

  
**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

**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*
    - high-pitched crying, irritability
    - exaggerated reflexes, tremors and tight muscles
    - sleep disturbances
  - *Autonomic nervous system*
    - sweating, fever, yawning, and sneezing
  - *Gastrointestinal distress*
    - poor feeding, vomiting and loose stools
  - *Signs of respiratory distress*
    - nasal stuffiness and rapid breathing

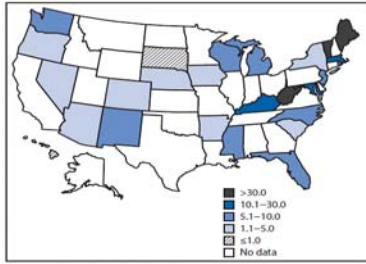
➤ **NAS is not Fetal Alcohol Syndrome (FAS)**

➤ **NAS is treatable**

Slide courtesy of H Jones (Finnegan et al., *Addict Dis.* 1976; 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

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

## Rolling Stone

By David Amsden April 3, 2014



## 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



5 NEWS

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

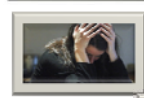
## NAS: Current Context

### Issues facing substance-using pregnant women and their children

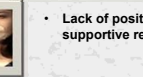
#### • Generational substance use



- Legal involvement
- Unstable housing
- Unstable transportation



- Limited parenting skills and resources
- Exposure to trauma



- Lack of positive and supportive relationships

Slide adapted courtesy of H Jones

8

# Shame



## 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

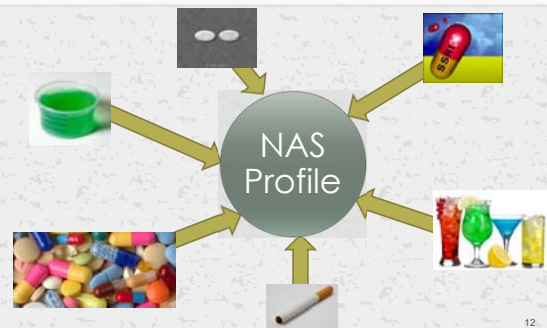
10

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

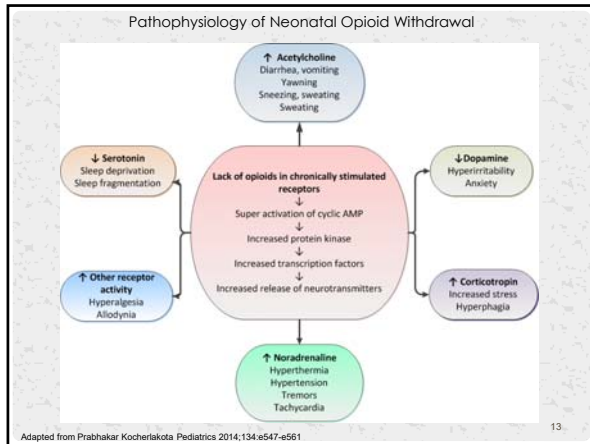
- WHO 2014: "Pregnant women dependent on opioids should be encouraged to use opioid maintenance treatment...rather than...attempt opioid detoxification."
- Facilitates retention of mothers/infants with decreased use of illicit substances when compared to no medication
- MAT results in NAS / NOWS which 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: Signs and Symptoms

- Signs of withdrawal typically start after 24-96 hours after birth depending upon the specific opioid exposure
- Central nervous system signs
  - Tremors
  - Irritability, high-pitched crying
  - Sleep disturbances
  - Tight muscles tone, hyperactive reflexes
  - Myoclonic jerks (sometimes misinterpreted as seizures), seizures - rare
- Autonomic signs
  - Sweating, fever, yawning and sneezing
  - Rapid breathing, nasal congestion
- Gastrointestinal signs
  - Poor feeding, vomiting and loose stools or diarrhea

**What would happen if NAS is untreated?**

- Depends upon the severity
- There are many infants who do not receive medication for NWS and their outcome is good
- However, an irritable, crying baby who does not sleep and cannot feed will be at risk for
  - Dehydration
  - Abusive trauma
  - Interrupted attachment and maybe failure of attachment
- Excessive irritability and dehydration are very likely to lead the caregiver to seek medical attention.
- An infant may die without treatment – however, in an extensive literature search, the only reported deaths occurred over 100 years ago
- NAS does not lead to poor neurodevelopmental outcomes

