

Optimizing Care for Neonatal Abstinence Syndrome

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Learning Objectives

At the end of this session participants will:

- 1) Understand the benefits of rooming-in as a strategy to improve management and outcomes of NAS
- 2) Understand that use of a numeric scoring system may be detrimental to optimal management of NAS
- 3) Understand the journey that our center experienced with a 'rooming in' model of care
- 4) Understand outcomes for infants with NAS



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I have no conflicts to declare



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**Children's and Women's
Health Center of BC**



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Teck Acute Care Center (TACC)

opened October 2017



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Definition of Neonatal Abstinence Syndrome (NAS)

- **“Neonatal withdrawal symptoms resulting from in utero exposure to maternal drugs, most commonly opioids”**

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Nomenclature

NAS – ‘Neonatal abstinence syndrome’

- NAS – ‘Neonatal adaptation syndrome’
- NOWS – ‘Neonatal opiate withdrawal syndrome’
- (historical – ‘congenital morphinism’ - 1875)



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NAS – signs and symptoms

- 1) Feeding – poor and uncoordinated suck
- 2) Poor sleep - with increased irritability
- 3) Poor consolability - with excessive and irritable crying
- 4) also seizures, vomiting, diarrhea, fever

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How did we get into this opiate wilderness?

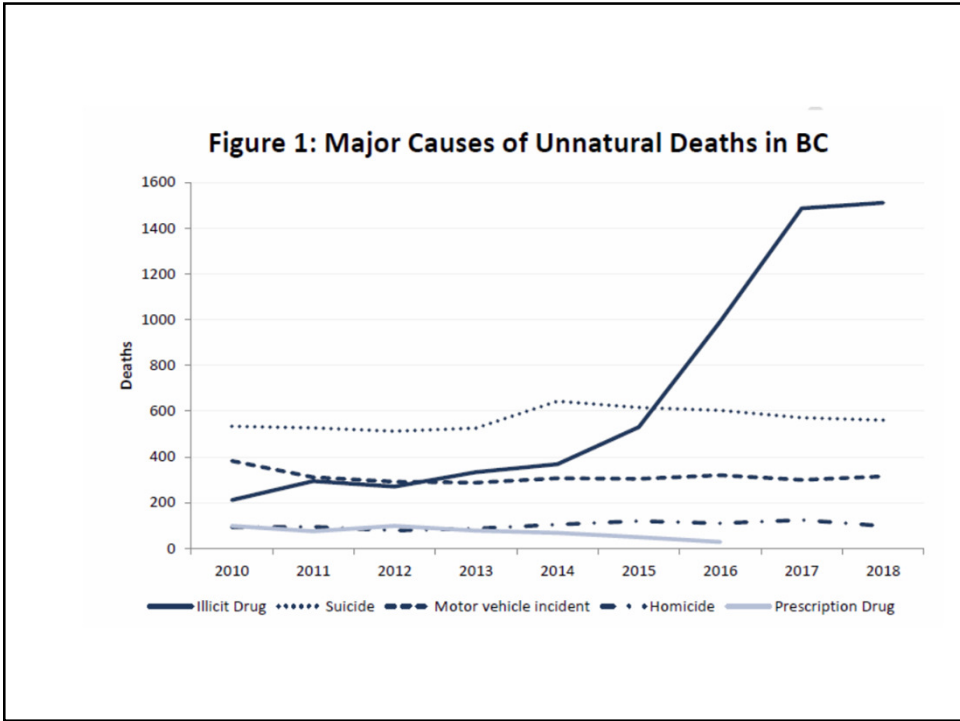


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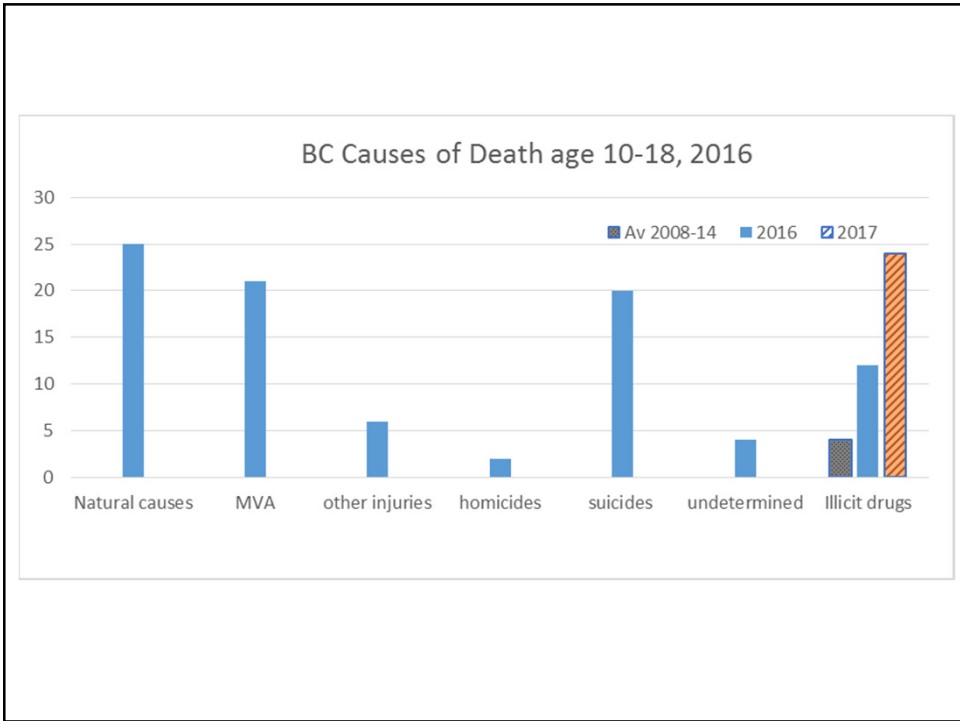
Reasons for Opioid Use

- **Pain management** – BUT opiates used way too liberally!
- Recreational use - dependence
- Harm reduction – methadone
- May involve polydrug use

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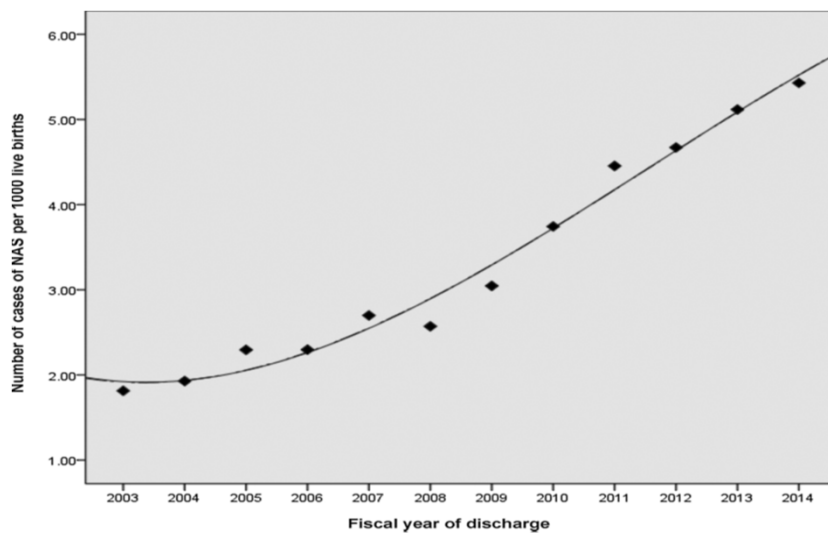
Fentanyl and carfentanil – 50 to 100 x more potent than morphine and powerfully addictive



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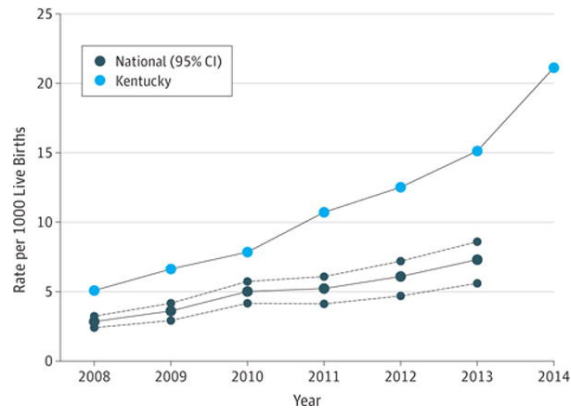
NAS incidence in Canada

