MATERNAL DRUG USE:EFFECTS ON BABIES
a multifaceted problem

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MATERNAL DRUG USE:EFFECTS ON BABIES
Bonnie J. Lees, MD has “NO” DISCLOSURES

Presentation will discuss

- the prevalence of drug use during pregnancy
- the approach to identification of prenatal drug exposure
- the immediate effects at birth and the long-term effects of various in utero drug exposures
- the confounding variables associated with prenatal substance abuse and long term outcomes
Medications in Pregnancy and Lactation

Workshop – annual meeting of SMFM (San Diego, CA)
Feb 3-4, 2015
SMFM        NICHD
AAP           ACOG

- 94% of pregnant women use at least 1 med while pregnant or lactating
- >50% of pregnant women use >4 meds during pregnancy, many using over-the-counter or herbal meds for which there is limited pregnancy information
- 70% take a medication in the first trimester
- 33% are exposed to psychotropic medications
- 30% are prescribed opioids in some populations*

(AJOG - Clinical Opinion Jan 2016)

MATERNAL DRUG USE: EFFECTS ON BABIES

Substance Use Disorder vs Substance Abuse

5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSMMD 2013) combines the previous categories of “substance abuse” and “substance dependence” into the category of single substance use disorder, which is measured on a continuum from mild to severe

MATERNAL DRUG USE

Almost all drugs are known to cross the placenta and have some effect on the fetus
MATERNAL DRUG USE: EFFECTS ON BABIES

- LICIT or legal
  - over the counter use of drugs
  - appropriate use of prescription drugs

- ILLICT or illegal
  - inappropriate use of prescription drugs
  - inappropriate use of street drugs
  - inappropriate use of designer drugs

Major Drugs of Abuse

- synthetic chemical modifications of existent drugs of abuse
- designed and manufactured in makeshift labs
- sold at great profit for recreational use
- most are technically not illegal until identified, evaluated and placed on schedule 1 or 2 by DEA
- many are stronger and cheaper than the substances from which they are derived
- available on internet
Poisons have become the leading cause of Accidental death

(Illlicit drug use pregnant: 15 to 17 yr – 16.2%; 18–25 yr – 7.4%; 26–44 yr – 1.9%)

Cigarette use 15–17 yr: pregnant: 22.7% vs non-pregnant: 13.4%

N 15 to 44 years of age by pregnancy status 2009–2010

(William Banner MD PhD)

#1 – marijuana (prevalence in pregnancy *= 5.6%)
#2 – psychotherapeutics (non–medical)
  pain relievers – most common
  tranquilizers
  stimulants
  sedatives

#3 – cocaine
#4 – hallucinogens

(Illlicit drug use 2013 National Survey on Drug Use and Health)
(* J Perinatol 2015, 35, 991–995)
Drug Use in Pregnancy

Polydrug Use:
50% mothers who used illicit drugs also used cigarettes and/or alcohol
(National Household Survey on Drug Abuse (NHSDA 2011))

Neonates with heavy in-utero exposure to alcohol were
2x as likely to be exposed to opiates
3.3x as likely to be exposed to amphetamines
(Alcohol 2010;44:623)

Drug Use/Abuse

Opioid Epidemic in the United States

OPIOID  –  natural and synthetic substances with morphine-like activities that activate mu-opioid receptors in the CNS and GI tract

OPIATE  –  subclass of opioids – alkaloid compounds extracted or derived from opium that include
  - Natural – morphine
  - Endogenous – enkephalins, endorphins, endomorphins
  - Synthetic – codeine, heroin (glacetyl/morphine); methadone; fentanyl (Sublimaze); hydromorphone (Dilaudid); buprenorphine

MOA – inhibit norepinephrine release at synaptic terminals

TERMS
MATERNAL DRUG USE

Why high rates of opiate use?

- overprescribing (focus on pain Rx)
- drug dealers recognizing untapped markets
- lack of detox beds
- lack of treatment programs
- medication-assisted therapy for opiate dependency (methadone)
- increased availability of low-cost heroin as oxycodone abuse has dropped

Drug Exposure – INCIDENCE

Drug-addicted babies in Mass. are triple national rate

WASHINGTON – New research shows that the number of babies born in Massachusetts with opiates in their system is more than triple the national rate – and far higher than the number tested by state officials.

Hospital diagnoses data reported to the federal government and obtained by The Globe shows that the toll of opiate addiction is affecting babies not only in Massachusetts, but in New England as awhole, at far greater rates than the rest of the nation.

Drug Exposure – INCIDENCE

In-utero narcotic drug exposure per 1000 hospital births*

- MA 17.5 (in 2013)
- Maine 26.5 (in 2011)
- Vermont 34.4 (in 2012)

Problems:
- state differences in reporting, if even required
- numbers unreported – probably only NAS patients reported

(* nationally 5 per 1000 births)
OPIOID Drug Exposure –NAS– COST

Maternal Opioid Use per 1000 births per year

<table>
<thead>
<tr>
<th>Year</th>
<th>Maternal Opioid Use (per 1000 births)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1.19 (95% CI, 1.01–1.35)</td>
</tr>
<tr>
<td>2009</td>
<td>5.63 (95% CI, 4.40–6.71)</td>
</tr>
</tbody>
</table>

NAS Diagnoses per 1000 births per year

<table>
<thead>
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<th>Year</th>
<th>NAS Diagnoses (per 1000 births)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1.20 (95% CI, 1.04–1.37)</td>
</tr>
<tr>
<td>2009</td>
<td>3.39 (95% CI, 3.12–3.67)</td>
</tr>
</tbody>
</table>

Mean Hospital Charges per patient (Hospital Charges across US*)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean Hospital Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>$39,400 ($130M)</td>
</tr>
<tr>
<td>2009</td>
<td>$53,400 ($720M)</td>
</tr>
</tbody>
</table>

All significant P < .001

60% of mothers covered by Medicaid

(JAMA April 30, 2012)
(7) Fetal Maternal Health 2014

Opioid Epidemic in USA

President Obama – wants to devote $billions to address
- education, PDMPs, medication disposal, pill mills

CDC – new prescribing guidelines – March 2016

Prescription Drug Monitoring Programs (PDMPs) in each State
- automated Rx reporting system

Hospitals – guidelines and best practices
- re: opioid prescription and monitoring

Publications on opioid and other substance use (MJ) and NAS
- increasing in number

SMFM, ACOG, AAP, Academy of Breastfeeding Medicine
- collaborating on practice guidelines for drugs in pregnancy and lactation

Focus in media, public policy and addiction medicine

Pain as 5th vital sign – started 1990s

Pain is over-treated for good patient satisfaction scores which (JAMA) uses to accredit hospitals – needed for Medicare and Medicaid payments

Pain treatment should not be equated with quality, health care as it can result in intractable and unsafe treatment

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More than 90% of non-profit pharmacies and medical experts want a letter Wednesday to the United States Attorney General asking for a non-profit company that supplies U.S. hospitals, asking to relax its standards for pain management. Only hospitals that have been accredited can get the drugs, even if the patients are covered by Medicare or Medicaid.