## Scoring tools for NAS

- Finnegan Neonatal Abstinence Scoring System
  - 31 items
  - Symptoms are weighted
  - Guidelines for pharmacologic treatment at score of 8 or greater
- MOTHER score (modified Finnegan score)
  - 19 items (which contribute to total score)
  - Items weighted differently
  - Some items eliminated and others added
  - Guidelines for treatment based on score rather than weight
- Lipsitz Neonatal Drug-Withdrawal Scoring System
  - 11 items
  - Items scored for severity and gives guidelines for treatment
- The Neonatal Withdrawal Inventory – 8 point checklist
- The Neonatal Narcotic Withdrawal Index – 6 signs plus others

## 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

## Factors affecting NAS

- Substances
  - Nicotine
  - Benzodiazepines
  - SSRIs
- Single gene polymorphisms
- Hospital protocols and education of the staff, breastfeeding support



17

## 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, 2004)
- 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](http://www.susquehannahealth.org)



[www.simplymotherhood.com](http://www.simplymotherhood.com)

19

## NAS: Pharmacologic Treatment

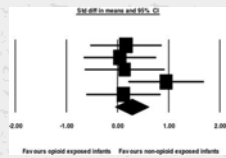
- Short-acting opioids (morphine sulfate, dilute tincture of opium)
  - Inpatient treatment
  - "standard of care"
  - Symptom based versus weight based
  - Endorsed by the AAP (2012)
- Methadone
  - Inpatient treatment and inpatient to outpatient treatment
  - Symptom versus weight based
  - Allows 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 (Kraff 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

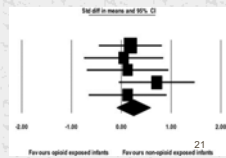
Psychomotor in opioid and non-opioid exposed infants

Study Name	Subgroup	Assessment
Hunt (2008)	1.5 years old	BSID (Psychomotor)
Burtowski (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

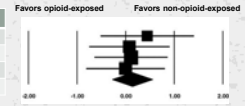
Study Name	Subgroup	Assessment
Hunt (2008)	1.5 years old	BSID (Mental)
Burtowski (1998)	1 year old	GDS (DQ)
Moe (2002)	1 year old	BSID (Mental)
Hans (2001)	1 year old	BSID (Mental)
Hans (2001)	2 years old	BSID (Mental)



Outcomes: Baldacchino et al, BMC Psychiatry 2014

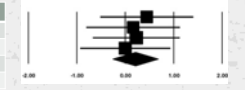
Cognition in opioid and non-opioid exposed infants

Study Name	Subgroup	Assessment
Hunt (2008)	3 years old	McCarthy
Ornoy (2001/2003)	5 years old	McCarthy
Moe (2002)	4.5 years old	McCarthy
Walhard (2007)	4.5 years old	McCarthy



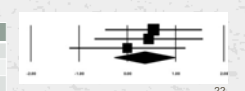
Psychomotor in opioid and non-opioid exposed infants

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
Walhard (2007)	4.5 years old	McCarthy Motor Scale

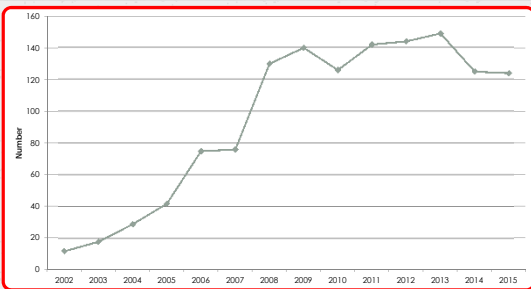


Behaviour in opioid and non-opioid exposed infants

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



Total Opioid-exposed Newborns Followed at UVM Children's Hospital (1,332 newborns)