J. Filteau, H.Coo & Kim Dow, J of Drug & alcohol dependence, Vol 185, p313 Jan 2018



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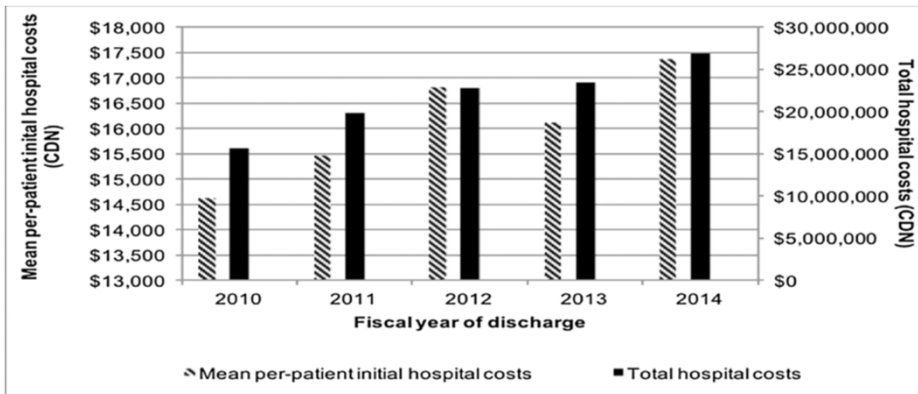
NAS – United States



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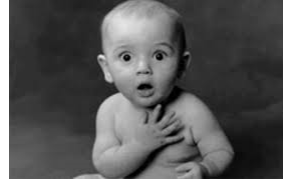
NAS hospital costs in Canada

J. Filteau et al, Jan 2018



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Impact of maternal opioids in pregnancy



- **NAS**
- Prematurity
- Decreased fetal growth (SGA)
- Social risk
- Increased resource utilization
 - Mean LOS 13.4 days for NAS vs. 1.4 days for well newborn
- Adverse long-term effects – uncertain

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Smoking

- Smoking is a known detriment to fetal growth and placental function
- The majority of mothers who use opioids also smoke
- Smoking results in some signs/symptoms of withdrawal in newborns



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Timing of Signs of NAS



- **Onset of signs/symptoms relates to half life of the drug and timing of last dose**
 - **Heroin and fentanyl - short half lives – withdrawal within 24 hours of birth**
 - **Methadone- longer half life – signs of NAS may not occur for 48-72 hours after birth - ??delay for weeks**
 - **Observation after birth - minimum 72 hours and 120 hours for methadone**

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Determinants of withdrawal severity

- **Type and dose of maternal opioid**
- **Breastfeeding - mitigates symptoms**
- **Other drugs used**
- **Location of newborn care**



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Breastfeeding

- **Associated with:**
 - **Decreased need for pharmacologic treatment**
 - **Decrease in duration of treatment**
- **Negligible transfer of methadone (cumulative daily intake 0.01-0.15 mg/day)**

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Breastfeeding and NAS

Vanessa Short et al, Breastfeeding Medicine, vol 11, #7, 2016

- **Retrospective cohort study of 3,725 neonates with NAS in Pennsylvania between 2012-2014**
- **Length of stay was reduced by 9.5% in the breastfed group compared to the bottle/formula fed group**



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Determinants of withdrawal severity

- Other drug exposures – e.g. SSRI (paroxetine)



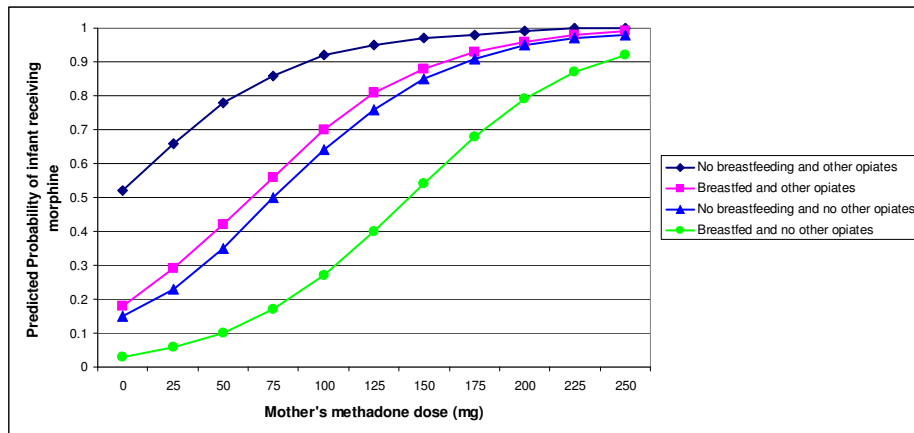
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Premature infants