OMAHA WORLD HERALD

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MATERNAL DRUG USE
PREGNANCY COMPLICATIONS

Effects difficult to determine

- confounding variables
- poorly reliable extent of drug use and dose/purity
- physiological pregnancy changes
- clinical manifestations of coexisting pregnancy–related disease
  (e.g., cocaine, heroin & amphetamine OD can cause hypertension
  and seizures similar to preeclampsia (PIH))

NICOTINE

- placental abruption
- premature rupture of membranes
- placenta previa
- preterm labor and delivery
- low birth weight (LBW)
- increased neonatal mortality (OR 1.2 to 1.4)

MARIJUANA

Active ingredient: delta-9-tetrahydrocannabinol
- Easily crosses placenta
- Fat soluble – long half-life (6 days)
- Increasing rates of use
  - medical marijuana laws; decriminalization of possession
  - higher potency available than in past
  (3% in 1980s to 12% in 2012 (ABM Clinical Protocol #21, 2015))
MATERNAL DRUG USE PREGNANCY COMPLICATIONS

- MARIJUANA – corrected for co-founders
  - low birth weight (LBW)
  - preterm birth
  - small for gestational weight (SGA)*
  - admission to a NICU*

(UpToDate – Jan 2015)
(J. Perinatol Sept 2015)

- OPIATES – but confounding variables
  - abruptio
  - fetal death/miscarriage
  - intraamniotic infection
  - intrauterine growth restriction (IUGR)
  - fetal meconium passage
  - preeclampsia
  - premature labor & delivery
  - premature rupture of membranes
  - placental insufficiency
  - postpartum hemorrhage
  - septic thrombophlebitis

(UpToDate – Jan 2015)

Prescription Opioid Epidemic and Infant Outcomes
- 112,029 mothers & infants
- in TN Medicaid program
- between 2009-2011
Methadone – Pregnancy

- Standard of care for pregnant women with opioid addiction but not approved for use in pregnant women (FDA class C)
- Maintenance Treatment (oral, known dose & purity, safe, available)

Pros
- Optimizes OB care & general maternal physical & mental health
- Decreases illicit drug use and resumption of heroin use
- Improves fetal outcomes
  - Reduce fetal stress and mortality
  - Improves fetal growth

Cons
- Unlikely successful detoxification after delivery
- Greater incidence, severity & duration of NAS vs heroin/buprenorphine

Buprenorphine (Subutex) or with naloxone (Suboxone)

- Acceptable alternate opioid during pregnancy
- Potential benefit of reduced severity of NAS, shorter treatment & stays (Jones - NEJM 2010)
- Recent meta-analysis: did not favor one over the other (Cochrane 2013;12:CD006318)
MATERNAL DRUG USE
PREGNANCY COMPLICATIONS

- **COCAIN**
  - effects related to dose and stage of pregnancy
    - Meta-analysis - 31 studies (Am J Obstet Gynecol 2011; 204.e1)
      - preterm birth (OR 3.38)
      - LBW (OR 3.66)
      - SGA (OR 3.23)
      - shorter GA at delivery (-1.47 wks)
      - reduced BW (-492 gm)
    - Others have reported miscarriage, abortion, decreased length (-0.71 cm) & HC (-0.43 cm)
    - fetal demise, placental abruption

- **AMPHETAMINES (METHAMPHETAMINES)**
  - studies controlled for confounders
    - IUGR – 2-4x increase
    - gestational hypertension
    - preeclampsia
    - abruption
    - preterm birth
    - intrauterine fetal demise
    - neonatal death
    - infant death

- **Counsel re: risks maternal and infant (short & long term)**
  - Encourage to moderate and ideally discontinue
    - opioids – switch to methadone
    - benzodiazepines – detoxification
    - cocaine, MJ – detoxification
  - Identify and address comorbid conditions
    - psychiatric, physical/ssexual/emotional abuse
  - Assemble multidisciplinary team
    - OB, medical, pediatric, psychiatric, addiction medicine, social service
  - Address needs of poorly nourished, homeless, incarcerated
  - Test for STDs (syphilis, GC, chlamydia, Hep B & C, HIV) and TB
    - repeat in Tri 3 if remain at risk
  - Continue assessments at prenatal visits – status, complications education
  - Obtain early US – determine GA for later IUGR and prematurity assessment
  - Assess for IUGR in 2nd half of pregnancy
  - Perform antepartum surveillance for OB indications
  - Consult anesthesia for pain Rx during delivery
  - Inform pediatric service re: possible withdrawal
  - Discuss risks and benefits of breastfeeding
MATERNAL DRUG USE

Identification of Prenatal Exposure

- history or self-report – validated screening tools
  inexpensive but problems with veracity and recall accuracy

- biological specimen screening
  immunoassay positive confirmed with
  gas chromatography / mass spectrometry
  (Universal laboratory screening is not recommended
  because of the limitations of the tests)

MATERNAL DRUG USE– SCREENING

- Screen – initial visit and each trimester
  (history or self-report)

- Substance users come from all S/E strata,
  ages and races
  - in one study, a prenatal care system that did
    not routinely screen for substance abuse
    identified less than 1/3 of women who
    subsequently had a child removed from the
    home because of parental substance abuse.
  (Adv Neonatal Care 2011; 11:255)

MATERNAL DRUG USE

Risk Factors: Indication to Screen?

