Anatomy, Physiology and Philosophy of Breastfeeding
Philosophy of Breastfeeding

- While lactation is a normal physiological process, the art of breastfeeding is a form of maternal behaviour which is easily influenced by external factors.
- It is not a totally instinctive process and success is best achieved through knowledge and educational support.
  - (National Breastfeeding Guidelines for Health Care Providers, Canadian Institute of Child Health, 1996)
Breastfeeding Education for Health Care Providers

- Benefits of breastfeeding
- Hazards of formula feeding
- Current international, national, provincial and local breastfeeding standards of policy and practice
- Social attitudes and values which influence breastfeeding
Breastfeeding Education of Health Care Providers

- Anatomy and physiology of lactation
- Biochemistry of human milk
- Infant anatomy and physiology affecting suck and feeding behaviour
- Early post-partum practices that promote success
Breastfeeding Education for Health Care Professionals

• Skills to assess and facilitate effective breastfeeding
• Prevention and management of common problems
• Medical indications for supplementation
• Community resources for breastfeeding support
Benefits of Breastfeeding

- More convenient
- Significantly less expensive
- Environmentally friendly
- Fosters a healthy parent-infant attachment
- Superior neurodevelopment
Benefits of Breastfeeding

• Faster return to pre-pregnant weight
• Less post-partum bleeding
• Decreased risk of ovarian and post-menopausal breast-cancer
• Decreased risk of bone demineralization
• Exclusive breastfeeding promotes child spacing for the first 6 months
Professional Statements

- Professional organizations have recognized the contribution of breastfeeding to preventative medicine and population health.
- The OMA, CPS, AAP and others have issued statements expressing the value and importance of breastfeeding and expect their members to model these values.
Anatomy of the Breast

- Nipple
- Areola
- Montgomery glands
- Ductal system and lactiferous sinuses
- Lobes and alveoli
- Myoepithelial cells
Stages of Lactation

- Mammogenesis, (puberty)
- Lactogenesis stage 1, (late pregnancy)
- Lactogenesis stage 2, (day 2 or 3 – day 8)
- Galactopoeisis, day 9 on
- Involution, about 40 days after last breastfeed
Hormonal Influence

• Estrogen and progesterone
• Prolactin
• Oxytocin
• Other Hormones
  – Cortisol
  – Thyroid-Stimulating Hormone (TSH)
  – Prolactin-Inhibiting Factor (PFI)
Infant Oral Development

• The fetus is able to swallow as early as 11 weeks gestation
• The suck reflex develops around 24 weeks
• The rooting response begins at 32 weeks
• The combination of sucking, swallowing, breathing is not coordinated until about 37 weeks
Infant Oral Structures

- Relatively short oral cavity
- Relatively large tongue in contact with palate and gums
- Lower jaw small and slightly receded
- Lips are partially everted
- Frenulum important for tongue movement
Infant Suckling Sequence

• Tongue position is important
• Rooting reflex allows the infant to find the nipple and latch onto the breast
• The jaw moves the tongue up
• As the anterior part of the tongue is raised, the posterior part moves in a peristaltic action and channels the milk to the back of the oral cavity
• Sufficient milk volume will trigger the swallow reflex
Infant Suckling Pattern

- Rapid sucks until milk flow commences
- Deep rhythmic sucks in a suck- swallow- breathe cycle
- Sucking bursts and resting periods
- Faster suckling and less swallowing during lower milk transfer
Colostrum

- Clear, yellowish liquid, produced from 20 weeks of pregnancy
- High in protein
- Low in fat and carbohydrates
- Easy to digest
- Laxative effect
- Rich in immunological factors
- 2-10ml per feeding until milk production increases
Transitional Milk

• Mixture of colostrum and mature milk
• Present from day 3 – day 10
Mature Milk

• Composed of foremilk and hindmilk
• Foremilk looks bluish-white, is produced between feedings
• Hindmilk is produced during feedings, higher is fat
• Breast milk changes during a feeding, during the day and during the entire breastfeeding time
Calories and Growth

- Breastmilk has 20 calories per oz (65kcal/dl)
- Energy intake and requirement for breastfed babies are usually below the official recommendations
- Weight loss of < 7% in first 3 days and <10% in first week
- Weight gain of 15 – 30 g per day for first four months (1oz/day except Sundays)
Fat

- Pre-term breastmilk has higher fat content
- Breastmilk contains essential fatty acids, including omega3 fatty acids
- Higher cholesterol
- Fat content changes
Lactose

