The Impact of Substance Use on Newborns
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Objectives
- 1. Discuss the incidence of drug use in pregnancy and the percentage of infants that have abstinence syndrome.
- 2. Review the effects of fetal exposure to substances of abuse pregnancy.
- 3. Discuss methods for evaluating the infant with Neonatal Abstinence Syndrome (NAS).
- 4. Review preferred treatment modalities for medically treating NAS.
- 5. Explore the challenges presented to caregivers in the safe discharge of these infant's and the subsequent follow up care.

Substance use during pregnancy has an impact on the medical and developmental outcomes of the newborns. It also has health, legal and economic consequences for the mother.

Do Infants Exposed to Maternal Opioids Have Drug Addiction?

NO
Addiction is an overpowering desire or need to continue taking the drug and to obtain the drug by any means. The baby is not addicted and is medically not at risk for later becoming an addict.

Neonatal Abstinence Syndrome
- Infant shows signs of withdrawal following birth.
- Due to the low molecular weight and high lipid solubility, these agents easily cross the placenta.
- Neonates born to chronic users of opiates are usually born with a passive dependency to those agents.
- With birth, the supply of these drugs is abruptly ceased, setting the stage for NAS.
STATISTICALLY SPEAKING

- 55-94% of neonates with in utero narcotic exposure will develop NAS.
- SAHHS-4.4% of pregnant women between the ages of 15 and 44 used illicit drugs.
- 15,000 or 15.8% of 15-17 year olds.
- 7.4% for 18-25 year olds
- 1.9% for 26-44 year olds
- Drug abuse has no age, race or socio-economic barriers
- Self-reporting will identify only about 40-60% of pregnant women.

STATE POLICIES

- Among those abusing drugs-32% abuse both ETOH and Tobacco
- 800,000 to 1 million fetuses are exposed to legal and illegal drugs yearly
- 3-5 fold increased risk for child abuse among parents who abuse drugs
- 11% (8.3M) children live with at least one parent who is either alcoholic or abuses illicit drugs
- Adolescents with parents who abuse drugs are 2-3 times more likely to abuse drugs

DRUGS OF ABUSE

- Many women are poly-drug users, get a better high, and don't think it is dangerous.
- Opiates/Opioids: Heroin, Morphine, Codeine, Opium, Methadone, Fentanyl, Demerol, Percodan, Darvon, Oxycodone, Buprenorphine.
- CNS Stimulants: Amphetamines, Methamphetamine, Cocaine, Nicotine, Ritalin, Concerta, Phencyclidines, Phenetermine.
- CNS Depressants: Alcohol, Barbiturates, Benzodiazepines, Valium, Librium, Xanax, Ativan, Clonipin, Sedatives-hypnotics, Quaalude, Cannabinoids, Marijuana, Hashish
- HALLUCINOGENS: LSD, Mescaline, Inhalants, Solvents and Aerosols, (glues, gasoline, paint thinner, cleaning solutions, Freon)
- Poly Drug Use: Cigarettes/Nicotine, Alcohol, Heroin/Methadone, Cocaine, Marijuana, Caffeine.

EFFECTS ON THE FETUS

- Cocaine, Anti-depressants, Amphetamines: May cause symptoms that resemble NAS. These symptoms appear to be toxic effects of these drugs on the CNS rather than symptoms of withdrawal.

Opioid dependent women may have other medical complications when pregnant:

- Anemia
- Septicemia
- Depression
- Cardiac Disease
- Hepatitis B &/or C

Active or passive maternal detoxification is associated with increased risk of fetal distress and fetal loss.
OTHER FETAL EFFECTS

- SAB
- IUFD
- PROM
- Premature birth
- IUGR
- Congenital Anomalies
- Placental Abruption
- Perinatal Distress

With drug usage we may see altered cell differentiation and synaptic development in the immature CNS.

Neurogenesis begins in first trimester. The neurons migrate from their site of origin along ventricles to their final destination in the cortex.

As this is occurring dendrites, axioms, and thousands of synaptic connections are forming.

