

## PedsCases Podcast Scripts

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### **Breastfeeding**

Developed by Jennifer Butler and Dr. Melanie Lewis for PedsCases.com.  
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### **Introduction**

Hello everyone! I am Jennifer Butler, a medical student at McMaster's School of Medicine in Ontario. This podcast on breastfeeding was developed for pedcases.com, with guidance from Dr. Melanie Lewis, Professor and Pediatrician in the Faculty of Medicine and Dentistry at the University of Alberta.

### **Objectives**

By the end of this podcast, listeners will be able to:

- 1) Explain the physiology of breastfeeding, including hormonal mediation, the letdown reflex, reflexes in the baby and components of breast milk.
- 2) Describe the benefits of breastfeeding for both mother and baby
- 3) Demonstrate an approach for managing and counseling commonly experienced breastfeeding concerns and providing available supports
- 4) List and describe alternatives if a mother is unable to breastfeed

### **Case**

You are completing your family medicine rotation and you are excited to see a 14 day old baby. You extract a complete history and while the baby appears to be thriving and has regained their birth weight, the mom is really struggling with breastfeeding and worries about inadequate breast milk supply and extremely painful nipples. What would be your approach to support the mom and baby? Let's review some background information first and then we will get back to this case.

### **Physiology**

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Let's start the discussion today with some physiology. Breast milk naturally contains all of the nutrients needed for an infant's first 6 months of life, including fats, carbohydrates, proteins, vitamins, minerals and of course water, with the exception of vitamin D which needs to be supplemented [1]. Infants have higher energy requirements compared to older children and adults. During the first month of life, they require 110 kcal/kg/day. At 3 months and 6 months, they require 95 kcal/kg/day and 80 kcal/kg/day respectively. Breastmilk contains enough calories to ensure infants reach their recommended daily intake. Fat containing long chain polyunsaturated fatty acids constitutes approximately half of the energy content in milk, or 3.5 g of fat/100mL. Energy from fat is especially important for neurologic development. Carbohydrates found in breastmilk are mainly lactose sugar and oligosaccharides which provide support against infection. Breast milk also has an adequate supply of protein with a good balance of amino acids. Milk has only 0.9g of protein/100 mL, which is lower than in other animal milk to not overload immature kidneys. Additionally, there is less casein protein so it can be more digestible by infants. Vitamins are also essential for newborns and young children. Breast milk provides a high bioavailability of iron and zinc. Additionally, there are enough iron stores for 6 months generally. Despite this, breast milk does not contain enough vitamin D, and this needs to be supplemented if exclusively breastfeeding [1].

Breast milk also contains factors that help digestion and absorption, as well as factors that augment the infant's underdeveloped immune system [1]. Bile salt stimulated lipase from breast milk helps to complete digestion of fats. Additionally, epidermal growth factor in milk helps to stimulate maturation of the infant's intestinal lining for improved digestion and absorption. Immunoglobulins from breastmilk help to coat the infant's intestinal mucosa to protect against infection and make it more difficult for bacteria to invade mucosal surfaces. Milk also contains whey proteins with lysozyme and lactoferrin, both anti-infective factors that help to break down unwanted microorganisms [1].

The composition of milk varies throughout the first two weeks of production. Colostrum is milk secreted in the first 2-3 days of the infant's life. Only small amounts are made, and the milk is rich in white blood cells and IgA. There is a large percentage of protein, minerals and fat soluble vitamins. The following 3-4 days is when milk truly "comes in". Higher quantities are produced as the baby grows. For example, by the 5th day of milk production, the mother is supplying 500-800 mL over 24 hours. After two weeks, the milk is mature [1].

The complex structure of the female breast allows for lactation. The breast is composed of the nipple and areola, mammary tissue, supportive connective tissue and fat, blood, lymph and nerves [1]. The mammary tissue includes the alveoli, which are collections of milk secreting cells and ducts. The milk collects in the lumen of the alveoli, which is surrounded by myoepithelial muscle cells that contract and cause the milk to flow. An average of 9 milk ducts pass through the nipple to outside. The nipple is surrounded by the areola located in Montgomery's gland. These glands are responsible for secreting fluid to protect the skin during lactation. Interestingly, this also provides an individual scent that attracts baby to mom [1]. When oxytocin is released, the ducts fill with milk and become wider in preparation.

