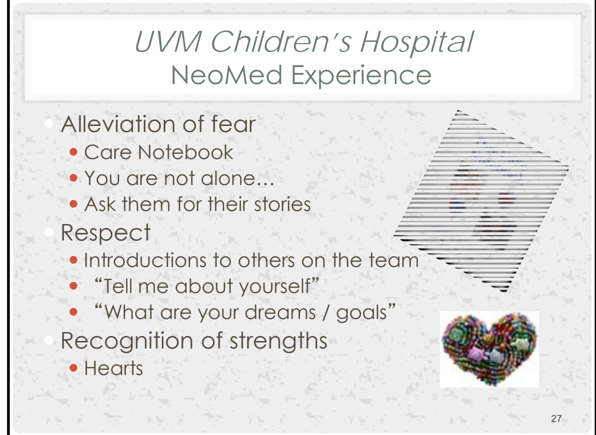

Outcomes: Baldacchino et al, BMC Psychiatry 2014
Psychomotor in opioid and non-opioid exposed infants
Study Name | Subgroup | Assessment
Hunt (2008) | 1.5 years old | BSID (Psychomotor)
Burlowski (1998) | 1 year old | GDS (Locomotor)
Moe (2002) | 1 year old | BSID (Psychomotor)
Hans (2001) | 1 year old | BSID (Psychomotor)
Hans (2001) | 2 years old | BSID (Psychomotor)
Cognition in opioid and non-opioid exposed infants
Study Name | Subgroup | Assessment
Hunt (2008) | 1.5 years old | BSID (Mental)
Burlowski (1998) | 1 year old | GDS (DQ)
Moe (2002) | 1 year old | BSID (Mental)
Hans (2001) | 1 year old | BSID (Mental)
Hans (2001) | 2 years old | BSID (Mental)
-2.00
-1.00
0.00
1.00
2.00
21


Outcomes: Baldacchino et al, BMC Psychiatry 2014
Cognition in opioid and non-opioid exposed infants
Favors opioid-exposed
Favors non-opioid-exposed
Study Name | Subgroup | Assessment
Hunt (2008) | 3 years old | McCarthy
Ornoy (2001/2003) | 5 years old | McCarthy
Moe (2002) | 4.5 years old | McCarthy
Walhord (2007) | 4.5 years old | McCarthy
Psychomotor in opioid and non-opioid exposed infants
Study Name | Subgroup | Assessment
Hunt (2008) | 3 years old | McCarthy Motor Scale
Ornoy (2001/2003) | 5 years old | McCarthy Motor Scale
Moe (2002) | 4.5 years old | McCarthy Motor Scale
Walhord (2007) | 4.5 years old | McCarthy Motor Scale
Behaviour in opioid and non-opioid exposed infants
Study Name | Subgroup | Assessment
Hunt (2008) | 3 years old | Vineland Social Maturity
Ornoy (2001/2003) | 5 years old | Achenbach
Moe (2002) | 4.5 years old | Achenbach
-2.00
-1.00
0.00
1.00
2.00
22


Total Opioid-exposed Newborns Followed at UVM Children's Hospital (1,332 newborns)
Number
160
140
120
100
80
60
40
20
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015


CHildren And Recovering Mothers (CHARM) Collaboration in Burlington, Vermont
A COLLABORATIVE APPROACH TO THE TREATMENT OF PREGNANT WOMEN WITH OPIOID USE DISORDERS
Practice and Policy Considerations for Child Welfare, Collaborating Medical, and Service Providers
SAMHSA
Table of Contents
24





UVM Children's Hospital
Why methadone for treatment of neonatal abstinence syndrome?

- Decreased frequency of dosing
- Less respiratory depression
- Less need for adjustment of dose

28

UVM Children's Hospital
Benefits /risks of newborn outpatient treatment program with methadone

Benefits

- Length of stay reduced
- Slow wean of methadone reduces symptoms of withdrawal
- Allows for more breastfeeding success
- Empowers family

Risks

- Safety concerns – overdose to baby, use by others
- Long half-life may lead to "overmedication" in hospital
- Often prolonged course – are we treating normal baby irritability with methadone?

29

Infrastructure: what works in Vermont

- Clinic staff with ability to "track infants down"
- Close relationships with obstetrics, substance abuse treatment providers, WIC, child protective services and home health nursing
- Single pharmacy to dispense methadone

30

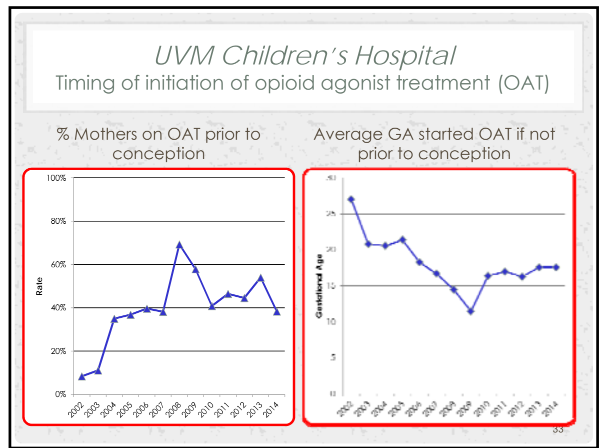
UVM Children's Hospital
NeoMed Clinic

- First NeoMed clinic visit within 1 week of discharge
- Infants requiring medication for NAS are seen at least every 2 weeks
- Bayley III Scales at 8-10 months
- Hepatitis C antibody at 18 months for exposed infants
- Multidisciplinary approach involving primary care provider, home health, early intervention, ChARM team, and maternal substance abuse provider