- Supplies energy
- Promotes growth of lactobacillus bifidus
- Enhances calcium absorption
Protein

- Serves nutritional and immunological purposes
- Casein – whey ratio of 40:60
- Casein requires high energy expenditure in digestion
- Whey composed of alpha-lactalbumin, serum albumin, lactoferrin, immunoglobulins and lysozymes
- Last three elements play an important factor in immunology
Nitrogen

• Free amino acids
• 3 essential amino acids are not manufactured by the body but must be consumed in the diet
• All 10 essential amino acids present in colostrum
• Nucleotides (nitrogenous based compounds) necessary for energy metabolism, enzymatic reactions, growth and maturation of the gastrointestinal tract and play a role in immune function
Vitamins and Micronutrients

- Vit A, D, K & E are minimally influenced by recent maternal diet but can be drawn from body storage.
- Water-soluble vitamins are influenced by maternal diet.
- Maternal vitamin supplementation is not necessary in well nourished women.
- Mothers on vegan diets may be Vit B12 deficient and need supplements to enrich their breastmilk.
Minerals

- Most minerals are present in breastmilk in small quantities only
- Most minerals are highly bio-available to the infant
- Iron is absorbed at a rate of 49% from breastmilk, 10% from cow’s milk and 4% from formula
- Calcium is absorbed at 67% from breastmilk and 25% from cow’s milk
- Pre-term infants may need mineral supplementation
Immune Factors in Breastmilk

- Phagocytes and lymphocytes
- Antibodies, secretory IgA, IgA, IgM
- Non-antibody antibacterial factors:
  - Lactoferrin
  - Bifidus factor
  - Oligosaccharides
Protective Effect of Breastmilk

• Respiratory infections
• Otitis media
• GI infections
• NEC and sepsis in pre-term infants
• ? SIDS
• Allergies
3 Keys to Success

- Mother and baby together
  - Rooming-in
  - Evaluate both
  - Treat both

- Feed the baby
  - Early, often, unrestricted, with correct position, latch and suck

Establish a good milk supply
Intake and Output

- 37cc colostrum per day
- 500 cc milk by day 5-7
- 750 – 850cc by 3 months
- Mothers can make enough milk for twins and triplets

- 1-2 voids per day for first 2 days
- 2-3 on day 3
- 4-6 on day 4
- 6-8 from day 5 on
- Meconium day 1-2
- Transitional stools day 2-4
- Yellow stools starting day 3-5
- 2-10 BM’s per day during first month
Infant Feeding Styles

- Q2-3h, continuing with predictable feeding pattern
- Cluster feeding followed by a longer period of sleep
- Slow feeders
- Fast feeders
Early Problems

- Sore nipples/poor latch
- Flat/inverted nipples
- Refusal to latch
- Engorgement/plugged ducts/mastitis
- Breast pain
- Fatigue
- Infant crying/sleeping
Sore/Flat/Inverted Nipples - Tx

• Check position/latch
• Improve position/latch
• Change position
• Use colostrum/EBM/Lansinoh
• Air dry, use breast shells
• Pump prior to feeding
• Consider nipple shield
Breast Refusal

- Use alternate feeding methods to feed baby
- If long term may need to use bottle
- Start pumping early
- Pump to replace feeds
- Give support ++ +
Engorgement/Plugged Duct/Mastitis

- Heat
- Rest
- Empty breast
- Massage
- Continue breastfeeding or pump
- If mastitis treat with ABx
Breast Pain

• Associated with let-down
• Burning pain after feeds usually due to thrush
• Always treat both mother and infant for thrush
Alternate Feeding Methods

• Lactation aid at breast
• Finger feeding
• Cup feeding
• Syringe feeding
• Nipple shield
• Bottle feeding
Drugs to Use With Caution

• New drugs without substantial data
• Antidepressants, anticonvulsants and narcotics
• Diuretics
• Estrogen containing contraceptives
• Nicotine
• Alcohol
Drugs That Are Contraindicated

• Chemotherapy
• Radioactive substances
• Recreational drugs
• Lithium

• Motherisk hotline: 416 8136780
• www.motherisk.org
References

• Breastfeeding and Human Lactation by Riordan and Auerbach
• National Breastfeeding Guidelines for Health Care Providers by the Canadian Institute of Child Health
• Family-Centred Maternity and Newborn Care: National Guidelines by Health Canada
• 18 Hour Breastfeeding Course by WHO/UNICEF