- Lower GA correlates with lower risk of treatment for NAS due to :
 - Developmental immaturity of CNS
 - Lower fat stores of drug

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Probability of Rx with morphine related to maternal methadone BCWH



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Long-term Outcomes from NAS

- Few studies without methodological flaws
- Studies with opiate exposed infants show:
 - Mean developmental index (MDI) significantly lower at 18 and 36 months
 - Increased motor delays at 9 months
 - Increased incidence of ADHD/ADD at 7 years



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Long term outcome – school performance grade 3, 5, 7

J. Lee Oei, et al, Pediatrics vol 139 #2, Feb 2017

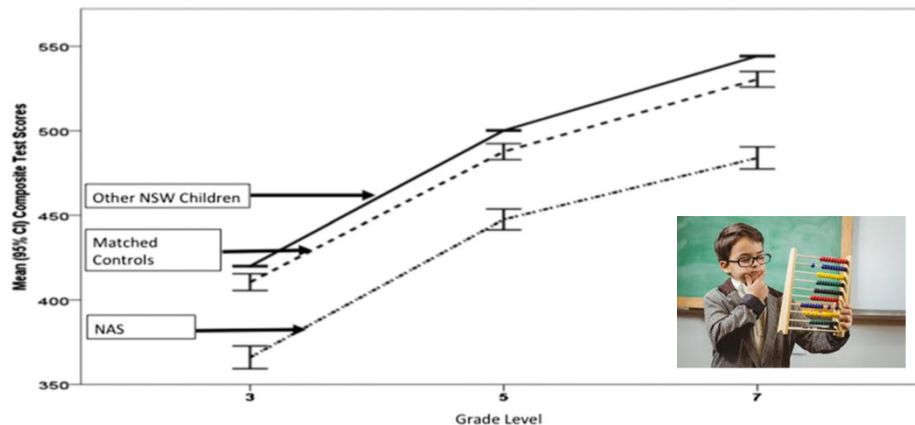
- Curriculum based test data on >500,000 children in Australia followed from 2000-2006 tested in grades 3, 5 and 7
- Included were 2234 with NAS, 4330 matched controls and 598,265 others
- Compared results from National Assessment Program in Literacy and Numeracy exams



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Long term outcome – school performance grade 3, 5, 7

J. Lee Oei, et al, Pediatrics vol 139 #2, Feb 2017



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NAS - national survey of Canadian hospitals 2017

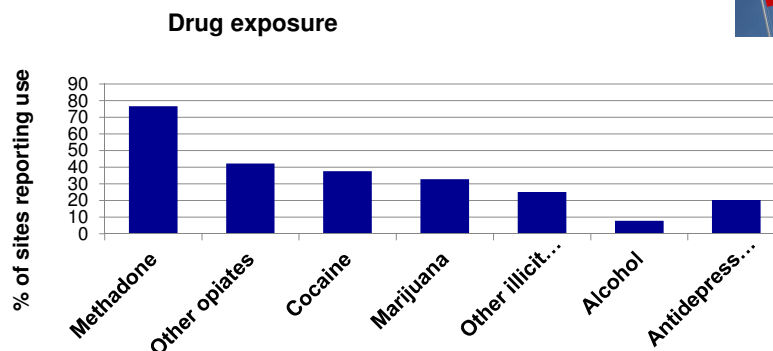
Murphy, Dow et al, Paediatrics & Child Health, May 2017

- Email survey sent to all Level II and NICUs in Canada (106) in 2014-2015
- 65 out of 106 (63%) responded
- Study conducted by Department of Pediatrics at Queens University (Kingston) and Mt Sinai Hospital (Toronto)



