

## Supplementation Who Needs It in the Early Postnatal Period?

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### By the end of this session, you will be able to:

- List the risks of non medically indicated supplementation in the early post natal period
- Identify medical indications for supplementation
- Describe a decision making strategy to determine when supplementation is necessary
- Describe the advantages and disadvantages of a variety of supplementation methods

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## What is the fuss?

- Supplementation carries risks
- Large numbers of babies are being supplemented without medical indication

Declercq et al. (2009) – US National Study – 49% supplemented

Semenic et al (2008) – 48% of babies supplemented – Canadian

Tender et al (2009) - Washington, DC study  
78% of babies supplemented in hospital with no clear medical indication for 87%

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## Reasons given for supplementation?

- Colostrum is not enough
- Mother's can not make enough milk for:
  - Premature babies
  - Large babies
- To prevent dehydration
- To prevent hypoglycemia
- To prevent weight loss
- Mother's need to sleep
- Supplementing with formula has no risks

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## Mothers Make Milk Colostrum is Enough Lactation Overview

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## Mothers Make Milk Colostrum is Enough

- **Lactogenesis I**
  - During pregnancy & first 2 days post partum
- **Lactogenesis II – day 3-8**
  - follows the birth of the placenta & rapid drop of serum progesterone
- **Lactogenesis III/Galactopoiesis**
  - from day 9 – maintenance
    - Endocrine to Autocrine
      - Prolactin Receptors
      - inhibitory Factor (FIL)

(Daly & Hartman, 1995; Neville & Morton, 2001)

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## The first days

- Stomach capacity only suited to small volumes
- Matches colostrum volume
  - (day 1 mean 37ml/24 hours)
- Stomach capacity increases as milk volume increases
- Milk volume increases rapidly average 650ml/24 hours by 2-3 wk

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## The baby's role in milk production

- Skin to skin plays a key role
- Production is dependent on effectiveness and frequency of milk removal
- The more empty the breast, the more rapid synthesis will be
- Full breasts slow or stop the rate of synthesis
- Babies do not consume all available milk – stop when they are full
- Women have varying breast storage capacity
  - (Daly & Hartman, 1995)



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## Fluid Balance Maintained with On-Cue Feedings

- on-cue breastfed newborns respond to decreased fluid intake by secreting vasopressin and increasing breast-feeding frequency (Marchini & Stock 1997)
- Separation of mother and baby, radiant warmers, and crying all deplete the newborn's fluid stores
- **SSC from birth with frequent opportunities to breastfeed prevents problems with fluid balance**

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## Breastfeeding stabilizes blood sugar

Separation of mother and baby, radiant warmers, and crying all impact negatively on blood sugar levels

LGA & SGA breastfed babies do NOT suffer hypoglycemic events more frequently than supplemented babies

Babies generate ketone bodies in response to decreased blood sugar

Formula blunts the ketone response  
(de Rooy & Hawdon, 2002)

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## Supplements do not prevent weight loss

- Babies can be expected to have weight loss in the first days after birth (Walker, 2008)
- Supplemented babies lose weight too (Walker, 2008)
- Babies whose mothers received epidurals may lose more weight - ? Related to IV fluids (Merry & Montgomery, 2000)

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## Mother's sleep

- Co-bedding babies breastfed more frequently with no difference in quantity of sleep than solitary cot sleeping babies (Ball, Ward-Platt, & Heslop, 2006)
- Breastfeeding mothers had more sleep in 24 hours than bottle feeding mothers (at 4wk) (Quillin & Glenn, 2004)
- No research found that supports in-hospital formula supplementation as a method to increase maternal sleep
- Need to explore hospital routines and home support to assist mothers to meet sleep needs (Cloherty et al 2004)

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## Supplementation carries risks

- Alters oxytocin & prolactin
- Decreases feeding frequency
  - Decreases milk supply
- Bottle - preference - stressful
- Potential allergy sensitization
- Increased sore nipples & engorgement
- Decreased maternal confidence
  - Modeling behavior
    - Early weaning

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## Acceptable Medical Reasons for use of Breastmilk Substitutes

World Health Organization / UNICEF

[http://whqlibdoc.who.int/hq/2009/WHO\\_FCH\\_CAH\\_09.01\\_eng.pdf](http://whqlibdoc.who.int/hq/2009/WHO_FCH_CAH_09.01_eng.pdf)

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## Infants

- Infants who should receive no breastmilk
  - Galactosemia
  - Maple sugar urine disease
  - PKU (some breastfeeding with monitoring and phenylalanine free formula)

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- Infants where breastmilk remains the best feeding option but who may need other food in addition to breastmilk for a limited time period

- Very low birth weight (<1500 gm)
- Less than 32 weeks gestation
- Newborn infants at risk of hypoglycemia by virtue of impaired metabolic adaptation or increased glucose demand (such as those who are preterm, small for gestational age or have experienced significant intrapartum hypoxic/ischemic stress, those who are ill and those whose mothers are diabetic) if their blood sugar fails to respond to optimal breastfeeding or breastmilk feeding.

