TEN STEP TUESDAY

Medications, part 2

It's Ten Step Tuesday!

This week's post is the second in a series on medications adapted from the fabulous Bobbi Philipp, MD, FAP, FABM, Pediatrician and Professor of Pediatrics at Boston Medical Center.

This week, we'll discuss four more factors that affect maternal medication transfer into human milk. They are oral bio availability, relative infant dose, milk/plasma ratio, and pH.

Oral Bio Availability

If the medication gets into the breast milk and the baby drinks from the breast, to have any effect on the baby the medication needs to be absorbed when it reaches the infant's stomach and gastrointestinal system. If the medication can't be absorbed or if it is destroyed along the way and doesn't enter the baby's blood circulation, the effect on the baby would be minimal to none. Some drugs are destroyed in the stomach, others are metabolized in the gut wall, others are not absorbed once they get to the small intestine, while others are sequestered in the liver and cannot exit.

Why are some drugs never given by mouth? The reason is probably that it has low oral bio availability. A mother or infant can swallow it, but it won't be absorbed from the GI tract.

- Ex. Gentamicin is an antibiotic used to treat gram negative infections. It is given via IV, never orally. Per Medications and Mothers' Milk, the oral bio availability is <1%.
- Ex. Insulin is an anti-diabetic medication used to treat diabetes. Why is it never given orally? Its oral bio availability is "negligible."

Relative Infant Dose (RID)

One of the more popular methods for estimating safety of a medication is to determine the Relative Infant Dose (RID). This is a weight adjusted infant dose relative to the maternal dose. The RID is calculated by dividing the infant's dose via milk in mg/kg/day by the maternal dose in mg/kg/day. RID is expressed as a percentage.

Key point: **If the Relative Infant Dose is less than 10%, most medications are relatively safe to use. The RID of the vast majority of drugs is <10%. (Hale's Medications & Mother's Milk)**

For more information contact
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Milk/Plasma Ratio

You may also see information on the milk/plasma ratio (M/P). This is the concentration of the drug in the mother's milk divided by the concentration of the drug in the mother's plasma.

- M/P >1-5 This is concerning as the drug may sequester in milk in high levels
- M/P <1 Only minimal levels are transferred into milk, which is preferred

pH

From Medications and Mothers' Milk: "The pKa of a drug is the pH at which the drug is equally ionic and nonionic. The more ionic a drug is, the less capable it is of transferring from the milk compartment to the maternal plasma compartment. Hence, the drug becomes trapped in milk (called ionic trapping). This is useful because drugs that have a pKa higher than 7.2 may be sequestered to a slightly higher degree than one with a lower pKa. Drugs with a higher pKa generally have higher milk/plasma ratios. Hence, choose drugs with a lower pKa." ("again…too much info, what do I need to remember?")

Key point: Choose drugs with a lower pH.

So in summary, choose medications with:

- High molecular weight (>800 Daltons)
- High protein binding (>90%)
- Low lipid solubility
- Short half-lives (which will lower the maternal plasma concentration)
- Low oral bio availability
- Relative Infant Dose (RID) <10%
- Milk to plasma (M/P) ratio <1
- Lower pH

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