ANESTHESIA AND THE BREASTFEEDING PATIENT

PRESENTED BY:
DR. REBECCA SULLIVAN, CRNA

PANA SPRING SYMPOSIUM
HERSHEY, PA
MAY 5, 2019
OBJECTIVES

• THE LEARNER WILL BE ABLE TO DISCUSS THE RISK AND BENEFIT DECISIONS RELATING TO ANESTHETIC MEDICATION ADMINISTRATION TO A BREASTFEEDING PATIENT

• THE LEARNER WILL UNDERSTAND THE MECHANISMS INVOLVED IN THE TRANSFER OF MATERNAL MEDICATIONS INTO BREASTMILK

• THE LEARNER WILL UNDERSTAND THE CURRENT RECOMMENDATIONS FOR ANESTHESIA IN A BREASTFEEDING PATIENT
BREASTFEEDING INFORMATION

• Goal of presentation is to discuss mechanism of drug concentrations secreted in human milk

• Ingestion of drugs passed to infants through human milk has been topic of many published reports.
THE STATEMENTS/LISTS ARE INTENDED TO DESCRIBE **POSSIBLE** EFFECTS ON THE INFANT AND OR LACTATION, **IF KNOWN**

**1983**


Lactmed database

• IF A DRUG/CHEMICAL IS DOES NOT APPEAR ON TABLE, IT ONLY INDICATES THAT THERE WERE **NO REPORTS IN THE LITERATURE.**
# Pregnancy Risk Categories

## Table 1

<table>
<thead>
<tr>
<th>Pregnancy Category</th>
<th>Category Description</th>
</tr>
</thead>
</table>
| A                  | **Human:** Adequate, well-controlled studies in pregnant women have **not** shown an increased risk of fetal abnormalities in **any** trimester of pregnancy  
**Animal:** NA |
| B                  | **Human:** No adequate, well-controlled studies in pregnant women AND  
**Animal:** No evidence of harm to the fetus OR  
**Human:** Adequate, well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus in **any** trimester AND  
**Animal:** Studies have shown an adverse effect |
| C                  | **Human:** No adequate, well-controlled studies in pregnant women AND  
**Animal:** Studies have shown an adverse effect OR  
**Human:** No adequate, well-controlled studies in pregnant women AND  
**Animal:** No studies have been conducted |
| D                  | **Human:** Adequate, well-controlled, or observational studies in pregnant women have demonstrated a risk to the fetus. However, the benefits of therapy may outweigh the potential risk. For example, the drug may be acceptable if needed in a life-threatening situation or serious disease for which safer drugs cannot be used or are ineffective. |
| X                  | Adequate, well-controlled, or observational studies in animals or pregnant women have demonstrated positive evidence of fetal abnormalities or risks. The use of the product is contraindicated in women who are or may become pregnant. |
LACTATION RISK CATEGORIES

L1: SAFEST

• CONTROLLED STUDIES FAIL TO DEMONSTRATE A RISK TO INFANTS

• THE PRODUCT IS NOT ORALLY BIOAVAILABLE TO THE INFANT
LACTATION RISK CATEGORIES

L2: SAFER

- LIMITED NUMBER OF STUDY SUBJECTS
- THE EVIDENCE OF DEMONSTRATED RISK FOLLOWING USE OF MEDICATION IS REMOTE
LACTATION RISK CATEGORIES

L3: MODERATELY SAFE

• NO CONTROLLED STUDIES
• MEDICATION SHOULD BE GIVEN ONLY IF THE BENEFIT JUSTIFIED
• NEW MEDICATIONS ARE AUTOMATICALLY CATEGORIZED AS MODERATE SAFETY
LACTATION RISK CATEGORIES

L4: POSSIBLY HAZARDOUS

• POSITIVE EVIDENCE OF RISK TO A BREASTFED INFANT OR TO BREAST MILK PRODUCTION

• THE BENEFITS OF USE FOR MOTHER MAY BE ACCEPTABLE DESPITE THE RISK TO INFANT.
LACTATION RISK CATEGORIES

L5: CONTRAINDICATED

• STUDIES HAVE DEMONSTRATED SIGNIFICANT AND DOCUMENTED RISK

• THE MEDICATION IS CONTRAINDICATED IN WOMEN WHO ARE BREASTFEEDING AN INFANT.
BREASTFEEDING BENEFITS

• SIMPLICITY, PORTABILITY
• NUTRITIONAL ADVANTAGES OVER FORMULA
• REDUCTION IN INFANT MORTALITY
• ENHANCED ANTIBODY RESPONSE TO VACCINATIONS
• HIGHER IQ (ENHANCES COGNITIVE DEVELOPMENT)
• DECREASE IN RISK OF IMMUNOLOGICALLY MEDIATED DISORDERS
BREASTFEEDING FACTS