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## Mothers

- Maternal conditions that may justify permanent avoidance of breastfeeding
  - HIV infection if replacement feeding is not acceptable, feasible, affordable, sustainable and safe
  - Exclusive breastfeeding to 6 months

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- **Maternal conditions that may justify temporary avoidance of breastfeeding**

- Severe illness that precludes breastfeeding her infant
- Herpes Simplex virus type 1 (HSV-1): direct contact between lesions on the mother's breasts and the infant's mouth should be avoided until all active lesions have resolved
- Maternal medications
  - Some specific medications until discontinued or safer alternatives are available
  - Radioactive iodine – I131
  - Excessive use of iodine or iodophors especially on open wounds or mucous membranes
  - Cytotoxic chemotherapy

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- **Maternal conditions during which breastfeeding can still continue, although health problems may be of concern**

- Breast abscess (nurse on the non affected side – can nurse on the affected side if no contact with infant's mouth and abscess or discharge)
- Hepatitis B (infants to receive hepatitis B vaccine within the first 48 hours or as soon as possible thereafter – note *guidelines in Canada differ*)
- Hepatitis C (*Canadian Public Health Care Agency – not contraindicated*)
- Mastitis if breastfeeding very painful, milk must be removed by expression to prevent progression of condition
- Tuberculosis- mother and baby should be managed according to national guidelines
- Substance use

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## Other (not WHO)

- Weight loss beyond day 4-5 or failure to regain birth weight by 2 weeks of age
- Demonstrated inability to feed effectively at the breast
  - Structural anomalies (eg cleft palate)
  - Neurological condition
  - Inability of the baby to latch secondary to nipple variations

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## Another way to look at it

(M Field)

### Distinguish between infants who:

- must not receive breastmilk
- cannot be fed at the breast
- when breastmilk is not available

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## Decision Making

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## Breastfeeding Flow Chart

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### ASSUMPTIONS

1. Continuous mother-baby skin-to-skin contact (MBSSC) is practiced from birth.
2. Babies kept in (MBSSC), have lower risk for hypothermia, hypoglycemia, increased stress response and delayed or ineffective transition to effective breastfeeding
3. Physical assessment of the baby occurs in MBSSC as separation alters physiological responses adversely
4. Weighing and other procedures which require separation are delayed to decrease infant stress response

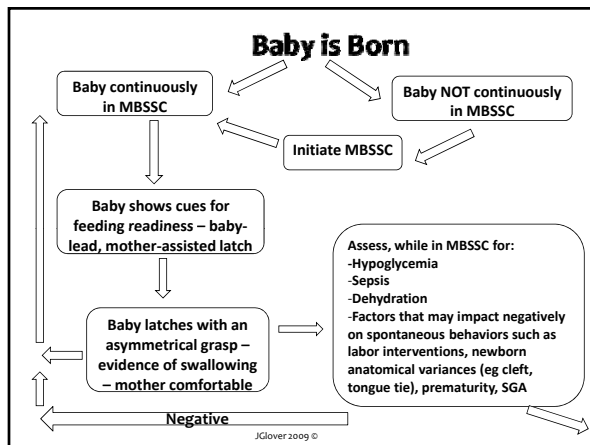
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5. **Baby-lead, mother-assisted latch is the norm**  
Babies breastfeed. Mothers learn to follow their babies' cues and to determine when feeding is effective and satisfying.
6. **infants show a gradual increased interest and effectiveness with breastfeeding over the first days after birth – intermittent swallow is common in the first days after birth**
7. **Effective feeding includes:**
  - a. adequate milk transfer as evidenced by swallow and weight and output patterns that are age appropriate
  - b. no discomfort for the mother as evidenced by no nipple trauma or breast pain

