Hormonal Physiology of Childbirth:
From Evidence to Action

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Objectives
1) Describe the key findings of the report: Hormonal Physiology of Childbearing: Evidence and Implications for Women, Babies, and Maternity Care
2) Describe opportunities to apply those principles for pregnancy and birth from the Hormonal Physiology of Childbearing Report
3) Describe strategies to implement change on birthing units and in institutions based on evidence and recommendations from the Hormonal Physiology of Childbearing Report.

Background
Definitions

- **Physiologic childbearing**: childbearing conforming to healthy biologic processes.

- **Hormonal physiology of childbearing**: reproduction-related biologic processes from pregnancy through the postpartum and newborn periods in relation to innate, endogenous hormone systems.

Physiologic Onset of Labor at Term:

- Complex process, not fully understood
- Fetal cortisol plus mother's readiness via estrogen production and other processes

Maternal Processes
Fetal Processes

Potential Impacts of Scheduled Birth: Mother

Potential Impacts of Scheduled Birth: Baby
Physiology of Oxytocin

Benefits of Oxytocin
- Rhythmic uterine contractions
- Late-labor oxytocin surge benefits pushing
- Calming and analgesic effects in mothers and babies, labor and through postpartum
- Reduces stress, increases sociability, primes reward centers imprinting pleasure with infant contact promoting longer-term infant survival

The First Hour After Birth
- Stronger contractions, reducing PPH risk
- Warming newborn via maternal chest
- Hormonally-mediated maternal-infant bonding
- Facilitate breastfeeding, reducing maternal, newborn stress
Synthetic Oxytocin Effects on Maternal Oxytocin and Physiology

- Uterine hyperstimulation
- Stronger contractions, ↑ pain without central oxytocin analgesia
- Synthetic oxytocin ↑ desensitization of oxytocin receptors
- Disruption of newborn breastfeeding behavior

Effects of Epidural on Oxytocin

- Slowed labor with need for synthetic oxytocin
- Prolonged pushing stage with increased use of assisted vaginal birth
- Disruption of maternal adaptations and attachment
Postpartum Separation and Impact on Oxytocin

- Reduced oxytocin due to lack of skin-to-skin
- Increased newborn stress and stress hormones, hypoglycemia, hypothermia
- Disruptions to breastfeeding initiation/duration
- Deficits in maternal hormones and adaptations with potential impacts on maternal-infant attachment

Beta-Endorphins: Normal Physiology

Know the root...
Endorphin

- Eoto = endogenous: originating from within an organism
- orphine = morphine: an analgesic from opium

Beta-Endorphins Promote:
Maternity Care Practices That May Impact Beta-Endorphins

Art: Silvia Nickerson

Potential Impact of Labor Analgesia on Beta-Endorphins

- Labor analgesia will ↓ beta-endorphins to some degree
- Beneficial if excess stress is inhibiting labor
- Reduced beta-endorphins may reduce postpartum reward center activation, impacting maternal adaptations and attachment

Figure 4. Maternal beta-endorphins levels, with and without epidural analgesia
Impact of Cesarean on Beta-Endorphins

Separation and Impact on Beta-Endorphins

- No studies directly assess mothers and newborns separation and effect on BEs
- Separation of mothers and newborns may increase stress, increase in BEs for both
- Animal studies - separation interrupts opioid systems, increases susceptibility to addiction

Stress Hormone Physiology

- Epinephrine, norepinephrine > fight or flight
- Slow labor allowing time for fight/flight
- Blood flow redistribution to essential organs
- May inhibit labor if women not calm, private, safe
- Later in labor, danger may stimulate contractions
- Physiologic rise in epinephrine in labor promoting alertness, PG production
- Cortisol rise may > contractions, oxytocin effect
Stress Hormone Physiology

Stress Hormone Effect on Newborn
Promotes newborn transition by:
- Blood flow to heart and brain
- Respiratory transition
- Metabolic fuels
- Thermoregulation
- Alertness, breastfeeding
- PP, skin to skin promote hormone reduction

Maternity Care Practices Affecting Stress Hormones
- Mother does not feel calm, safe, private
- Techniques promoting relaxation
- Continuous labor support
- Epidural effect on epinephrine, oxytocin
- Lack of catecholamine surge in cesarean
- Mother/newborn separation effect on stress
- High quality research lacking
Prolactin Physiology

- May reduce stress in pregnancy
- Elevated late pregnancy, receptor formation
- Declines with advancing labor
- >> as birth approaches, due to BE and oxytocin
- Prolactin stimulates oxytocin release
- PP elevations promote breast milk production
- Prolactin, cortisol + early BF > prolactin receptors
- Effect on multiple beneficial maternal adaptations

Maternity Care Practices Affecting Prolactin

- High quality research lacking
- Stress may reduce prolactin, affecting breastfeeding
- Cesarean may affect pre-labor and late labor elevations, affecting breastfeeding
- Separation PP may affect prolactin levels, possibly affecting breastfeeding success
Participant Discussion
Individual, pair, table
- Personal commitment
- Possible system or workplace change

Change Process
- Plan
- Do
- Check
- Act

Practice Recommendation
Reduce stress during prenatal care
Practice Recommendation
Physiologic onset of labor at term

Practice Recommendation
Hospital admission in active labor

Practice Recommendation
Privacy to reduce anxiety/stress in labor
Practice Recommendation
Non-pharmacologic comfort measures, analgesics used sparingly

Practice Recommendation
Non-pharmacologic methods to assist labor progress, medications used sparingly

Practice Recommendation
Promote continuous labor support
Practice Recommendation
Foster spontaneous vaginal birth

Practice Recommendation
Support mother and infant skin-to-skin contact

Photo: Elisabeth Fall

Practice Recommendation
Support early and frequent breastfeeding
Participant Discussion

Discuss ideas in pair, full table
- what needed
- who participates
- engage all players
- assess results

Six Recurring Themes

* Evolutionary origins
* Beneficial pathway
* Mother-baby dyad
* Interorchestration of hormone systems
* Cascade of intervention
* Long term impacts

References and Resources

* American College of Nurse-Midwives Health Birth Initiative – multiple resources
* Association of Women's Health, Obstetrical, and Neonatal Nurses – Go the Full 40
References and Resources

- AWHONN nurse staffing guidelines - https://www.awhonn.org/awhonn/content.do?name=08_Store/08_nursingstandards.htm