- young (especially adolescents), unmarried, lower education
- late PNC, multiple missed prenatal visits
- impaired school or work performance
- sudden behavior change
- high-risk sexual behavior, hx of STDs (sex for drugs)
- relational problems, unstable home environment
- OB hx – miscarriage, IUGR, prematurity, abruption, stillbirth, fast delivery
  (unplanned pregnancy in 86% pregnant opioid-using women
  J Subst Abuse Treat 2011; 40:199)
- Med hx – CVA, MI, hypertensive episodes, physical signs of use or withdrawal
- poor dentition
- poor weight gain
- mental health disorder – severe mood swings
- PH or FH substance abuse or substance abusing partner
- law encounters – violence, trauma, theft, prostitution

(Ultile To Date Jan 2015)
(Hadak – Pediatrics Feb 2012)
MATERNAL DRUG USE – Screening

Legal Requirements & Need for Consent
- vary among states
- should have hospital policy that complies with local laws & is nondiscriminatory

NE
- no consent needed to screen infant
- no law but policy that infants with positive screens or NAS be reported to CPS

IA
- law that allows infant testing without consent and positive screens are to be reported to the Department of Human Services
- need informed consent as legal and economic implications
  - without consent if medically indicated (unconscious or intoxication)
  - test to provide appropriate Rx

Neonatal Toxicology Screening

Urine
- most common but high false negatives (positive if recent exposure)

Meconium
- exposures during 2nd and 3rd trimesters
  - may not reflect drug abstinence close to delivery
  - detection more likely than maternal or infant urine screens
  - sent to reference labs - delayed results
  - need to collect before contaminated with milk/formula stools

Umbilical Cord Blood & Tissue
- using drug class-specific immunoassays
  - concordance with meconium screens
  - research - not available for clinical use

Hair
- difficulty quantifying small amount of drug, slow growth of hair and culturally unacceptable
  - research labs

Nails/Vernix
- experimental

Neonatal Drug Screening – Urine

<table>
<thead>
<tr>
<th>Substance</th>
<th>Concentration/Unit(s)</th>
<th>Duration of Detectability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>30 to 150 mg/dl</td>
<td>4 to 6 hours</td>
</tr>
<tr>
<td>Amphetamines</td>
<td>1 to 2 ng/ml</td>
<td>1 to 2 hours</td>
</tr>
<tr>
<td>Barbiturates</td>
<td>&gt; 0.4 ug/ml</td>
<td>24 hours</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>1 to 2 ng/ml</td>
<td>1 to 2 hours</td>
</tr>
<tr>
<td>Cocaine</td>
<td>10 to 200 ng/ml</td>
<td>24 hours</td>
</tr>
<tr>
<td>Methadone</td>
<td>1 to 2 mg/dl</td>
<td>1 to 2 hours</td>
</tr>
<tr>
<td>Methamphetamine</td>
<td>1 to 2 mg/dl</td>
<td>1 to 2 hours</td>
</tr>
</tbody>
</table>

Hair
- difficulty quantifying small amount of drug, slow growth of hair and culturally unacceptable
- research labs

Nails/Vernix
- experimental

References
- Kocherlakota - Pediatrics August 2014
Maternal and Baby Drug Screening

Mother-Baby Dyads (Phoenix, Az 2006-2010) (maternal urine/newborn urine & meconium)

+ for THC
  both – 22.4%
  one only – 77.6%
  mother only – 35.2%
  baby only – 42.4%

26.1% of dyads + for THC were + for another illicit drug
  opioids – 11.6%
  amphetamines – 10.8%
  cocaine – 6.5%
  mother – opioids – 16.3%
  baby – amphetamines – 8.8%

THC can be a marker for other illicit drug use
SCREEN BOTH mother and baby

MATERNAL DRUG USE

EXPOSURE:

› Prenatal – in-utero

› Postnatal
  - breastfeeding
  - passive inhalation
  - accidental ingestion
  - poisoning
  - environmental exposure (occult)

MATERNAL DRUG USE

Drug Effects: Mechanism of Action:

› early( embryonic) – teratogenic/structural
  eg. alteration in brain development

› later (fetal) – abnormal growth/maturation
  eg. alteration in brain neurotransmitters
  altered nutritional substrate to fetus

› secondary to withdrawal

› acute effects of the drug itself
Neonatal Abstinence Syndrome (NAS)

- The constellation of clinical findings involving multiple systems associated with opioid withdrawal has been termed neonatal abstinence syndrome (in-utero opioid exposure – 55–94% withdraw)
- Neurobehavioral dysregulation also seen in infants exposed antenatally to sedative hypnotics benzodiazepines barbiturates alcohol

Neonatal Abstinence Syndrome

WITHDRAWAL vs TOXICITY or EFFECT

Withdrawal – signs and symptoms worsen as drug levels decrease

Toxicity/Effect – signs and symptoms abate as drug levels decrease

PRENATAL DRUG EXPOSURE

TABLE 2: Summary of Effects of Prenatal Drug Exposure

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>Marijuana</th>
<th>Methadone</th>
<th>Opioid</th>
<th>Caffeine</th>
<th>Cocaine</th>
<th>Methamphetamine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth</td>
<td>Effect</td>
<td>Effect</td>
<td>No effect</td>
<td>Effec</td>
<td>Effect</td>
<td>Effect</td>
</tr>
<tr>
<td>Neurobehavior</td>
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<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
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<tr>
<td>Language</td>
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<td>Adjustment</td>
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<td>Effect</td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
</tr>
</tbody>
</table>

* Effect or no effect noted. (** arousal, excitability – J Pediatrics, 2006)

(Hudak - Pediatrics, February 2012)

(Behnke - Pediatrics, March 2013)
**PRENATAL DRUG EXPOSURE**

**Nicotine**

- SIDS – 2-4X increased risk
  - (plus increases in other risks for SIDS – preterm, LBW)
- diabetes mellitus (type 2) – 4x increased risk
- asthma – increased incidence
- sperm volume and count – decreased
- PTH and 25OHD – decreased with increased phosphorus
- sleep problems

(UptoDate – July 2014)