Now, I'd like to take a few minutes to discuss the hormonal control and attachment reflexes involved with lactation. The two main hormones you need to be familiar with are prolactin and oxytocin. When the babe suckles at the breast, sensory impulses cause the anterior pituitary to secrete prolactin, and the posterior pituitary to secrete oxytocin. Prolactin is responsible for stimulating growth of mammary tissue during pregnancy as well as producing milk afterwards. While pregnant, high levels of progesterone and estrogen block the action of prolactin, so milk is not secreted. When these levels fall after the birth of the baby, milk secretion can start. When babe suckles on the breast, prolactin increases to stimulate milk for the next feed. More suckling leads to more stimulation of the nipple, more prolactin, more milk etc [1].

Oxytocin on the other hand is responsible for the let down reflex. This hormone causes the myoepithelial cells to contract so milk can flow through the ducts. This reflex is conditioned to a mother's sensations. Often, touching, smelling, seeing or hearing the baby cry will be enough to start milk ejection. On another note, oxytocin is also responsible for causing the uterus to contract after delivery, to reduce bleeding [1]. Lactation is also controlled by FIL polypeptides in breast milk. Local control occurs within each breast independently. If milk is not removed either by baby feeding or by pumping, FIL will collect and stop cells from secreting more milk. This peptide is able to partially control the amount of milk secreted, based on how much baby needs [1].

The baby also has reflexes required for feeding. Rooting, suckling, swallowing and breathing all need to be coordinated for a successful feed. When something touches a baby's lips or cheeks, the babe will turn to find it and open their mouth. This rooting reflex is present from 32 weeks gestation. The suckling reflex occurs when something touches the baby's palate, causing them to suck. Lastly, if the mouth fills with milk, the baby has a reflex to swallow. Coordination between all of these actions

appears between 32-35 weeks, so the majority of infants are able to breastfeed fully by 36 weeks [1].

## **Benefits of Breastfeeding**

There are various benefits to breastfeeding for both mother and baby. From an economic standpoint, breastfeeding is a great option, as it is more cost effective than formula and also reduces healthcare costs. Often, you might hear pediatricians saying “breast is best!”. Breast milk is considered the optimal feeding method for all infants during the first 6 months of life [2]. Maternal benefits occur during lactation, as well as long afterward. There is a reduced risk of postpartum blood loss through the effects of oxytocin produced during lactation. Additionally, there is a delay in ovulation after giving birth from breastfeeding. Some studies suggest that there are lower rates of breast cancer, epithelial ovarian cancer, hypertension and type 2 diabetes in the mothers who breastfeed, but the evidence to support this is insufficient [2]. That being said, mothers can feel more connected to their child by being able to breastfeed.

The breastfeeding benefits to baby are significant and are supported by governmental and medical professionals. There are direct benefits to infant nutrition, GI functioning, host defense and psychological well being [3]. As discussed above, there are a variety of biologically active components and cells in breastmilk, including antimicrobial agents, immunomodulatory activity, factors promoting GI development and function. Additionally, there are considerable short term neurobehavioural benefits including reducing infant crying, increasing glucose levels, promoting greater cardiorespiratory stability and decreasing stress. Longer term benefits such as a decreased risk of developing type 1 diabetes, IBD, wheezing, asthma etc. is based primarily on case control studies and evidence is low [3].

## **Breastfeeding Concerns**

For some women, challenges with breastfeeding result in a shorter length of time before switching to formula feeding. We are going to discuss here a few of the most commonly identified breastfeeding concerns and some ways they can be managed.