Each component influences the next and the process is orchestrated by genetics, cellular environment.

Any agent that has an effect in the CNS has the ability theoretically to modulate this delicate process.

Which Babies Withdraw

- It is not easy to predict NAS.
- Most opiates are short acting and not stored by the fetus in any appreciable amount
- Clinical presentation varies with the opioid, maternal drug history, maternal metabolism, net transfer of drug across the placenta and placental metabolism
- Also depends on the infants metabolism after birth. As well as their excretion, gestational age, total amount exposed to

OPIOIDS

Affects on Fetus

- Premature Birth
- Low birth weight
- IUGR
- At risk for depressed motor performance
- Tendency towards behavioral difficulties
- Perinatal distress-Meconium staining during delivery
- LGA-Methadone
- Placental insufficiency
- IUFD

Onset

- Heroin-with in 24 hours
- Methadone- within 24-72 hours. May be delayed until 5-7 days. The onset of withdrawal peaks at 40 hours. Signs may be most severe at 70 hours.
Opioid Antagonist

- Buprenorphine (Subutex)- Category C.
- Partial opioid agonist used for maintenance therapy.
- Approved in the US for opioid detox and maintenance. It is not FDA approved for use in pregnancy.
- But it is considered safe in pregnancy.
- Cochrane Review favored buprenorphine over methadone in regards to LOS (32 VS 42) and BW.
- NAS still occurs but only half require treatment. Still have some with severe withdrawal up to 5%.
- Need lower doses of morphine to reduce withdrawal signs and symptoms.
- No formal regulations stating what type of comprehensive care has to be provided for mom.
- DO NOT change meds on a patient who is stabilized.

ALCOHOL

- Withdrawal within 3-12 hours after birth.
- Can have seizures associated with alcohol withdrawal.
- Causes hyperactivity, crying irritability, poor suck.
- Duration of signs: 18 months.

BENZODIAZAPINES

- Withdrawal 1-3 days after birth.
- Hypotonia, poor suck, apnea, bradycardia, tremors, hyperactivity.
- Duration of signs: 8-10 months.

BARBITURATES

- Withdrawal can occur 4-7 days after birth. Range is up to 14 days.
- May see seizures associated with withdrawal.
- Irritability, excessive crying, diarrhea, increased tone, disturbed sleep, restlessness, vasomotor instability.
- Duration of signs: 4-6 months with treatment.

POLY DRUG USERS

- TOBACCO:
  - Smaller babies (150 to 250 gm difference in BW)
  - Very irritable
  - Caffeine:
    - Jitteriness, vomiting, tachypnea, bradycardia
  - Onset of signs: at birth
  - Duration of signs: 1-7 days

- AMPHETAMINES
  - Withdrawal within 1-3 days after birth.
  - Meth Mites- User picks at skin. Increased risk of infection.
THC

- Detectable for weeks depending on usage.

COCAINEx

- Clears within 1-3 days after birth, could take longer depending on maternal usage.
- Causes vasoconstriction. SIDS occurs more frequently in cocaine exposed infants.

MOST FREQUENTLY SEEN SYMPTOMS IN THE INFANT

GI DYSFUNCTION:
- Poor feeding
- Frequent emesis
- Diarrhea
- Poor weight gain
- Hyper metabolic state - high caloric requirements
- Dehydration
- Mouth Sores - Cocaine

CNS
- Seizures
- Jitteriness
- High pitched cry - excessive
- Hypertonia
- Excessive crying
- Wakefulness
- Tremors
- Hyperactive reflexes
- Myoclonic Jerks

Other
- Fever
- Frequent yawning
- Nasal stuffiness
- Sneezing
- Skin excoriation
- Sweating
- Nasal flaring
- Tachypnea