**PRENATAL DRUG EXPOSURE**

**Alcohol**

- Growth restriction
- Fetal alcohol spectrum disorder (FASD)
  - 1 report in FASD infants
  - Poor habituation, low arousal, abnormal motor
- Poor growth – FADS
  - Attention & adaptive behavior problems, social behavior
  - Lower IQ, poorer memory & executive functioning
- Abn development & use of language – causing social interaction problems
- Deficits in math & reading

(Behnke – Pediatrics, March 2013)
### PRENATAL DRUG EXPOSURE

**Marijuana**

<table>
<thead>
<tr>
<th>Short-term effects/birth outcome</th>
<th>Fetal growth</th>
<th>Anomalies</th>
<th>Withdrawal</th>
<th>Neurobehavior</th>
<th>Long-term effects</th>
<th>Growth</th>
<th>Behavior</th>
<th>Cognition</th>
<th>Language</th>
<th>Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
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<td>No effect</td>
<td>Effect</td>
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<td>Effect</td>
</tr>
</tbody>
</table>

- Abnormal behaviors—some similar narcotic exposure
- Startles & tremors
- Inattention, impulsivity at 1 yr
- Deficits in problem-solving skills that require sustained attention & visual memory analysis and integration
- Subtle deficits in learning & memory
- Academic underachievement especially in reading & spelling

*Born, SGA, Preterm, NICU admission*

*(Behnke – Pediatrics, March 2013)* *(UpToDate – Jan 2015)*

### PRENATAL DRUG EXPOSURE

**Opium**

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<tbody>
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<td>No effect</td>
<td>Strong effect</td>
<td>Effect</td>
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<td>No effect</td>
<td>No effect</td>
<td>No data</td>
<td>No data</td>
<td></td>
</tr>
</tbody>
</table>

- Lower birth weight
- NAS
- NAS

- Hyperactivity, short attention span—toddlers
- Memory & perceptual problems—children
- Lower developmental scores—gone with medical & environmental controls

*(limited or no data)*

*(Behnke – Pediatrics, March 2013)*

### PRENATAL DRUG EXPOSURE

**Cocaine**

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effect</td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
<td>Effect</td>
<td>No effect</td>
<td>No consensus on effect</td>
<td>Effect</td>
<td>No consensus on effect</td>
<td></td>
</tr>
</tbody>
</table>

- Lower birth weight
- NAS
- NAS

- Negligible or no data
- No data
- No data
- No data

- Irritability, labile states, decreased behavioral & autonomic regulation, poor alertness & orientation
- Lower developmental scores—gone with medical & environmental controls
- Negative effect on trajectories of behavior (ADHD, oppositional defiant disorder)
- Subtle language delays—working memory
- Variable with +/- studies
- Individualized ed plan adjusted for IQ
- Learning disabilities

*(Behnke – Pediatrics, March 2013)* *(Up to Date – July 2014)*
**PRENATAL DRUG EXPOSURE**

Subsequent Drug Abuse in Exposed Offspring

- **cause and effect vs socioeconomic, environmental, genetic factors**
- **Nicotine**
  - early experimentation & abuse of nicotine
  - higher rates of hospitalization for substance abuse in adult offspring
- **Alcohol**
  - increased risk ethanol abuse
- **Marijuana**
  - increased risk for MJ and cigarette use
- **Opiate, Cocaine, Methamphetamine**
  - insufficient data — on risk for tobacco, alcohol or illicit drug use

**Psychotropic Meds**

- in pregnancy
  - 1.8% use antidepressants
  - 3.0% uses benzodiazepines
- **NAS "symptoms" associated with**
  - selective serotonin reuptake inhibitors (SSRIs)
  - selective norepinephrine reuptake inhibitors (SNRIs)
  - tricyclic antidepressants (TCAs)
  - benzodiazepines
- Mental health disorders increase risk of substance abuse
SSRI Use During Pregnancy

- Mothers
  - older, social assistance, drug dependant, multipara, multiple gestation

- Babies
  - LBW, preterm, fetal death, seizures
  - Paroxetine (Paxil) & Fluoxetine (Prozac)
  - small increase in R-outflow tract defects
  - late SSRI use - LBW (OR 3.64), preterm (OR 1.8)
    admit to NICU (OR 3.30) withdrawal, jitteriness, poor neonatal adaptation (OR 4.08) including respiratory distress, hypoglycemia, low Apgars, lethargy, poor tone, weak or absent cry, feeding difficulties

Prenatal SSRI Use and Autism Spectrum Disorder (ASD)

SSRI use in pregnancy may be associated with an increased risk of ASD,
  at least in boys – with greatest risk being in the first trimester
  (vs last 6 mo pregnancy – not 1st 3 mo - JAMA Peds Feb 2016)

Maternal Depression in pregnancy linked to
  preterm birth
  fetal growth restriction
  preeclampsia
  increased irritability in newborn
  reduced activity and attentiveness

Gestational Depression
  can affect developmental delay (DD)
  independent of postpartum depression

NEONATAL ABSTINENCE SYNDROME

- results from the sudden discontinuation of fetal exposure to substances used or abused by mother during pregnancy

- withdrawal from
  licit (legal or prescribed)
  illicit (illegal or abuse of prescription drugs)
NAS requiring pharmacologic treatment
42–94%
Methadone dose and NAS severity
- some studies - positive relationship
- 1 study (J Peds 2010) - no correlation with rate of NAS

Studies - contradictory
- different maternal management (doses and if partial detox)
- maternal metabolism inter-individual variability
  thus cumulative fetal exposure varies among infants on equivalent maternal doses

NAS - Clinical Features

NAS - Risk Factors

Different SNPs (single-nucleotide polymorphisms) are associated with improved outcomes and worse NAS outcomes, in terms of number of treatment meds needed and length of hospital stay.
NAS – in Preterm Infants
Decreased Incidence and Severity in < 35 weeks

Why?
- decreased cumulative exposure
- decreased placental transmission in early gestation
- decreased excretion due to renal/liver immaturity
- decreased fatty tissue so less fat deposition of drug
- decreased receptor development/sensitivity – immature CNS
- limited ability to express signs of motor function dysfunction
  difficulty in identifying signs – assessment tools for term infants

NAS – DIAGNOSIS

- History (or suspected) of maternal substance abuse
- Positive Screening - maternal and/or infant
- Infant findings compatible with NAS