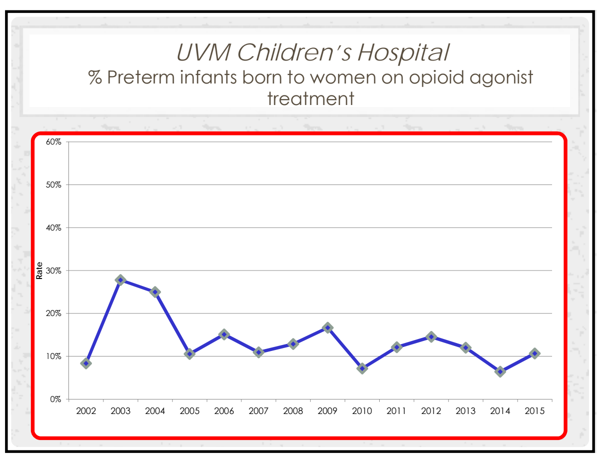
31

UVM Children's Hospital:
Infants born to opioid dependent women with substance abuse on **methadone** or **buprenorphine** at delivery (N = 970)

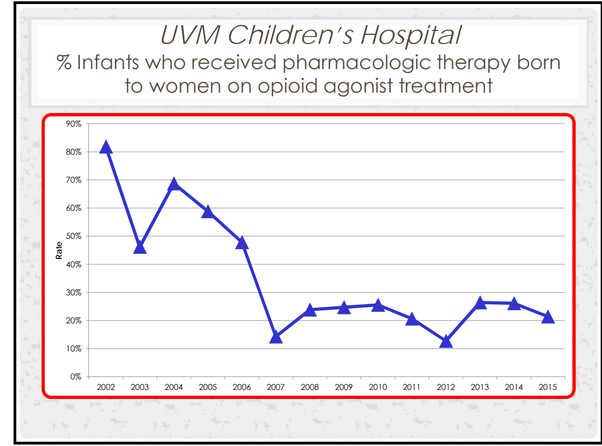
Number
120
100
80
60
40
20
0
2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
MOTHER Study
Buprenorphine
Methadone



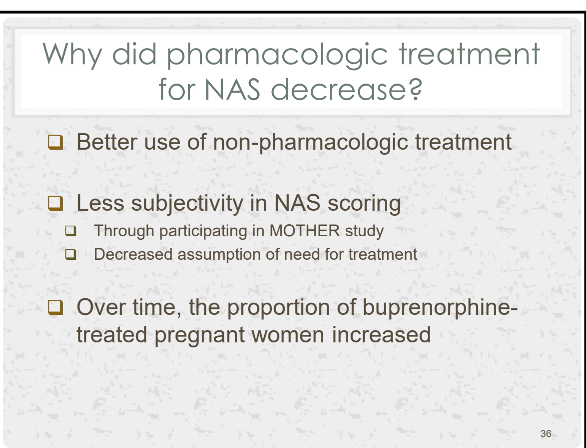
UVM Children's Hospital
Timing of initiation of opioid agonist treatment (OAT)
% Mothers on OAT prior to conception
Average GA started OAT if not prior to conception
Rate
100%
80%
60%
40%
20%
0%
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Gestational Age
25
20
15
10
5
33



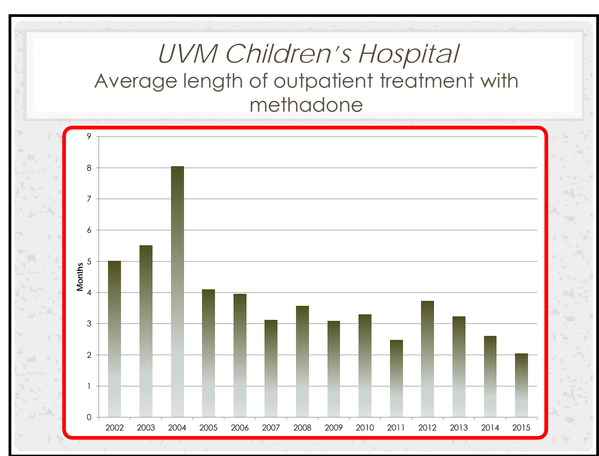
UVM Children's Hospital
% Preterm infants born to women on opioid agonist treatment
Rate
60%
50%
40%
30%
20%
10%
0%
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