NEONATAL EVALUATION

- Maternal history
- Confirmatory drug testing - urine in mother
- Begin NAS scoring 2-4 hours after birth
- May need to do further screening: sepsis work-up, Hep B, HIV, STD's
- Precludes early discharge
- Collect meconium and/or urine for toxicology screen - know what your drug screen tests for.
- Infant - Meconium - may detect drugs used after 20 weeks, urine.
NON-PHARMACOLOGICAL INTERVENTIONS
- Try first
- Low lights
- Decrease stimulation
- Coordinate care
- Quiet environment
- Swaddling, rocking, swinging
- Minimize excoriations - preventative
- Pacifier
- Soft bedding
- Frequent feedings
- Soft music

PHARMACOLOGICAL INTERVENTIONS
- Finnegan Scoring
  - 21 point scoring scale used to determine degree of withdrawal
  - Gives a quantitative measure of the severity of symptoms of withdrawal.
  - If begin scoring within 2-4 hours after birth
  - It is a continual assessment
  - Tracks progression and then response to therapy.
  - Make sure the infant's needs are being met first.
  - Three scores greater than eight or two greater than twelve

Morphine Sulfate
- Most commonly used
- Minimize the physiological effects of central autonomic system dysfunction
- Dosage: 0.04-0.05 mg/kg/day divided q 3-4 hours.
- Weaning: Maintain a control dose for 24-48 hours
  - Wean by 10% once a day, if scores are 6-8
  - When reach 0.04 mg q 4 hours may discontinue.
- Ideal: has a short half life

METHADONE
- Little experience in newborns, longer half life makes it less ideal, difficult to wean despite good early responses, no long term studies.
- 0.05-0.2 mg/kg per dose q 12 to 24 hours.
- Reduce by 10% to 20% per week over 4-6 weeks
- Adjust weaning based on signs and symptoms of withdrawal.
- Respiratory depression, ileus, single report of QTc prolongation

TINCTURE OF OPIUM
- Short half life
- Has no additives or high alcohol content
- Improves sucking quickly

Phenobarbitiol
- Drug of choice for non opioid withdrawal, suppresses agitation well, long half life
- Little effect on amelioration of withdrawal symptoms related to opioid withdrawal
- Loading: 16mg/kg PO on day 1
- Maintenance: 1-4 mg/kg per dose PO q 12 hours
- Weaning: By 20% every other day depending on scores.
- May cause sedation
Clonidine

- Limited studies in infants
- Decreased duration of pharmacotherapy for NAS without causing short term adverse cardiovascular outcomes
- Dose: 1 microgram q 4 hours
- Decreased catecholamine release leads to decrease BP and HR

FOLLOW UP CARE

- MANY CHALLENGES TO HEALTH CARE PROVIDERS
- Need to establish close follow up with PCP
- Length of hospitalization varies depending on drug used, severity of withdrawal and social factors

LONG TERM ISSUES

- Heroin - Inconclusive, associated with premature birth and lower birth weight, increased risk for slightly depressed motor performances and a tendency toward behavioral difficulties.
- THC - 4 years lower memory and verbal skills, 9-12 years - decreased impulse control and visual skills. Normal reading language verbal and IQ.

- Feeding difficulties - need higher caloric formula
- Cranky for a long time - months (10)
- Infants may have difficulty sleeping for a long time
- Once the babies are off medication does not mean that the care for them is completed.
- There have not been conclusive studies as to specific longer term outcomes
- Parents are unprepared for the complex care needed for their infants and the extended length of stay which frequently causes clashes with staff.

- Cocaine - cognitive defects twice as likely through first two years (2002)
- 13.2% rate of mental retardation is 4.89 x higher than that expected in the population at large
- 38% mild or greater delays requiring intervention - double the rate of non cocaine users
- NIDA study - No effects on performance, verbal or IQ

- Difficulties with attitudes
- Parents may still be drug seeking
- Is the home environment safe
- These infants may not gain weight as well. Needs closer follow up
- Developmental follow up is crucial for the infant
- Parents may need education regarding basic infant needs and development
- Can mom care for baby?
- What is mom's treatment plan?
CLINICAL SCENARIO

- Do we know how well she can care for the baby?
- Will the parents keep follow up appointments?
- When do we call Child Protective services?
- Do the parents feel that any one cares about them?

References