• STATISTICS
  • IN THE US MORE THAN 10 MILLION WOMEN ARE EITHER PREGNANT OR BREASTFEEDING AT ANY GIVEN TIME.
  • 70% INITIALLY CHOOSE TO BREASTFEED
BREASTFEEDING FACTS

• BENEFITS TO MOTHER
  • ENHANCED MOTHER-CHILD INTERACTION
    • KANGAROO CARE “SKIN TO SKIN”
  • SUCKLING PROMOTES POSTNATAL UTERINE INVOLUTION
  • ENHANCED WEIGHT LOSS, REDUCED BLOOD LOSS POSTPARTUM
BREASTFEEDING FACTS

• USUAL REASONS FOR STOPPING
  • INABILITY OF INFANT TO LATCH ON EFFECTIVELY
  • LACK OF MILK PRODUCTION
  • RETURN TO WORKFORCE

SUPER MUM
RECOMMENDATIONS FOR MED ADMINISTRATION

• OVER 90% OF MOTHERS RECEIVE ONE OR MORE DRUGS IN FIRST WEEK OF POSTPARTUM

• MANY WOMEN ARE ADVISED TO DISCONTINUE NURSING BECAUSE OF CONCERNS OF ADVERSE IMPACT TO INFANT
RISK BENEFIT ANALYSIS

• CONSIDER MULTIPLE FACTORS
  • NEED FOR DRUG BY MOTHER
  • POTENTIAL ADVERSE EFFECTS ON INFANT
  • POTENTIAL EFFECTS ON MILK PRODUCTION
  • AMOUNT OF DRUG EXCRETED IN HUMAN MILK
  • ORAL ABSORPTION BY BREASTFEEDING INFANT
  • TIMING OF FEEDING
WHAT INFLUENCES TRANSFER TO MILK?

- MOLECULAR WEIGHT
- CONCENTRATION IN MATERNAL PLASMA
- PKA
- PROTEIN BINDING
- LIPOPHILICITY
HOW DO DRUGS ENTER MILK?

• DRIVEN BY EQUILIBRIUM FORCES (CONCENTRATION GRADIENT)

• BREAST MILK CAN BE THOUGHT OF AS A SPECIAL COMPARTMENT CLOSELY LINKED TO PLASMA

• PASS FROM MATERNAL PLASMA THROUGH CAPILLARY WALLS INTO THE ALVEOLAR CELL LINING
PASSAGE OF MEDS

• COLOSTRAL PERIOD
  • FIRST 72 HOURS LARGE GAPS BETWEEN ALVEOLAR CELLS EXIST.
  • MILK PROTEIN AT HIGHEST.
• THESE GAPS PERMITS ENHANCED PASSAGE OF MOLECULES INTO BREAST MILK
MILK PASSAGE

• PROLACTIN INFLUENCE ON ALVEOLAR CELLS

• ONCE THESE SPACES CLOSE THIS IS REFERRED TO AS MATURE MILK.
RELATIVE INFANT DOSE

FYI volume of milk ingested by infant is generally 150ml/kg/day.

- DOSE OF DRUG INGESTED BY INFANT COMPARED TO MOTHERS DOSE (MG/KG)
- IF RELATIVE INFANT DOSE (RID) IS LESS THAN 10% MEDICATION IS QUITE SAFE TO USE
- THE RID OF THE VAST MAJORITY OF DRUGS IS <1%
- RETROGRADE DIFFUSION OF THE DRUG FROM BREAST MILK TO PLASMA REMOVES MEDICATION FROM THE MILK EVEN IF MOTHERS HAS NOT EMPTIED HER BREAST.
ANESTHETICS IN BREAST MILK

• **MIDAZOLAM** - SHORT HALF LIFE COMPARED TO OTHER BENZOS. SINGLE DOSE SAFE
  • STUDIES SHOW 24 HRS 0.009% REMAINED IN HUMAN MILK

• **FENTANYL** - EXTREMELY LOW AFTER 2 HOURS
  • 24HR 0.039%

• **ETOMIDATE** - BRIEF PLASMA DISTRIBUTION PHASE

• **KETAMINE** - UNREPORTED

• **PROPOFOL** - BRIEF PLASMA DISTRIBUTION PHASE
  • 24 LEVEL IN BREAST MILK 0.025%

• **ANESTHETIC GASES** - LITTLE TO NOTHING REPORTED. BRIEF PLASMA DISTRIBUTION PHASES, **ASSUMED SAFE**.
ANESTHETICS IN BREAST MILK

• **NEUROMUSCULAR BLOCKING AGENTS** - POOR LIPID SOLUBILITY & LOW ORAL AVAILABILITY

• **MORPHINE** - LOW ORAL BIOAVAILABILITY AND LIMITED PASSAGE INTO MILK
  • NEURAXIAL SINGLE DOSE MORPHINE
    • NEGLIGIBLE MATERNAL PLASMA LEVELS... MILK CLEAR

• **DILAUDID** - USE WITH CAUTION.