NAS – DDX and Comorbidities

Differential Diagnosis
- seizures – hypocalcemia, hypoglycemia, HIE, intracranial bleed
- fever & irritability - sepsis/infection
- hypothyroidism
- poor feeding – polycythemia, colic

Comorbidities
- maternal STDs - syphilis, gonorrhea, hepatitis C & HIV
- maternal polydrug

(Prenatal cocaine – infants had increased infections
  - hepatitis (OR 13.46); syphilis (OR 8.84); HIV (OR 12.37)
  (UpToDate – July 2014))
Maternal Drug Use
NEONATAL COMPLICATIONS

- In 2009 - NAS babies compared to all other births
  - LBW – 19.1%
  - respiratory complications – 30.9%
  - feeding difficulties – 18.1%
  - seizures – 2.3%
  - medicaid – 78.1%
  - reside in zip codes in lowest income quartile – 36.3%
- In 2009 – 77.6% charges for NAS – Medicaid

(JAMA April 30, 2012)

NAS – Scoring Systems

- Finnegan (Addict Dis 1975;2(1-2):141-58)
  Modified Neonatal Abstinence Scoring System
  - 21 items scored from 0–5 in 3 systems
    - CNS
    - Metabolic/Vasomotor/Respiratory
    - GI

  Neonatal Drug Withdrawal Scoring System
  - 11 items scored from 0–3
NAS – Scoring System
Finnegan – CNS

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Score</th>
<th>Intent</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral and Motor activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apprehensive, retracted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeds in clusters</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Feeds in excess</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eats too fast</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Eats too slow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breathing pattern</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apneic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypopneic</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cyanotic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nystagmus</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Prolonged Expiratory</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Abdominal Rebound</td>
<td></td>
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</tbody>
</table>

NAS – Scoring System
Finnegan – Metabolic, Vasomotor, Respiratory

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Score</th>
<th>Intent</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congenital Hypothyroidism</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Hypothyroidism</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Respiratory</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Respiratory Insufficiency</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Respiratory Distress</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

NAS – Scoring System
Finnegan – GI

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Score</th>
<th>Intent</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>GI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anorexia</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Vomiting</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Diarrhea</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Bleeding</td>
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</tbody>
</table>
**NAS – Scoring System**

**Indications of Withdrawal**

- Finnegan – 3 consecutive scores of ≥ 8 or 2 consecutive scores ≥ 12
- Decision to initiate pharmacologic Rx has been based on single or serial withdrawal scores
- Optimal threshold score for institution of pharmacologic Rx is unknown
- No studies have compared the use of different withdrawal score thresholds for initiating pharmacologic Rx on short-term outcomes

(Hadak - NAS - Pediatrics 2012)

**USE**

- initiate pharmacological Rx
- monitor therapy
- titrate therapy
- terminate therapy

**HOW**

- after feeds
- at 3–4 hour intervals
- when awake

Score should represent status of infant both at the time of assessment and during the preceding time period

(Kocherlakota - Pediatrics 2014)

**PROBLEMS**

- no system is perfect – not totally objective
- interobserver variability high
- scorers need to be trained
- long time to complete scoring (long evaluation)
- useful in term not preterm infants
- developed for opioid withdrawal and being used for nonopioid withdrawal vs toxicity
- reliability, sensitivity, specificity (not studied)
NAS – Management

Goal
- control symptoms so infant is able to integrate into a social environment & manage stimuli
- realize a consistent weight gain – adequate sleep & nutrition

Nonjudgmental Mutidisciplinary Team
- physicians – obs, peds, FPs, psychiatrists
- nurses
- social workers
- OT and PT
- drug abuse treatment providers – addiction specialists (after consent)
- mental health therapists
- child protective services

NAS – Nonpharmacologic Rx

- early awareness of irritability
  - calm and soothe before cycle of irritability, excessive crying, poor feeding and lack of sleep occurs
- room in mother and infant
  - caring nonjudgmental approach
  - encourage maternal participation

(40% of NAS can be treated symptomatically without medication)
(Wang – Medscape 2014)

NAS – Nonpharmacologic Rx

- gentle handling
- swaddling (avoid autostimulation)
- continuous minimal stimulation – dim light/low noise
- avoid waking a sleeping infant
- feeds – demand, frequent, small volumes, hypercaloric (150–250 cal/kg/d)
- kangaroo care
- pacifiers
- water beds
- music therapy
- massage therapy
- holding, cuddling, manual rocking (positioning & comfort)
- tactile “white noise” – vibrating box clipped to bassinet at MGH
- non-insertive acupuncture
- skin care

(Kocherlakota – Pediatrics 2014)
(Hadak – NAS – Pediatrics 2012)
(Wang – Medscape 2014)
Goal:
- stabilize clinical sign of withdrawal
- restore normal newborn activities
- achieve therapeutic effect by using
  - fewest drugs
  - lowest doses
  - shortest times

Naloxone – AVOID !!

NAS – Pharmacologic Rx

- required in 27 to 91% of NAS
- no uniformly accepted management protocols
  Why?
  - complex nature of withdrawal
  - unknown effects of various drugs and polydrug use
  - effects of genetic predisposition

When?
- nonpharmacological Rx fails
- withdrawal scores remain high
- serious signs – eg. seizures
- severe dehydration due to diarrhea/vomiting

(Kocherlakota – Pediatrics 2014)

**TABLE 4: Pharmacologic Treatments Options for NAS**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mechanism of Action</th>
<th>Dose</th>
<th>Therapeutic</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naloxone</td>
<td>µ-op receptor antagonist</td>
<td>0.01–0.05 mg/kg IV, then increase to 0.1 mg/kg IV</td>
<td>6-hour half-life</td>
<td>None</td>
</tr>
<tr>
<td>Methadone</td>
<td>µ-op receptor agonist, partial receptor antagonist</td>
<td>0.5–1 mg/kg PO, then increase to 0.1 mg/kg PO</td>
<td>12-hour half-life</td>
<td>Constipation, vomiting, respiratory depression</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>γ-aminobutyric acid receptor antagonist</td>
<td>Loading dose: 15 mg/kg, then maintenance dose: 1 mg/kg/hour</td>
<td>10-hour half-life</td>
<td>Sedation, hypotension, respiratory depression</td>
</tr>
<tr>
<td>Disulfiram</td>
<td>µ-op receptor antagonist</td>
<td>Initial dose: 30–60 mg/kg PO, then increase to 0.1–0.2 mg/kg PO</td>
<td>2-hour half-life</td>
<td>None</td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>γ-aminobutyric acid receptor antagonist</td>
<td>Daily dose: 5 mg/kg PO, then increase to 10 mg/kg PO</td>
<td>24-hour half-life</td>
<td>None</td>
</tr>
</tbody>
</table>