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8. **Infants in continuous MBSSC with frequent effective breastfeeding rarely need supplementation**
9. **Supplementation without medical indication has the potential to impact negatively on the infants health and breastfeeding initiation**
10. **Mothers may express a substantial volume of colostrum 2-3 hours after birth if the baby has not breastfed**

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## Prior to Supplementation

- assessment needs to be carried out
  - Maternal assessment
  - Infant assessment
  - Assessment of breastfeeding

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## Maternal history & physical

Needs to be done initially & if problems arise

### History

present, past, family hx  
pregnancy, labor hx  
medications, allergies

### Physical assessment

breasts  
nipples

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## Infant history & physical

- History to date
- Physical examination
  - Reflexes
  - Behaviour
  - Oral anatomy
- Careful assessment to changes over time
  - Level of consciousness

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## Assessing Intake

Expectations for the 1<sup>st</sup> 4 weeks after day 4

Wet diapers 4-6      Dirty diapers 4+

### Weight

Loss over the first 2-3 days

5-10% of BW

Regain BW by day 8-10

Faster gain in the 1<sup>st</sup> 3 month

120-210 gm/week – 18-30 gm/day

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## Assessing a Breastfeed

- Cuing - Mother responds appropriately
- Mother independent with latch
- Position & Latch:
  - Wide grasp – deep draw excursion
  - Comfortable – no nipple or breast pain
- Milk transfer evident
  - Swallow – output patterns – weight patterns
- Mother's confidence & satisfaction

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## Techniques to improve intake

- Skin-to-skin contact
- Frequent feedings
- Correct any latch problems
- Breast compressions
- Relaxation techniques & visualization
- Sleep when baby is sleeping

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- Remember to look at the whole picture and do not make decisions on one factor

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## With What?

- Mother's own expressed breastmilk
- Banked donor breastmilk
- Formula
  - hydrolyzed

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## How?

- Dependent on reason
- When possible, at breast
- Cup
- Finger feeding
- Bottle

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### When?

- Throughout the feeding (SNS)
- At the start of the feeding to help baby stay at the breast longer and to have positive associations with the breast (Smillie, conference proceedings 2007)
- At the end of the breastfeeding

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### How Much?

- Dependent on baby’s condition, age and reason for supplementation
- Standard calculations used

(Calgary Health Region: Breastfeeding Infant – Supplementation for the Well Infant, 2006)

Newborn age	Colostrum	Commercially prepared infant formula
1 <sup>st</sup> 24 hours	2-10 mL colostrum/feed for a range of 10-120 mL/24 hours (average total intake of 37mL per 24 hour)	30mL/kg/24 hrs
24-48 hours	5-15ml of colostrum/feed for an average total intake of 60-120 mL/24 h	60mL/kg/24 hrs

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Newborn age	Breastmilk	Commercially prepared infant formula
48-72 hrs	90 ml/kg/24 hours	90 ml/kg/24 hours
72-96 hours	120 ml/24 hours	120 ml/24 hours
96-120 hours	150-180 ml/24 hours	150-180 ml/24 hours
Over 120 hours	180 ml.24 hours	180 ml.24 hours

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### How Much?

- Smaller more frequent volumes may be more physiologically sound (Bergman, 2008)
- Volume/single MER = 30-35cc
- Baby’s cycle between states –q9omin
- Feed every 90 min =  $16 \times 30 = 480/24h$
- (for 3kg baby=160 ml/kg/d)

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### How to Stop

- Dependent on:
  - Reason for supplementation
  - Age and condition of the baby
- Gradually with time for maternal supply to increase to meet baby’s need  
10-15cc/feeding every 2-3 days

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### Milk Supply Support

- Effective milk removal is the key to effective supply
  - Manual expression or pump if supplementation needed
- Use of galactogues
  - Foods
  - Herbs
  - medications

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## Hints for Expressing Milk

- To make breastmilk flow easily:
  - heat
  - massage
  - visualization
  - fluids to thirst
  - rest
  - relaxation techniques

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## Increasing/Maintaining Milk Supply

- pump as often as a baby feeds
- pump 6 – 8 + times in 24 hrs
  - Does not need to be evenly spaced
  - Does not need to be same length each time
- pump each breast
- switch sides
- double pumping

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## Supplementation: Who Needs It?