Firstly, the most common reason for stopping breastfeeding is inadequate milk supply [4]. This can happen for a few reasons. Insufficient milk supply to the infant can occur because of either inadequate production of milk, or the baby is unable to extract enough milk. Primary lactation failure or not producing enough milk is very uncommon, and happens in less than 5% of women. However, perceived insufficiency often leads to

unnecessary supplementation and can be managed with education and reassurance. Milk supply is dependent on adequate breast stimulation and sufficient milk removal. This can be assessed by signs of hydration in the child, as well as by feeding, urine output (wet diapers) and weight history. Frequent feeding and complete milk removal are first-line recommendations to promote breast milk supply. Medications such as galactagogues are reserved for cases when there is not enough milk produced despite maximizing the latch and milk transfer. Safe duration of these medications is unknown, and the general recommendation is 10-14 days. Infants should gain an average of 170-240 grams per week during the first few months of life. It is important to follow up and take action if any signs indicate inadequate growth [4].

An optimized latch is essential for milk production and transfer to the infant [4]. Poor latching may potentially be helped by correcting techniques and trying various positions. Signs of an effective latch include lips flanged out, asymmetric latch (the baby's lower lip covers more of the areola than the upper lip), tummy to tummy, chin touching breast, and having a listen and watching to see active suckling (LATCH mnemonic). If a change in position is still not helpful, the infant should be examined for the presence of ankyloglossia (tongue-tie). This may impact the infant's tongue movements and can impair the ability to achieve a good latch. Treatment with frenotomy is variable and surgical release of the tongue-tie does not always improve feeding. This procedure should be done based on clinical guidance and the degree to which the infant is able to feed [5].

This brings us to another common concern women have, which is nipple and breast pain [4]. This can be caused by nipple injury, vasoconstriction, engorgement, plugged ducts or breast infections. Breastfeeding itself should never be painful. If there is pain, often it can be attributed to incorrect technique and poor latching. If not, it is possibly an infection. Nipple infections such as yeast or thrush are associated with burning nipple pain, or radiating pain. Candidiasis is treated with antifungals given to both baby and mother. Bacterial infections of the breast can also occur simultaneously, with *Staphylococcus aureus* being most common. Breastfeeding can continue with antibiotics to treat infections. Mastitis, or inflammation of the breast, is another common cause of breast pain. It is usually associated with engorgement, fever, breast erythema and systemic symptoms. Inflammation may or may not involve an infection. Treatment includes ongoing effective breast milk removal, hydration, nutrition, and NSAIDs for discomfort. If there is no improvement, mothers should be assessed by their doctor for consideration of antibiotic treatment [4].

One final concern new parents often have is neonatal jaundice. There are two types of jaundice associated with breast feeding in neonates: breast milk jaundice and lactation failure jaundice [4]. The vast differential for etiologies of neonatal jaundice, not involving breast milk, are covered in another pedscases podcast. Breast milk jaundice is a benign physiological hyperbilirubinemia that occurs in weeks 2-3 of life and can last several weeks. While lactation failure jaundice is indicative of inadequate hydration, hypovolemia and weight loss. Neonates with lactation failure jaundice often require medical intervention and fluid resuscitation [4]. Of note, laboratory investigations of jaundice associated with breastfeeding will demonstrate unconjugated hyperbilirubinemia.

Clinicians are often the first point of contact for mothers struggling to breastfeed. It is important to provide emotional support, educate mothers and their families about recommendations and anticipatory guidance for common obstacles [6]. Troubleshooting lactation and latch difficulties to ease pain and ensure baby wakes easily to feed every 2-3 hours is essential, and can be aided by lactation consultants in many hospitals. Ensuring that the mother has set achievable personal goals and has self-care strategies in place can also ease much stress. Other things health care providers can do is offer professional and peer support, as well as implementing breastfeeding-friendly office environments [6]. In the event that contraindications exist for breastfeeding, there are other options available. Always remember that breastfeeding babies should be supplemented with 400 to 800iu of vitamin D daily.