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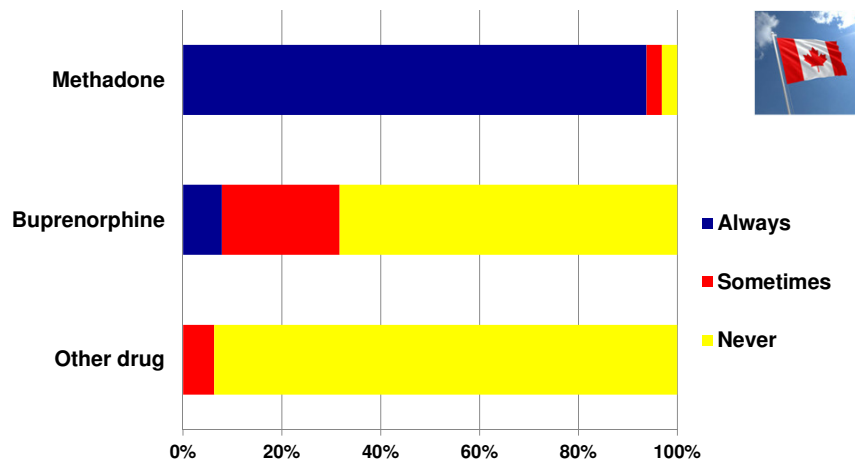
Canadian NAS survey results



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Medications used to treat maternal opioid dependence

Canadian national survey 2014



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Identifying infants at risk of NAS

- Routine screening of at risk infants – 70%
- Urine, meconium or hair used for screening – urine always used in 88%
- We do not screen urine, meconium or hair



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Management of infants – Canada 2014



- 89% of hospitals use Finnegan scoring tool (FNASS) to monitor at-risk infants
- Threshold for treatment - 94% use threshold of >8 and 6 % use 12



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Location of care for NAS

89% in NICU with cardiorespiratory monitors – **11% room in with mother**

- We use NICU or level 2 nursery only for infants needing NG feeding or IV therapy
- We have never used routine cardiorespiratory monitors



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Management of infants Canada 2014



Morphine used as first-line Rx in 97%

Adjunct medication used in 65%

- Phenobarbital
- Clonidine
- Breastfeeding always encouraged in 54%
- **We currently use morphine + occasionally phenobarb or clonidine but we do not discharge on treatment drugs**

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Meta-analysis – best NAS treatment

Timothy Disher et al, JAMA Pediatrics, Jan 22, 2019

- **Primary outcomes:**
 - length of treatment
 - length of stay
 - need for adjuvant therapy
 - adverse events

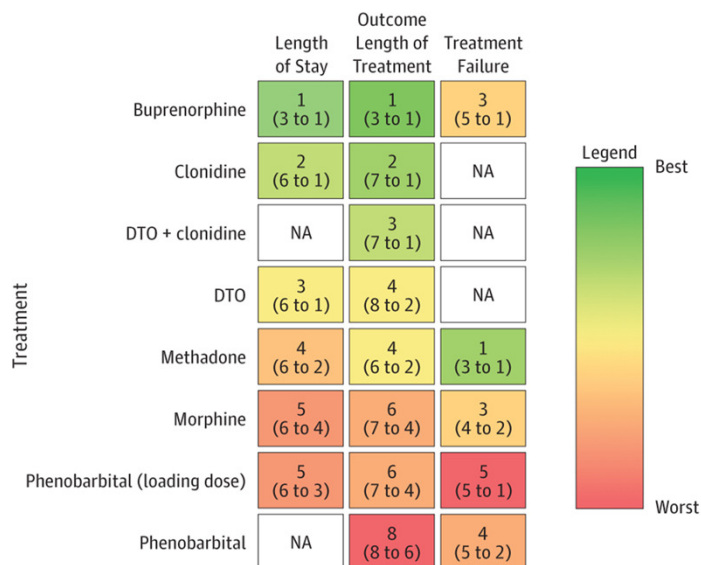
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NAS – optimal pharmacotherapy

- **Results** – 18 trials (N=1072) were eligible for inclusion
- **Drugs included** - buprenorphine, clonidine, diluted tincture of opium+clonidine, diluted tincture of opium, morphine, methadone and phenobarbital

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'Heat plot' for all outcomes



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Tools to Assess Neonatal Withdrawal

- Finnegan scoring system used by 90% of units, as recommended by the CPS and the AAP
- Concern that it results in overtreatment
- **We have never used Finnegan in over 1500 infants with NAS since 2001**



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A 'novel' approach to assessing infants with NAS

Matthew Grossman et al, Hospital Pediatrics, Jan 2018

Objective – to compare infants with NAS using traditional Finnegan scoring system (FNASS) with infants assessed by Eat, Sleep, Console (ESC)

Method – 50 consecutive opioid exposed infants all had FNASS scores q2-6 hours but were managed by the ESC approach
Actual treatment decisions were compared

