If Baby Could Talk: Laboratory Detection of Prenatal Drug Exposure

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Illicit drug use while pregnant

- 5.9% of all ages
- 18.3% age 15-17
- 9.0% age 18-25
- 3.4% age 26-44

What about prescription drug use and misuse?

2012 SAMHSA National Survey on Drug Use and Health, NSDUH Series H-46, HHS Publication 13-4795, Rockville, MD, USA
The number of infants diagnosed with neonatal abstinence syndrome (NAS) has increased >10-fold since 1995. Between 2010-11

- 99.6% tested positive for opioid exposure
- 97.1% admitted to intensive care units; average stay was 26.1 days
- <1% were documented to use heroin
AN ESTIMATED 10-11% OF ALL BIRTHS IN THE USA ARE AFFECTED BY PRENATAL DRUG EXPOSURE

Drugs in Pregnancy – what it means for baby

- Premature birth
- Low birth weight
- Withdrawal symptoms (e.g., NAS)
- Feeding issues / failure to thrive
- Developmental delays
- Behavioral problems
- Neglect
- Increased risk of drug abuse later in life
How to detect prenatal drug exposure?

- Maternal self-report
  - Unreliable and under-estimates use

- Maternal testing
  - Serial, comprehensive testing is not practical or cost-effective for most
  - Does not prove that baby was exposed (or not)

- Maternal screening to evaluate risk of exposure

- Newborn testing
Approach to detect drug-exposed newborns

1. Consult local and/or state policies
2. Evaluate risk of drug exposure during pregnancy
3. Collect specimen(s)
4. Submit specimen(s) for testing and/or monitor newborn for signs/symptoms of NAS
5. Submit specimen(s) for testing with NAS or other reason for testing
Specimens for drug detection

- Urine
- Blood
- Meconium, Umbilical Cord

Estimated detection window:
- Hours
- Days
- Weeks
- Months

Concentration of drugs
Meconium

- First stool of the newborn
- Used for drug testing for ~25 yrs
- Begins to form at ~12-16 wks gestation
- Accumulates over remainder of pregnancy
- Largest quantity accumulates in late pregnancy
- Usually passes within 48 hours of birth
- Looks different than milk stool
- Collection requires coordinated efforts and may not be available
Umbilical cord tissue

- Forms ~5th week of gestation
- Grows with fetus throughout pregnancy
- Typically about 20 in long with full term births
- Drugs appear to deposit consistently across the length of cord
- Easy to collect at time of birth
- Particularly useful for high-risk scenarios wherein time to result is critical
- Concentrations of drug analytes are lower in cord than in meconium, but can be detected with appropriate methods
Overall positivity rate at ARUP ~73% (n=76,631)
Algorithm for evaluation of results

**Are results consistent with expectations?**

- **No**
  - Unexpected negative(s)
    - Contact laboratory to discuss testing
    - Discuss results with mother
  - Compare with pharmacy history for mother and newborn

- **Yes**
  - Unexpected positive(s)
    - Discuss results with mother
    - Contact laboratory to discuss testing

- Proceed as per relevant local policies
Frequently asked questions

- Can we detect first trimester exposures?
- Can we detect how frequently the mother used drugs, time of last use, and/or how much was used?
- Can we detect drugs administered in the hospital?
- Can we determine how and when a newborn will be affected by drug exposure(s)?
- What if results from twins or triplets don’t agree?
- What are the typical patterns of results observed?
Thank-you for your attention

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Examples of Recent ARUP References

**Meconium**


**Umbilical cord tissue**


Summary and Conclusions

- Meconium and umbilical cord can detect drug-exposed newborns
  - Qualitative results agree well between specimen types, for most drugs
  - Preferred specimen may depend on the hospital model for selection of newborns to test; umbilical cord is available at birth
  - Umbilical cord avoids detection of drugs administered to the newborn

- Drug detection reflects exposure based on test design, drug stability and recovery from the specimen matrix, drug use patterns, and timing of specimen collection relative to drug use

- Interpretation of results requires consideration of maternal admissions, pharmacy history for mother and newborn, and consultation with the laboratory regarding the testing performed