(Kocherlakota – Pediatrics, August 2014)
Not Recommended:
Paregoric – (camphorated tincture of opium – anhydrous morphine (0.4 mg/ml) – multiple opiates, antispasmodics (noscapine, papaverine), ethanol (45%) & benzoic acid & anise oil
Tincture of Opium – (25 x higher concentration of morphine – 10 mg/ml) – need to dilute 1:25 to 0.4 mg/ml – risk of drug error & overdose
Oral morphine solution (2mg/ml) (UpToDate – NAS – June 2014)

NAS – Pharmacologic Rx

- OPIOID NAS
  (heroin, methadone, morphine, fentanyl)
  Morphine
  - decreases seizures, diarrhea, agitation, improves feeding
  - short half–life – give q3–4h
  - can increase dose rapidly but wean slowly
  - add phenobarb/clonidine if max dose reached

  (Kocherlakota – Pediatrics 2014)

NAS – Pharmacologic Rx

Morphine Alternatives

- Methadone
  longer half life – can give q12h
  difficult to titrate

- Buprenorphine
  sublingual
  no large-scale studies to support its use

  (Kocherlakota – Pediatrics, August 2014)
NAS – Pharmacologic Rx

- NONOPIOID & POLYDRUG NAS
  - Phenobarbital
    does not prevent seizures or improve GI symptoms
    potential long-term effects on neurodevelopment (animal data)
  - Clonidine
    no large-scale studies have proven efficacy in NAS
    risk of hypotension & bradycardia
  - Both – levels can be monitored
    - decrease Rx duration and avoid higher morphine doses (Kocherlakota - Pediatrics, August 2014)
  - Chlorpromazine
    - in SSRI NAS
      - in NAS shorter Rx and hospital stay than Morphine (Mazurier – Acta Paediatr. 2008;97(10):1358-1361)

NAS – Management

PROBLEMS
- Only half (55%) of NICUs have written guidelines for management of NAS
- Only 69% used a published abstinence scoring system
- Marked inter-center variations in management of withdrawal (Sarkar – J. Perinatology 2006)

NAS – Treatment Protocols

In Ohio

Use of standard treatment protocols with specific starting doses, explicit instruction about dose escalation and stringent weaning guidelines resulted in shorter duration of opioid treatment & shorter hospital stays

No difference between those treated with morphine and those treated with methadone

Phenobarb Rx was longer if used a morphine-based rather than a methadone-based weaning protocol (Hall, Pediatrics 134:2, August 2014)
Medications are to be initiated, increased, decreased, or discontinued depending on the Finnegan score. Morphine can be initiated at a higher dose if scores are high; for example, if the scores are 17 to 20, morphine can be started at 0.12 mg per dose, and if the scores are >25, morphine can be initiated at 0.20 mg per dose. Methadone can also be escalated by >10% for higher scores.

Involvement in a multicenter (199), multistate (TN, MI, VT, NH, MA) quality improvement collaborative focused on infants requiring pharmacologic treatment for NAS was associated with:

- increases in standardizing hospital patient care policies
- decreases in health care utilization
  - reduced length of pharmacotherapy treatment
  - reduced length of stay
  - reduced the number of infants discharged from the hospital on medication tapers

Breastfeeding and the Drug-dependent Woman

In chronic users, methadone levels are similar to maternal blood levels.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Required Ref or Notes for Usages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brexanolone</td>
<td></td>
</tr>
<tr>
<td>Methadone</td>
<td></td>
</tr>
<tr>
<td>Opium</td>
<td></td>
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<tr>
<td>Oxycodone</td>
<td></td>
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<tr>
<td>Phenobarbital</td>
<td></td>
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<tr>
<td>Phenytoin</td>
<td></td>
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<tr>
<td>Tegretol</td>
<td></td>
</tr>
<tr>
<td>Valium</td>
<td></td>
</tr>
</tbody>
</table>

(Sachs, AAP Committee on Drugs – Pediatrics, Sept. 2013)
Breastfeeding and the Drug–dependent Woman

Contraindications:

- maternal HIV infection
- continued use of illicit drugs or alcohol
  - PCP (phencyclidine), cocaine, cannabis, amphetamines
  - effect on maternal judgment or mood may affect ability to care for infant

(Sidellman, Policy Statement, AAP Section on Breastfeeding - Pediatrics, March 2012)
(Sachs, Clinical Report, AAP Committee on Drugs - Pediatrics, September 2013)

Considerations:

- what is known about the differences among drugs in a therapeutic class
  - ratio of human milk/maternal plasma [drug]
  - estimated total daily infant dose (as fraction of daily maternal dose weight adjusted)
  - ratio of infant /maternal plasma [drug]

But – what is an acceptable dose?

(Sachs, Clinical Report, AAP Committee on Drugs - Pediatrics, September 2013)
(Sidellman, Policy Statement, AAP Section on Breastfeeding - Pediatrics, March 2012)
Breastfeeding and the Drug-dependent Woman – Methadone

- Appears to be safe
- May reduce severity of NAS
  - 7 minute quantities enough (Abdel-Latif, Pediatrics – June 2006)
  - Other factors associated with breastfeeding
    - Soothing agitated infants (Gray, Pediatrics, 2002; 109:590-593)
    - But probable BM itself as same if breastfed or bottle fed BM
      (Abdel-Latif 2006)

  But – could it just be sucking???
  - And what if mother does not supply BM consistently?
- May reduce need for pharmacologic Rx
- BM concentrations not related to maternal dose
- BM concentrations unlikely to prevent NAS

(UpToDate – NAS – June 2014)