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Results – ESC vs FNASS

Matthew Grossman et al, Hospital Pediatrics, Jan 2018

	ESC	FNASS
Infants Rx morphine (%)	6 (12%)	31 (62%)
Average length of stay	6 days	23 days



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Conclusion

Using the Eat, Sleep, Console (ESC) approach vs Finnegan resulted in a dramatic decrease in the need to treat with morphine and reduced the length of stay

[This is our experience!](#)



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NAS assessment/monitoring BCWH Fir module

- **We use a global observation approach with input from nursing, physicians and mother**
- **Our approach closely mimics ESC**
- **Observation sheet but no numerical score**
- **WEIGHT is the major concern**

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NAS management

- **Initial management focuses on non-pharmacological interventions**
 - **ROOMING-IN – lots of holding/cuddling**
 - **BREASTFEEDING**
 - **Decreased sensory stimulation (quiet, dark)**
 - **Swaddling when crying (not for sleeping)**
 - **Kangaroo care**
 - **Pacifiers as needed**
 - **Frequent feeds (often hypercaloric)**

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Reasons for admission or transfer to NICU or Level 2 nursery (Rabbit)

- **<35 weeks or <2200 grams**
- **Significant respiratory distress**
- **Need for NG feeds, IV fluids or antibiotics**

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Treatment Recommendations

- **When supportive measures fail we use morphine as our first line drug starting with .04 mg/kg/dose prn**
- **Reassess in 24 hours – if >3 prn doses needed start maintenance**

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Treatment recommendations

- Phenobarbital or clonidine used as adjunct therapies to morphine in patients when morphine is inadequate

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Treatment Recommendations

- We encourage infant rooming-in with mother throughout hospital stay
- When needed - supervised care/feeding in the central nursery on the ward
- Cardio-respiratory monitors only if in the Intermediate Nursery or NICU
- `Volunteer cuddlers` are used – days only

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Association of rooming-in with outcomes in NAS

Kathryn Dee Macmillan et al, p 345, vol 172, April 2018

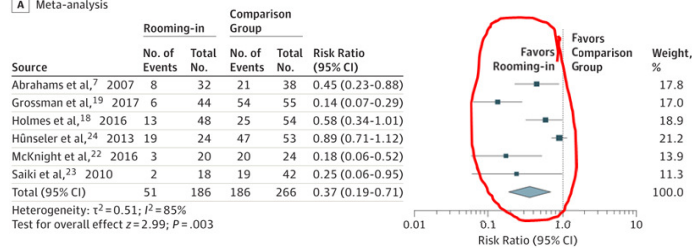
- Systematic review and metaanalysis
- Of 413 publications 6 met inclusion criteria
- **RESULTS** – consistent evidence that rooming-in is preferable to NICU care



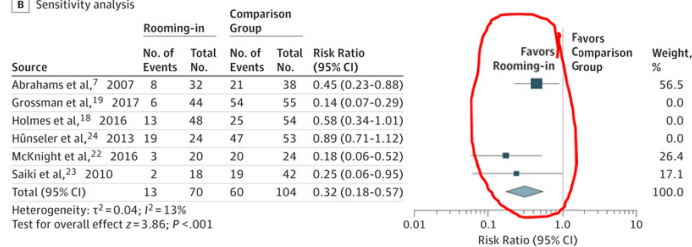
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Rooming in vs usual care – need for pharmacotherapy

A Meta-analysis



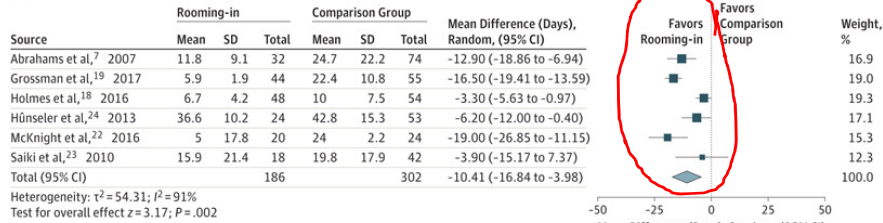
B Sensitivity analysis



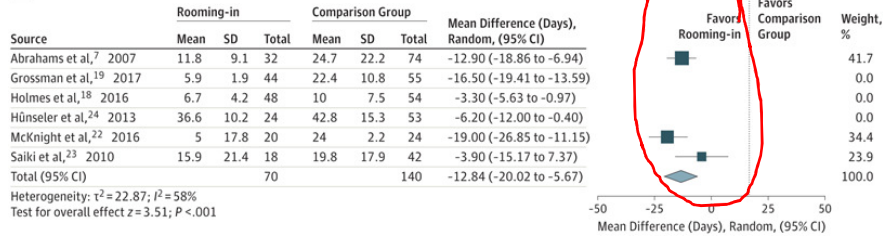
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Rooming in vs usual care re length of stay