## **Alternatives**

It is important to assess before childbirth, what the mother's plan is for feeding her baby. Ensure that the family is aware of all current recommendations, understands that "breast is best" and has any questions answered. There are very few absolute contraindications for breastfeeding [4]. Infants who should not have human milk include those with inborn errors of metabolism (galactosemia, maple syrup urine disease or PKU for example) or allergies. Additionally, infants may require a period of supplementation if they are SGA, preterm, have unresolved hypoglycemia, significant weight loss or are not regaining birth weight. Mothers should not be breastfeeding if they are HIV positive, have severe illness, are taking certain medications, and/or have Herpes Simplex virus active lesions near the nipple and areola. Substance use in the mother requires close monitoring and may require supplementation [4].

A side note about covid - research is currently ongoing to determine how covid-19 is affecting infant growth and development. However, a recent CPS statement

concludes that breastfeeding and skin-to-skin contact, even in the context of a covid infection, is recommended [7].

Some women are not able to, or choose not to breastfeed. Clinicians must respect their autonomy and provide support and reassurance. In cases where breastfeeding is contraindicated or not desired, an alternative could be pumped breast milk instead, where mother's milk is still supplied to the baby. Expressed breast milk is the first choice if the infant requires supplementation [6]. This can be done to promote ongoing milk production and to ensure the baby is getting an adequate volume. Options for supplementation techniques include using a cup, spoon, dropper, syringe or finger-feeding or bottle feeding. If expressed breast milk is not available, either donor milk or formula based feeding can be implemented. There are multiple different formulations of commercial formula available, including conventional cow's milk formula, partial whey hydrolysate formula, partial casein/whey hydrolysate formula, extensive casein or whey hydrolysate formula, soy protein-based formula, amino acid based formula etc [6]. Each has their own benefits depending on the scenario. At the end of the day, a growing, happy baby is the best baby!

### **Case Review**

Let's now revisit our 14 day old patient and their mom. Recall that the baby is gaining weight appropriately, but the mom is struggling to breastfeed with very painful nipples and possible inadequate milk supply. The first step to consider is getting additional history about feeding. It is unlikely that the baby is not getting enough milk, as the birth weight has been regained. However, the latch may not be optimized given mom's painful nipples. Additionally, assessment of the baby's suck reflex and for possible tongue ties could provide more information. A referral to a lactation consultant for an assessment would be helpful. Another aspect to consider is possible infection in the mom's breast. Nipple pain is common in the first weeks of breastfeeding. The skin can become cracked and tender and is exacerbated with a sub-optimal latch onto the nipple when the baby is feeding. Mother's may even report noting blood in the baby's mouth, which often turns out to be coming from the nipple, not the baby. Examining a mother's breast if there is significant pain is warranted to determine if there are other factors such as mastitis or local infection of the nipple. Using creams like lanolin can be helpful and safe while breastfeeding to soothe and heal sore and cracked nipples. Simply exposing the breasts to air and keeping them clean and dry is also helpful. It is also not uncommon for babies with thrush (oral yeast infection) to transfer the yeast to the mom's nipple causing additional inflammation and discomfort. Lastly, offering support and recognizing that breastfeeding can be really challenging is important. If a



mother chooses not to breastfeed, support and a non-judgemental attitude is critical. You provide support and reassurance, answer all of the mother's questions with a plan and follow-up moving forward.

### **Key Takeaways**

Breastfeeding is an important aspect of newborn care that has many benefits for mother and baby. Breast milk contains the right components for proper growth and development, and can even improve the psychological bond between baby and mother. The let down reflex, mediated by oxytocin and prolactin, allows for effective milk production, whereas coordinated suck, swallow, breath reflexes allow the baby to consume. Common barriers to breastfeeding include nipple pain, infection, poor latch technique, inadequate milk supply and jaundice. As students, future clinicians, and current physicians, we should be able to provide support and suggest resources for mothers who have concerns about breastfeeding. If breastfeeding is contraindicated, or the mother decides to formula feed, this is also very acceptable and we need to support the mother's decisions! Overall, the most important thing to consider is the baby is well fed, growing and thriving, and the mother feels well supported. I hope you all enjoyed this podcast today! Thanks to Dr. Melanie Lewis for all of her help in the creation of this podcast. Thanks for listening, everyone.

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