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

Table of Contents

- Abstract/Introduction ..... 1
- Introduction ..... 1
- Background ..... 4
- Objectives/Purpose ..... 4
- Special Use Needs ..... 5
- Research/Intervention/Question ..... 6
- Collaborative Approach/Intervention Policy and Practice ..... 6
- Setting/Qualities ..... 6
- Need for Further Action Among Multiple Agencies ..... 6
- Operational Framework for Implementation ..... 6
- Director of Laboratory-Clinical Affairs (DCLA) Framework ..... 6
- Methods for Collaborative Practice ..... 6
- Interventions/Intervention Team ..... 6
- Guiding Principles ..... 6
- Appendix 1: Intervention/Intervention Team ..... 6
- Appendix 2: Practice ..... 6
- Appendix 3: Funding/Research and Resources ..... 6
- Appendix 4: Key Features of Medication Agreement for Treating Opioid Use Disorders ..... 6
- Appendix 5: Practice and Policy Considerations for Child Welfare, Collaborating Medical, and Service Providers ..... 6
- Appendix 6: Child Welfare/Department of Labor/Department of Health Services ..... 6
- Appendix 7: Child Welfare/Department of Labor/Department of Health Services ..... 6
- Appendix 8: Child Welfare/Department of Labor/Department of Health Services ..... 6
- Appendix 9: Child Welfare/Department of Labor/Department of Health Services ..... 6



### UVM Children's Hospital Antenatal Visit With Neonatology

- Schedule 1 – 2 visits with NeoMed Clinic staff
- Written information (Care Notebook)
  - <http://www.uvm.edu/medicine/vchip/?Page=ICONcarenotebook.html>
- Promote breastfeeding



UVM Children's



"I SWEAR TO TELL THE TRUTH, THE WHOLE TRUTH, AND NOTHING BUT THE TRUTH, FROM MY PERSPECTIVE."

### UVM Children's Hospital NeoMed Experience

- Alleviation of fear
  - Care Notebook
  - You are not alone...
  - Ask them for their stories
- Respect
  - Introductions to others on the team
  - "Tell me about yourself"
  - "What are your dreams / goals"
- Recognition of strengths
  - Hearts



### 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

*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

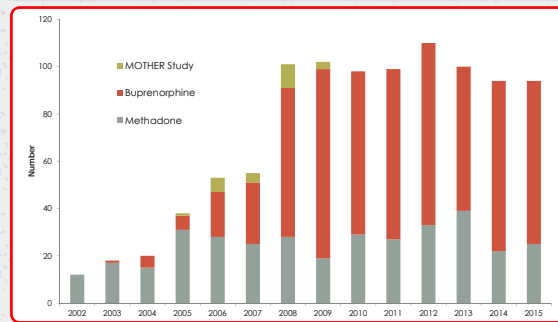
*UVM Children's Hospital*  
**NeoMed Clinic**

- 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

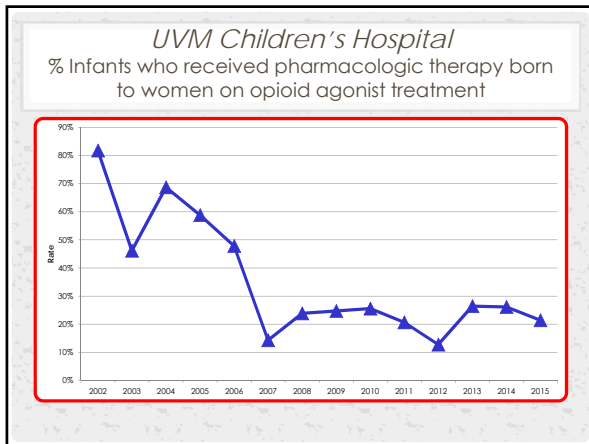
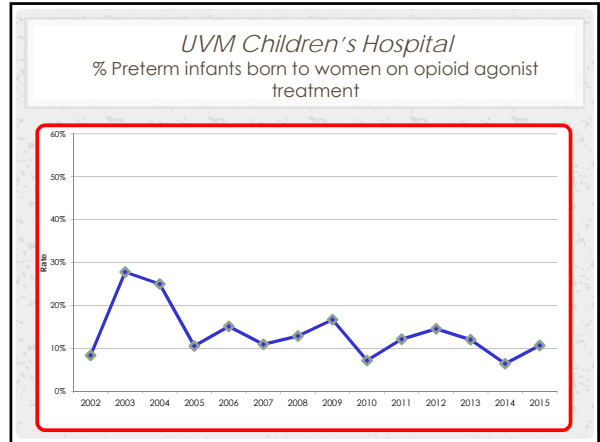
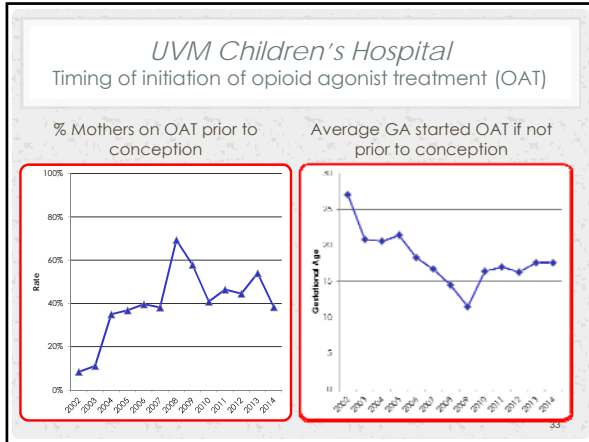