A Meta-analysis



B Sensitivity analysis



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CPS Practice Point May 2018

“Recent literature supports practices that keep opioid-dependent mothers and their infants together from birth, such as rooming-in”



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Treatment with morphine - BCWH

- New protocol just commenced with morphine .04 mg q4h with PRN dose of .02 mg
- Reassessment after 24 hours and adjust dosing based on number of prns needed
- Wean by 10-20 % if no prn dosing needed for >24 hours
- Discontinue Rx when .05 mg dose is reached and continue with prn

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BCWH Fir module – our journey



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BC Women's Hospital: 1982 – normal postpartum care

**Babies separated from their mothers
after feeding and returned to 'central
nursery'**

Holding/cuddling significantly reduced

Breastfeeding was rendered difficult

**Partners were not permitted to stay in the
room**



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BC Women's Hospital: 1984

- **PROGRESS!**
- **Babies mostly stayed with mothers in
their rooms – 'rooming in' was born**
- **Partners were allowed to stay
overnight**
- **And everyone was happier**



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However....

- It took 17 years to extend this model of care to infants of substance using mothers
- Fir Square - 12 bed unit opened in 2001 with dedicated nursing, medical and social work staff
- July 2019 - moved to the 3rd floor of the old BCCH – expanded to 13 beds

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The journey to Fir

- Perinatal addictions team (family doctors) assume overall clinical and administrative management of our unit
- Pediatricians direct morphine treatment + advise re difficult feeding and other medical issues e.g. antiretrovirals
- Teamwork is essential!



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Champions were key!

Ron Abrahams (family doc) and Liz Whynot (CEO)



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The birth of Fir

- **Sheway in downtown eastside of Vancouver**
- **Multidisciplinary care for substance using moms**
- **Mothers referred from Sheway to Fir**
- **Harm reduction model!**



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Outcomes of rooming-in at BCWH (Fir)

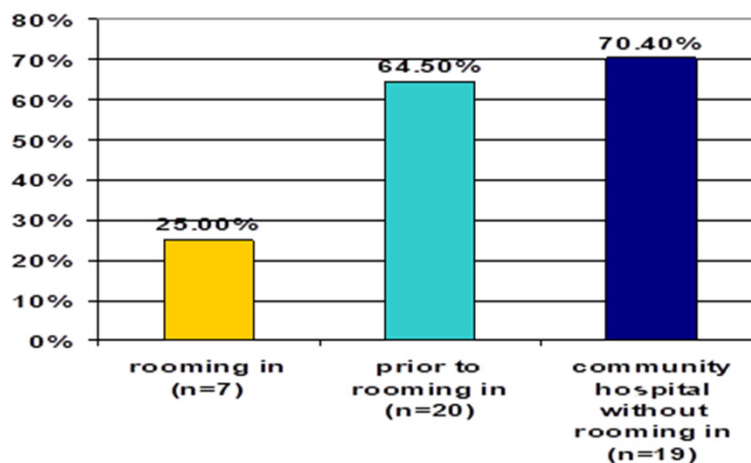
Abrahams R et al, Can Family Physician, 2007;53:1722
Obstetrics and Gynec Can 2012;34(5):p475



- Retrospective cohort study: 3 groups:
- Tertiary care hospital prior to rooming in (N=33)
- Tertiary care hospital rooming-in (N=38)
- Community hospital with no rooming-in (N=36)