• **LOCAL ANESTHETICS** - CONCENTRATION LOW IN MILK AND NOT EASILY ABSORBED MY INFANT
  **EXCEPTION IS LARGE VOLUME TUMESCENT SOLUTION

• **TORADOL/ACETAMINOPHEN** - SAFE
OTHER MEDICATIONS OF CONCERN

• **CODEINE - ACTIVE METABOLITE** -
  - Concern regarding apnea, brady and sedation in infants with inactive enzyme CYP2D6

• **OXYCODONE** -
  - CNS depression in 20% of exposed infants

• **HYDROCODONE** -
  - Less than 4% wt adjusted dose - freq used w breastfeeding mothers

• **DEMEROL** -
  - Active metabolite half life prolonged. May cause neonatal sedation, bradycardia & apnea

• **STREET DRUGS - SEE UPCOMING SLIDE**

• **ANTIANXIETY/ANTI DEPRESSANTS** -
  - Specific to mechanism and metabolism. See risk chart

• **HERBAL MEDICATIONS** -
  - Kava (liver damage), yohimbe (fatalities), St Johns wort (colic, lethargy), fenugreek (coag/glucose issues), chamomile, black cohosh, echinacea, ginseng, gingko, valerian not recommended in breastfeeding women
OTHER MEDICATIONS OF CONCERN

- **CARDIAC DRUGS/ANTIHYPERTENSIVES-**
  - AMIODARONE- WIDE VARIATIONS OF CONCENTRATIONS FOUND IN BREAST MILK. CAN RESULT IN BRADY OR HYPOTHYROIDISM. RECOMMEND STOP BREASTFEEDING
  - BETA ANTAGONISTS- ATENOLOL, SOTALOL, IMMATURE RENAL FUNCTION IN NEONATES CAN RESULT IN BRADY OR HYPOTENSION

- **IODINE**
  - HYPOTHYROIDISM CAN RESULT IN BREASTFEEDING INFANT

- **ANTICOAGULANTS-**
  - HEPARIN SAFE- LARGE MOLECULAR WEIGHT DOES NOT CROSS INTO MILK
  - WARFARIN SAFE (HIGH PROTEIN BINDING)

- **HYPOGLYCEMICS-**
  - INSULIN AND ORAL HYPOGLYCEMICS DO NOT CROSS INTO BREASTMILK IN SIGNIFICANT AMOUNTS
  - IS HYDROLYZED IN INFANT GUT IF INGESTED
STREET DRUGS INFLUENCE ON INFANT

Alcohol
• Impaired neurological development

Methadone
• Minimal excretion, can withdrawal

Cocaine
• Irritability, tremors, GI issues (n/v/d)

Marijuana
• Motor development delays
ANESTHESIA WITH NURSING INFANT

• IMPLICATIONS OF DRUGS USED IN ANESTHESIA IN POSTPARTUM MOTHERS DEPEND ON NUMEROUS FACTORS INCLUDING...
  • AGE OF THE INFANT
  • STABILITY OF THE INFANT
  • LENGTH OF LACTATION
  • THE ABILITY OF INFANT TO CLEAR ANESTHETICS
PREMATURE INFANT CONSIDERATIONS

- EARLY MILK PRODUCED FOR PREMATURE INFANT IS DIFFERENT IN COMPOSITION FROM MILK OF TERM INFANT
- DATA OF DRUG CONCENTRATIONS REFERS TO MATURE MILK
- REDUCED CLEARANCE OR IMMATURITY OF METABOLIC PATHWAYS
RECOMMENDATIONS

• CHOOSE DRUGS WITH:
  • SHORT HALF LIVES
  • HIGH PROTEIN BINDING
  • LOW ORAL BIOAVAILABILITY
  • HIGH MOLECULAR WEIGHT
  • AVOID PCA (CONTINUOUS INFUSIONS)
    • SPACE OUT DOSES, FEED IMMEDIATELY PRIOR
  • AVOID DRUGS WITH ACTIVE METABOLITES
SUMMARY

• RESUMPTION OF NORMAL MENTATION IS A HALLMARK THAT MEDICATIONS REDISTRIBUTED FROM PLASMA COMPARTMENT

• “CLEAR MIND, CLEAR MILK” REPLACES “PUMP AND DUMP”
SUMMARY OF RECOMMENDATIONS

THE LOWEST, SAFEST MATERNAL DOSE OF DRUG SHOULD BE ADMINISTERED TO NURSING MOTHER.

AVOID MEDICATIONS THAT MAY DISRUPT THE PATIENTS ABILITY TO PRODUCE BREASTMILK

THE POSSIBLE RISKS TO THE INFANT SHOULD BE WEIGHED AGAINST THE BENEFITS OF CONTINUING BREAST FEEDING.
The age and condition of the infant are deemed the most important criteria.

A mother may breast feed postoperatively as soon as she is alert.

CLEAR MIND, CLEAR MILK!