- Few babies can not be breastfed
- Few babies need supplementation in the first days after birth when kept in SSC
- Do not supplement based on one finding
- Do not supplement until a full assessment is done
- Supplement at the breast if baby able to latch
- Supplement by cup if baby unable to latch
- Protect milk supply
- Ongoing assessment to continue until supplementation no longer needed

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## References

- Abouelfetoh, A. M., Dowling, D. A., Dabash, S. A., Elguindy, R. & Seoud, I. A. (2008). Cup versus bottle feeding for hospitalized late preterm infants in Egypt: A quasi experimental study. *International Breastfeeding Journal*, 3(27). DOI: 10.1186/1746-4358-3-27.
- Academy of Breastfeeding Medicine (2003). ABM protocol number 3: Hospital guidelines for the use of supplementary feedings in the healthy term neonate. <http://www.bfmed.org/ace-files/protocol/supplementation.pdf>
- Ashraf RM et al (1993). Additional water is not needed for healthy breastfed babies in a hot climate. *Acta Paediatr*, 82(12),1007-1011.
- Ball, H.L., Ward-Platt, M.P., Heslop, E., Leech, S.J. & Brown, K.A. (2006). Randomised trial of infant sleep location on the postnatal ward. *Archives of Disease in Childhood*. 91(12), 1005-10.

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- Bouwstra, H. Boersma, E. R., Boehm, G., Dijk-Brouwer, D. A., Muskiet, F., Hadders-Algra, M. (2003). Exclusive breastfeeding of healthy term infants for at least 6 weeks improves neurological condition. *Journal of Nutrition*, 133, 4243—4245
- Chalmers, B., Dzakpasu, S., Heaman, M. & Kaczorowski, J. (2008). The Canadian maternity experiences survey: An overview of findings. *Journal of Obstetrics and Gynecology Canada*, 30(3): 217-228.
- Chertok, I. R. A., Raz, I., Shoham, I., Haddad, H., and Wiznitzer, A. (2009). Effects of early breastfeeding on neonatal glucose levels of term infants born to women with gestational diabetes. *Journal of Human Nutrition and Dietetics*, 22(2), 166-9.
- Chulada, P.C., Arbes, S.J. Jr., Dunson, D., & Zeldin DC. (2003). Breast-feeding and the prevalence of asthma and wheeze in children: analyses from the Third National Health and Nutrition Examination Survey, 1988-1994. *Journal of Allergy & Clinical Immunology*, 111(2), 3280-336.
- Cloherty, M., Alexander, J. & Holloway, I. (2003). Supplementing breastfed babies in the UK to protect their mothers from tiredness or distress. *Midwifery*, 20, 194-2004.

JGlover 2009 ©

- Daly, S.E., & Hartmann, P. E. (1995). *Infant development and milk supply: Part 1: Infant demand and milk synthesis in lactating women*. *JHL*, 11, 21-225.
- Daly, S.E. & Hartmann, P.E. (1995). *Infant demand and milk supply. Part 2: the short-term control of milk synthesis in lactating women*. *JHL*, 11, 27-31.
- Declercq, E., Labbok, M., Sakala, C. and O'Hara, M. (2009). Hospital practices and women's likelihood of fulfilling their intention to exclusively breastfeed. *American Journal of Public Health*, 99(5):929-35.
- de Rooy, L. and Hawdon, J. (2002). Nutritional risk factors that affect the postnatal metabolic adaptation of full-term small-for-gestational-age infants. *Pediatrics*: 109(3) E42
- DiGirolamo, A. M., Grummer-Strawn, L. M., Fein, S. B. (2008). Effect of maternity care practices on breastfeeding. *Pediatrics*, 122 Suppl2:S43-9.
- Flint A, New K, Davies MW. Cup feeding versus other forms of supplemental enteral feeding for newborn infants unable to fully breastfeed. *Cochrane Database of Systematic Reviews* 2007, Issue 2. Art. No.: CD005092. DOI: 10.1002/14651858.CD005092.pub2

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Hill PD, Humenick SS, Brennan ML et al (1997). *Does early supplement affect long-term breastfeeding?* Clin Pediatr, 36(6), 345-350

Horta, B.L., Bahl, R., Martines, J.C. & Victora, C.G. (2007). Evidence of long-term effects of breastfeeding: Systematic reviews & meta-analysis. World Health Organization [http://www.who.int/child-adolescent-health/New\\_Publications/NUTRITION/ISBN\\_92\\_4\\_159523\\_0.pdf](http://www.who.int/child-adolescent-health/New_Publications/NUTRITION/ISBN_92_4_159523_0.pdf)

Host A, Husby S, & Osterballe O (1988). A prospective study of cow's milk allergy in exclusively breastfed infants. Incidence, pathogenic role of early inadvertent exposure to cow's milk formula and characterization of bovine milk protein in human milk. Acta Paediatr Scand, 77(5), 663-670.