31

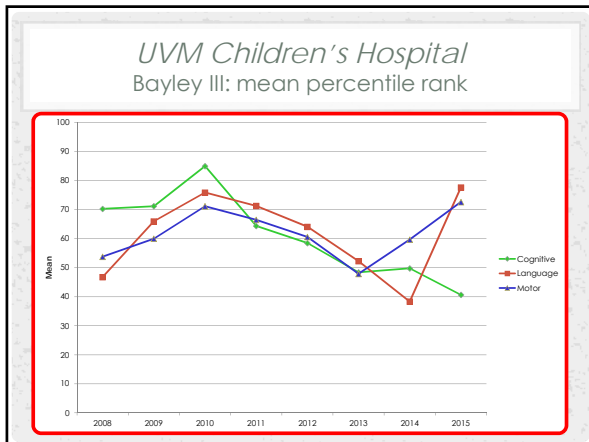
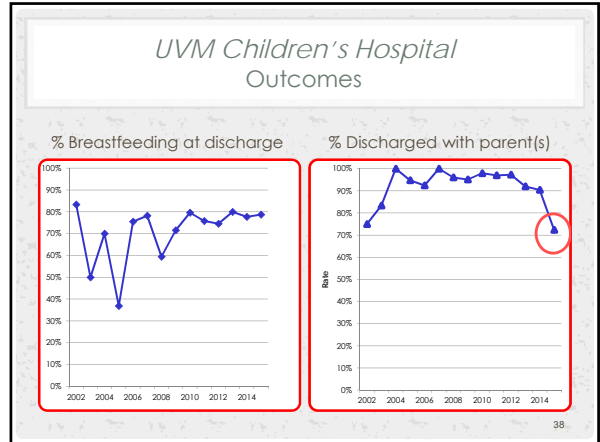
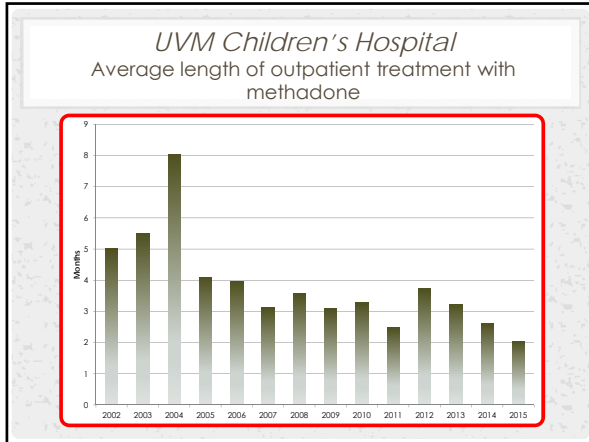
*UVM Children's Hospital:*  
Infants born to opioid dependent women with substance abuse on methadone or **buprenorphine** at delivery (N = 970)







- ### 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



### 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

## Vermont Experience: Overall

- ChARM Team: Children and Recovering Mothers
- Monthly collaborative multidisciplinary meetings
  - <https://www.ncsacw.samhsa.gov/resources/opioid-use-disorders-and-medication-assisted-treatment/default.aspx>
- High risk factors:
  - Increased distance to treatment center
  - Discontinuation of methadone / buprenorphine
  - Actively using partner
  - Abusive relationship with partner
- Women respond well to positive interactions with health care providers

★  
methadone/buprenorphine  
treatment centers



41

## 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



Babylevise.com

The health of the baby depends upon the mother's health

43

## Acknowledgements

*We would like to thank the infants and families we have had the pleasure of caring for – we continue to learn from them daily.*



JVM Children's Hospital

44