Breastfeeding and the Drug-dependent Woman – Methadone

OK as –
- Low levels in milk < 3% maternal weight-adjusted dose
- Low levels in infant < 3% maternal trough concentrations

As long as mother is –
- Abstinent
- HIV negative
- Appropriate drug treatment program
  - Enrolled & closely monitored
- Significant social support

But –
Long-term effects of methadone in humans are unknown
Potential lethargy, respiratory difficulty and poor weight gain

(UpToDate – NAS – June 2014)

Breastfeeding and the Drug-dependent Woman – Methadone

Transferred amounts of methadone are insufficient to prevent NAS

But
Gradually wean, not abruptly stop breastfeeding
As NAS can occur

(?? So do low levels have a significant effect)

(UpToDate – NAS – June 2014)
Psychoactive Drugs and Breastfeeding

- AAP – 2001 – “unknown but may be of concern” still limited information on long-term effects

? safe
- estimated relative infant doses less than 2% weight-adjusted maternal dose
- milk-maternal plasma ratios < 1
- Infant / Maternal [plasma] < 0.10

? unsafe
- Infant [plasma] > 10% of therapeutic maternal [plasma]

(Sachs, Clinical Report, AAP Committee on Drugs – Pediatrics, September 2013)

Psychoactive Drugs and Breastfeeding

Paroxetine (Paxil) – only SSRI with infant/mat plasma < 0.10

SSRI Levels in Breast Milk
Fluoxetine (Prozac) & Citalopram (Celexa) > Fluvoxamine (Luvox) & Paroxetine (Paxil) > Sertaline (Zoloft)

(Sachs et al., Pediatrics, September 2013)

Psychoactive Drugs and Breastfeeding

Why be concerned?
- May have measurable amounts in plasma and neural tissue (developing brain)
  - long half-life of some drugs/metabolites
  - infant’s immature hepatic/renal function

(Sachs – Pediatrics, September 2013)

- What is a safe amount in breastmilk?
- Is the preterm infant at greater risk?
Psychoactive Drugs and Breastfeeding

So, if breastfeeding is desired

- Counsel mother regarding benefits of breastfeeding
- potential risk of exposure to clinically significant levels
- unknown long-term effects of this exposure

ACOG

"Because all SSRIs have low molecular weight, they all cross into the breast milk to some degree. The relative infant dose is unknown, but is unlikely to cause adverse effects. The potential effect of decreased bonding if maternal depression worsens, as well as the benefits of breastfeeding, outweigh the risks of SSRI use for the infant during breastfeeding" (Temming, ACOG Clinical Opinion - Jan 2016)

Sertraline (Zoloft) & Fluoxetine (Prozac) - may be best, as highest levels in BM occur 8–9 hours after ingestion so can discard milk at that time

Serotonin Syndrome in Breast-fed Neonate

Late Preterm – tachypnea, jitteriness, irritability
low grade fever, metabolic acidosis

Mother – fluoxetine (Prozac) – 60 mg/day
- exclusively breast feeding

Baby’s serum fluoxetine level on day 8 was in adult therapeutic range
- symptoms resolved on formula

SSRI Toxicity in infants – rare but ? under diagnosed or misdiagnosed as SSRI withdrawal
Encourage women under the following circumstances to breastfeed their infants (III):

- Engaged in substance abuse treatment; provision of maternal consent to discuss progress in treatment and plans for postpartum treatment with substance abuse treatment counselor; counselor recommendation for breastfeeding
- Plans to continue in substance abuse treatment in the postpartum period
- Abstinence from drug use for 90 days prior to delivery; ability to maintain sobriety demonstrated in an outpatient setting
- Toxicology testing of maternal urine negative at delivery
- Engaged in prenatal care and compliant.

Counsel women under any of the following circumstances not to breastfeed (III):

- Not engaged in substance abuse treatment, or engaged in treatment and failure to provide consent for contact with counselor
- Not engaged in prenatal care
- Positive maternal urine toxicology screen for substances other than marijuana at delivery [see b) above]
- No plans for postpartum substance abuse treatment or pediatric care
- Women relapsing to illicit drug use or legal substance misuse in the 30-day period prior to delivery
- Any behavioral or other indicators that the woman is actively abusing substances
- Chronic alcohol use.

Evaluate carefully women under the following circumstances, and determine appropriate advice for breastfeeding by discussion and coordination among the mother, maternal care providers, and substance abuse treatment providers (III):

- Relapse to illicit substance use or legal substance misuse in the 90-30-day period prior to delivery
- Concomitant use of other prescription medications deemed to be incompatible with lactation
- Engaged later (after the second trimester) in prenatal care and/or substance abuse treatment
- Attained drug and/or alcohol sobriety only in an inpatient setting
- Lack of appropriate maternal family and community support systems
- Report that they desire to breastfeed their infant in order to either retain custody or maintain their sobriety in the postpartum period.
NAS – Hospital Observation/Monitoring

If no symptoms of withdrawal & Finnegan score ≤ 8 or less

short half-life (4h) (Low-dose prescription opioid eg. hydrocodone)
  – 3 days

long half-life (methadone)
  – 5 to 7 days

AND social/environmental safety addressed.

(Hadak - Pediatrics 2012)

NAS – Discharge Criteria

- Infant –
  - withdrawal or toxic symptoms resolved
  - feeding well, sleeping well & gaining weight
  - medications weaned or weaning plan can be carefully controlled as out-patient
  - early general pediatric follow-up/monitoring
  - long-term growth & development follow-up
  - specialist care as needed – neurodevelopmental, psycho-behavioral, ophthalmologic

- Maternal
  - ongoing substance abuse treatment, psychiatric care, comorbidity treatment

- Family
  - agencies involved as needed
  - home environment – safe and stable
  - family support assessments

(Kocherlakota Pediatrics, August 2014)

MATERNAL DRUG USE

Developmental Problem Pathways:

- effect of drug exposure on developing CNS
- effects of prematurity and IUGR
- postnatal exposure
- maternal characteristics
- infant characteristics
- environmental influences
NAS – LONG-TERM OUTCOMES

- “studies have not addressed whether long-term morbidity related to NAS is decreased by pharmacologic Rx or whether continued postnatal drug exposure augments the risk of neurobehavioral and other morbidities”

- “pharmacologic therapy of the infant may introduce or reinforce a maternal disposition to rely on drugs for the treatment of infant discomfort or annoying behavior.”