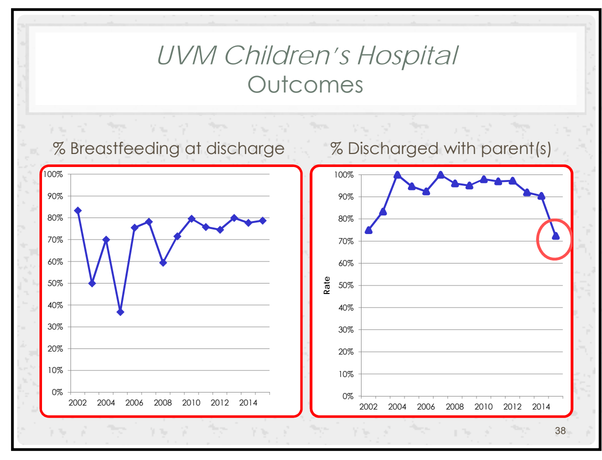


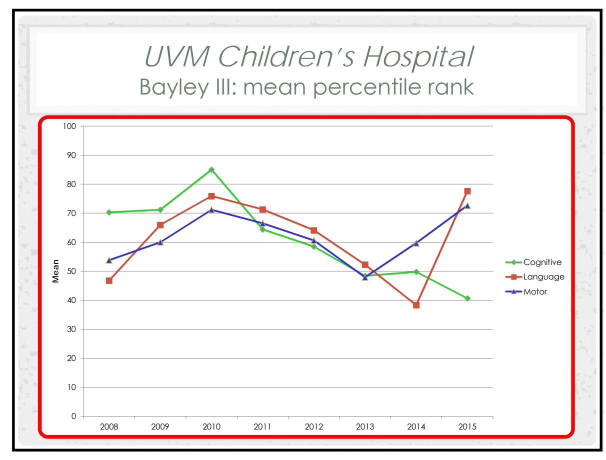
UVM Children's Hospital
% Infants who received pharmacologic therapy born to women on opioid agonist treatment
Rate
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

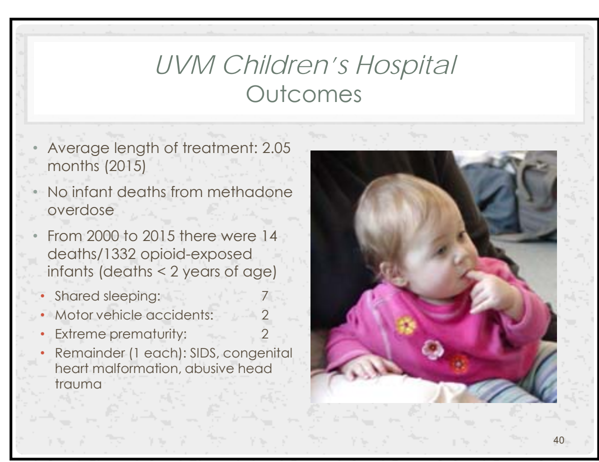


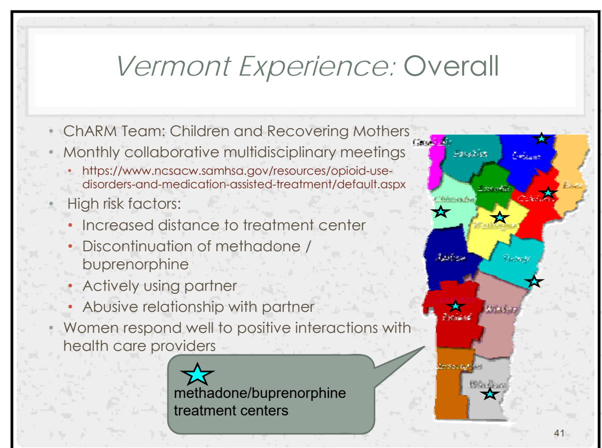
Why did pharmacologic treatment for NAS decrease?
Better use of non-pharmacologic treatment
Less subjectivity in NAS scoring
Through participating in MOTHER study
Decreased assumption of need for treatment
Over time, the proportion of buprenorphine-treated pregnant women increased
36


UVM Children's Hospital
Average length of outpatient treatment with methadone
Months
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015


UVM Children's Hospital
Outcomes
% Breastfeeding at discharge
% Discharged with parent(s)
Rate
38


UVM Children's Hospital
Bayley III: mean percentile rank
Mean
Cognitive
Language
Motor


UVM Children's Hospital
Outcomes
Average length of treatment: 2.05 months (2015)
No infant deaths from methadone overdose
From 2000 to 2015 there were 14 deaths/1332 opioid-exposed infants (deaths < 2 years of age)
Shared sleeping: 7
Motor vehicle accidents: 2
Extreme prematurity: 2
Remainder (1 each): SIDS, congenital heart malformation, abusive head trauma
40



Summary

- The incidence of NAS is increasing – does this represent increased identification of cases, increased access to care for pregnant opioid-dependent women?
- Behind every case of NAS, there is a mother suffering from the disease of addiction – this is where efforts need to be the greatest – need to decrease judgement, increase access to trauma-informed treatment
- Community strategies that focus on punishment will result in increased morbidity and mortality for children and their families
- Developmental / behavioral outcomes are overall not affected by opioid-exposure in utero on its own, unlike alcohol exposure

42