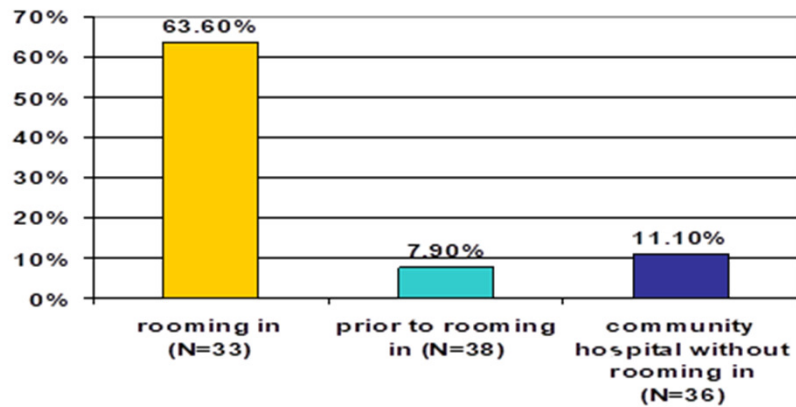
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Results – treatment with morphine



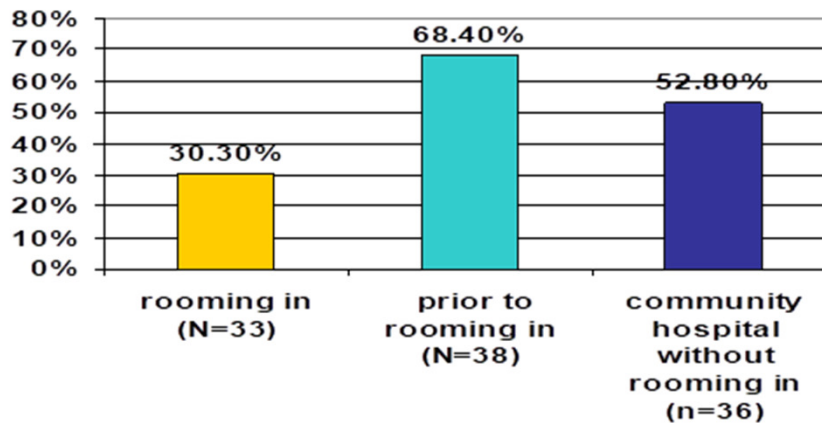
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Results – breastfeeding



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Results – rate of apprehension by the Ministry (MCFD)



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Kingston General Hospital Rooming-in Program



McKnight et al Am Journal of Perinatology 2016

Primary outcomes	NICU (n=24)	Rooming-in (n=20)	p-value
Treated with morphine (%)	20 (<u>83%</u>)	3 (<u>15%</u>)	<0.001
Duration of Rx (days)	24.0 (3-56)	5.0 (3-34)	<0.001

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Criteria for discharge - Fir

- Signs of NAS stable for 5-7 days
- Weaned off morphine
- Weight stable or gaining for 2-3 days
- Home assessment completed
- Follow-up arranged - many followed up by a pediatrician in the Sheway clinic up to 18 months



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Take-home Messages

1. Rooming-in with mother should be the standard of care, as babies belong with their mothers and outcomes improve
2. Avoid routine electronic monitoring
3. Avoid the Finnegan scoring system as it results in over treatment with morphine – use [Eat, Sleep, Console](#)
4. Breastfeeding should be encouraged as outcomes improve



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Key References

1. Canadian Pediatric Society – Practice Point Jan 2018
<https://www.cps.ca/en/documents/position/opioids-during-pregnancy>
2. Pharmacological treatments for NAS – T.Disher, JAMA Ped, January 2019
3. Bagley SM et al. Review of the assessment and management of neonatal abstinence syndrome. Addict Sci Clin Prac 2014,19(9):1-10
4. Dow KE et al. Neonatal abstinence syndrome: Clinical practice guidelines for Ontario. J Popul Ther Clin Pharmacol 2012, 19(3): e488-506
5. Murphy, K et al, NAS – National Canadian Survey, Pediatrics and Child Health, May 2017, pg 148
6. Neonatal abstinence syndrome, AAP Grand Rounds, September 2017
7. **Novel approach to assessing infants with NAS, Matthew Grossman, Hospital Pediatrics, vol 8 #1, Jan 2018, p 1**
8. Beyond the Finnegan scoring system – Schiff & Grossman, Seminars in Fetal and Neonatal Medicine, January 2019, P1-6
9. Rooming-in and outcomes with NAS, Kathryn Dee Macmillan, JAMA Pediatrics April 2018, p345
10. Buprenorphine for NAS, Walter Kraft et al, NEJM, June 15, 2017 p2341

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NAS – the journey continues...



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