(Hadak – Pediatrics, 2012)

NAS – LONG-TERM OUTCOMES

- Unknown
  for both NAS itself and its treatment
  - few studies have looked at these children beyond first few years of life.
  - confounding prenatal and postnatal medical and socioeconomic variables including environment & dysfunctional caregivers affecting outcome

DRUG ADDICTION

Recent advances in neuroscience have radically altered our understanding of addiction as a neurologic disorder as opposed to a predominantly deviant behavior

Approach as a chronic disease rather than a problem of moral failure, because of long lasting changes in the brain

Nora Volkow, MD
Director of National Institute on Drug Abuse NIH
ADDICTION
is a chronic, relapsing biological and behavioral disorder with genetic components and marijuana use is addictive in some individuals

(Marijuana Use During Pregnancy and Lactation
ACOG Committee Opinion July 2015)

DRUG ADDICTION
› need exposure plus genetics and environment
› repeated use can lead to
  - neuroplastic brain changes
  - impaired function in brain areas needed for executive function
  - weaken brain’s dopamine system which can effect prefrontal cortex (decision-making)
› Adolescents
  - connections between key brain areas may not be fully formed until early 20s
  - may transition to addiction faster than adults
  - greater risk for impulsive drug use

PREVENT DRUG ADDICTION
Risk Factors – reduce early
› early aggressive behavior
› poor social skills
› lack of parental supervision
› drug availability
Protective Factors - increase

- positive relationships
- parental monitoring and support
- academic competence
- anti-drug use policies
- personal self-control
- neighborhood attachment

Legalization of Drugs of Abuse

A mixed message for teenagers

Cannabis Use
Risks of Heavy Use regardless of Legal Status

Lancet Psychiatry Journal
R. Mattick, MD – Australia’s National Drug and Alcohol Research Center at University of New South Wales

- 3765 cannabis users in 3 large, long running studies
- 7 developmental outcomes up to age 30 yr
  - completing high school
  - obtaining university degree
  - cannabis dependence
  - use of other illicit drugs
  - suicide attempts
  - depression
  - welfare dependence

Consistent associations between frequency of use and outcomes, even after controlling for confounding factors – age, sex, ethnicity, S/E status, use of other drugs, mental illness
Cannabis Use

- If smoke daily before age 17
  > 60% less likely to complete high school or obtain university degree

- Daily users during adolescence
  7x more likely to attempt suicide
  18x greater chance of cannabis dependence
  8x as likely to use other illicit drugs later in life

Risks increased relative to dose, with daily users showing the strongest effects

Adolescence – a period where the mind and brain are still developing!

AAP: Policy Statement on Marijuana

- opposition to use in any capacity, medical or otherwise, for children 0–21 years
- opposition to “medical marijuana” outside FDA jurisdiction
- yet recognition that marijuana “may currently be an option for cannabinoic administration for children with life-limiting or severely debilitating conditions and for whom current therapies are inadequate”
- opposition to legalization of marijuana
- support research and development of pharmaceutical cannabinoids
  - recommendation to change marijuana from DEA schedule I to a schedule II drug to facilitate this research
- support decriminalization of marijuana use – focus on treatment
- opposition to use of smoked marijuana (lung damage and secondhand smoke)
- opposition to adult use in presence of minors (importance of role-modeling on adolescent behavior

Breastfeeding and Cannabis

ACOG (Committee Opinion, Number 617, July 2015)
- in absence of adequate evidence re: effects on infants through breastfeeding, marijuana use is discouraged

Academy of Breastfeeding Medicine (Clinical Protocol #21, 2015)
- breastfeeding mothers should be counseled to reduce or eliminate their use of marijuana

AAP
- maternal substance use is not a categorical contraindication to breastfeeding (2015)
Breastfeeding and Cannabis

- Dissenting Opinion
  Lactation and the Marijuana-Using Mother –
  “unclear why a recommendation would err on the side of breastfeeding with potentially toxic exposures and other risk factors that could portend short-and long-term infant harm”
  “perhaps this view reflects a lack of understanding of substance use disorders in general”

[Authors and publication details]

Legalization of Drugs of Abuse

No scientific truth was ever determined by a vote

MATERNAL DRUG USE

PREGNANCY DOES NOT CURE DRUG ADDICTION

BREASTFEEDING DOES NOT CURE DRUG ADDICTION

?? window of opportunity for intervention
**Future for opioid issue?**

- reduce opioid exposure in women of childbearing age
- improve maternal treatment programs
- better identification and treatment of high-risk through personalized genomic medicine
- evidence-based strategies for Dx, Rx and weaning in NAS
- research re: long-term effects of IU opioid exposure and neonatal Rx modalities
- use of modeling and simulation to optimize Rx
- institutional-wide and multidisciplinary approaches to standardize and continuously assess/improve NAS care protocols

**FOOD FOR THOUGHT**

- The addicted parent(s) needs treatment.
- The drug-affected infant needs protection.
- Often the best way to help the child is to help the mother --- “break the cycle”.
- Does society and the legal system emphasize family preservation at the expense of the infant’s welfare?
- Do federally funded methadone treatment programs perpetuate methadone use?
- Do treatment programs work that do not include job training for individuals to re-integrate into society?
- Do treatment programs work for individuals that do not have a family support system?
- Are we becoming too “politically correct” or “liberal” in our terminology and approach to this issue?

**MATERNAL DRUG USE**

- is part of a much larger, multifacted social problem.
- requires a multifacted and multidisciplinary approach to evaluation and treatment
- requires a societal (and political) commitment to face and deal with the problem
Maternal Drug Use – References

4. Infants of Mothers with Substance Abuse / Neonatal Abstinence Syndrome LM Janson, JA Garcia-Prats – UpToDate July 2014; Sept 2014
5. Overview of Illicit Drug Use in Pregnant Women G Chang, CL Lockwood – UpToDate Jan 2015
8. The Transfer of Drugs and Therapeutics Into Human Breast Milk: An Update on Selected Topics AAP Clinical Report – Committee on Drugs – HC Sachs – Pediatrics132:3, September 2013


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Thank You!

(Oregon Coast at Sunset)