Howard, C. R., Howard, F. M., Lanphear, B., Eberly, S., deBlieck, E. A. et al (2003). *Randomized clinical trial of pacifier use and bottle-feeding or cupfeeding and their effect on breastfeeding.* Pediatrics, 111(3), 511-518.

Kimpimaki, T. et al.(2001). *Short-term exclusive breastfeeding predisposes young children with increased genetic risk of Type I diabetes to progressive beta-cell autoimmunity.* Diabetologia, 44(1), 63-69.

Kramer, M.S. and Kakuma, R. (2003). Optimal duration of exclusive breastfeeding. Cochrane Database CD003517.

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Kramer, M.S., Guo, T., Platt, R. W., Sevkovskaya, Z., Dzikovich, I. et al (2003). *Infant growth and health outcomes associated with 3 compared with 6 months of exclusive breastfeeding.* American Journal of Clinical Nutrition, 78(2), 291-295.

Martin-Calma J, Bunnell J, Valero MT et al (1997). The effect of feeding glucose water to breastfeeding newborns on weight, body temperature, blood glucose and breastfeeding duration. JHL, 13(3), 209-213.

Marchini G, Persson B, Berggren V et al (1998). Hunger behaviour contributes to early nutritional homeostasis. Acta Paediatrica, 87(6) 671-675.

Marchini G & Stock S (1997). Thirst and vasopressin secretion counteract dehydration in newborn infants. J Pediatr, 130(5), 736-739.

Merry, H. & Montgomery, A. (2000). Do breastfed babies whose mothers have had labor epidurals lose more weight in the first 24 hours of life. *Academy of Breastfeeding Medicine News and Views* 2000;6:3.

Neville, M. C. & Morton, J (2001). *Physiology and endocrine changes underlying human lactogenesis II.* Journal of Nutrition, 131, 3005S-3008S.

Noel-Weiss, J., Courant, G., & Woodend, A. K. (2008). Physiological weight loss in the breastfed neonate: a systematic review. *Open Medicine*, 2(4) <http://www.openmedicine.ca/article/view/183/204>

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Nylander G, Lindemann R, Helsing E et al (1991). *Unsupplemented breastfeeding in the maternity ward: positive long term effects.* Acta Obstet Gynecol Scand, 70(3), 205-209.

Oddy, W. H. and Peat, J. K. (2003). *Breastfeeding, asthma and atopic disease: an epidemiological review of the literature.* Journal of Human Lactation, 19, 250-261.

Perez-Escamillo R, Segura-Ilín S, Canahuati J et al (1996). *Prelacteal feeds are negatively associated with breastfeeding outcomes in Honduras.* J Nutr, 126(11), 2765-2773.

Ryan, et al (2002). *Mothers survey, Ross products breastfeeding trends 2003-2006.* Pediatrics, 1103-1109

Semenic, S., Loiselle, C. & Gottlieb L. (2008). Predictors of the duration of exclusive breastfeeding among first-time mothers. *Research in Nursing & Health*, 31(5)428-441.

Tender, J. A. F., Janakiram, J., Arce, E., Mason, R., Jordan, T. Marsh, J. et al (2009). *Reasons for in-hospital formula supplementation of breastfed infants from low-income families.* Journal of Human Lactation, 25(1), 11-17.

2007

Van Howe, R. S. & Storms, M. R. (2008). *Blood glucose determination in large for gestation age infants.* American Journal of Perinatology, 25(5), 283-289.

Walker, M. (2006). *Breastfeeding management for the clinician: Using the evidence.* Sudbury, MA, Jones & Bartlett.

Walker, M. (2006). *Breastfeeding management for the clinician: Using the evidence.* Sudbury, MA, Jones & Bartlett.

Walker, M. (nd). *Supplementation of the breastfed baby. Just one bottle won't hurt – or will it?* Retrieved June 3, 2009 <http://www.health-e-learning.com/articles/JustOneBottle.pdf>

West, D. & Marasco, L. (2009). *The breastfeeding mother's guide to making more milk.* New York: McGraw Hill.

World Health Organization (2009). *Acceptable medical reasons for use of breastmilk substitutes.* Geneva: author.

Zieger, R. S. (2003). *Food allergen avoidance in the prevention of food allergy in infants and children.* Pediatrics; 111(suppl), 1662-1671