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Patient education: Pumping breast milk (Beyond the Basics)

Authors: Lisa Enger, RN, BSN, IBCLC, Nancy M Hurst, PhD, RN, IBCLC

Section Editor: Steven A Abrams, MD

Deputy Editor: Alison G Hoppin, MD

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Literature review current through: Nov 2019. | **This topic last updated:** Mar 12, 2018.

BREAST PUMP OVERVIEW

A breast pump is a device that allows a woman to express breast milk from the breasts when it is not possible to breastfeed her infant directly. Many women choose to use a breast pump so that they can continue to provide breast milk while working or if their infant is hospitalized. However, it is not necessary for all women who breastfeed to purchase or use a breast pump.

This topic review discusses the use of breast pumps and breast milk storage and preparation. Additional breastfeeding topics are available separately. (See ["Patient education: Common breastfeeding problems \(Beyond the Basics\)"](#) and ["Patient education: Breastfeeding guide \(Beyond the Basics\)"](#) and ["Patient education: Maternal health and](#)

[nutrition during breastfeeding \(Beyond the Basics\)"](#) and ["Patient education: Deciding to breastfeed \(Beyond the Basics\)".](#))

CHOOSING A PUMP

There are a wide variety and quality of breast pumps available, which vary in cost, quality, and efficiency; the optimal pump depends upon your needs and how frequently the pump will be used [1,2]. No one pump is best for every woman. In most situations, you should wait to buy a pump until after your infant is born; this will allow you to determine your individual needs.

Some of the most common reasons women use a breast pump include the following:

- To stimulate your milk production when you are unable to nurse your infant after birth, if your infant is sick or separated from you.
- To maintain your milk supply when you are away from your infant (eg, after returning to work).
- To provide breastmilk if you choose to feed your baby from a bottle rather than directly from the breast

Hospital grade electric breast pump — A hospital grade electric breast pump is recommended for women who must initiate and maintain their milk production for extended periods of time, such as those with a premature or hospitalized infant who cannot nurse immediately after delivery [3]. This is the most efficient, easiest, and fastest type of pump, and is the most effective way to maintain an adequate milk supply for an infant's full nutritional needs [4]. Although most women prefer to pump both breasts at the same time (double pump), this machine can be used to pump one breast at a time [1].

The amount of time it takes to empty both breasts will vary depending upon the woman's experience with the pump, although it generally takes about 10 to 15 minutes after let-down has occurred. A hospital grade pump can be safely used by more than one woman in a hospital and may be rented for home use. Some commercial health insurance plans cover the cost of renting a hospital-grade breast pump.

Personal electric pump — A smaller, personal electric breast pump is designed for one woman to use several times per day. These pumps are not as effective in establishing and maintaining a woman's milk supply long-term (without some direct breastfeeding). Most models allow you to pump one or two breasts at a time. The life expectancy of these pumps is generally about one year, depending upon how frequently the pump is used.

Most of the high quality personal pumps are self-contained in a carrying case (as a backpack or shoulder bag) that includes the motor, supplies, and, in some cases, a cooler for storing milk. The pump and related equipment are small and light enough to carry on a daily basis. These pumps work well for the working mother or when traveling. These pumps are intended for use by only one woman; sharing or reselling of a personal pump is not recommended. More information about choosing a breast pump is available from the US Food and Drug Administration [website](#).

Single-sided pump — If you want to pump occasionally so that you can leave your baby with a caregiver for a few hours, a single-sided breast pump may be adequate [5]. Single pumps are powered by hand, batteries, or electricity. Single breast pumps are not recommended if you need to maintain your milk supply while working or for a premature infant, but are adequate for occasional use. Pumping both breasts with a single-sided pump takes about 20 to 30 minutes.

COVERAGE OF COSTS IN THE UNITED STATES

As of August 1, 2012, the Affordable Healthcare Act under the Women's Preventive Services: Required Health Plan Coverage Guidelines has expanded to include the following coverage: "Comprehensive lactation support and counseling by a trained provider during pregnancy and/or in the post-partum period, and the costs for renting breastfeeding equipment in conjunction with each birth. Mothers should contact their insurance providers to verify their coverage. It is currently up to each insurance company to determine the type of pump covered and length of coverage."

HOW TO PUMP

Each of the different types of pumps has specific instructions for use. The following are general recommendations for use of a breast pump.

- Wash your hands with soap and water before pumping. It is not necessary to wash the breasts or nipples [\[6\]](#).
- Ensure that the pump pieces and milk collection containers are clean. Washing with hot soapy water is sufficient; it is not necessary to sterilize the pump or bottles when pumping for a healthy infant. Do not let the pump parts soak in water between use. Instead, rinse and allow to dry. Do not wash the pump tubing because it cannot be dried easily. If moisture or milk is noted in the tubing, contact the manufacturer. It may be necessary to purchase new tubing. For extra germ removal, pump parts may be sanitized once a day using steam, boiling water, or a dishwasher with a sanitize setting. A fact sheet outlining how to keep your breast pump kit clean is available online [here](#) .
- Most women prefer to sit while pumping. For electric pumps, set the pump's suction strength to a comfortable level. Pumping should not hurt. On some pump models, the cycling speed (the number of suction cycles per minute) can be set based on personal preference; some women start with a rapid cycle speed then slow the speed after their milk begins to flow in a steady stream. (See '[Let-down](#)' below.)
- Be sure that the flanges (the cone-shaped pieces that fit over the breasts and nipples) are the appropriate size ([figure 1](#)). When pumping, the nipples should not rub against the tunnels of the flanges. It may be necessary to purchase larger flanges to pump comfortably and stimulate the breasts correctly. Be sure to purchase pump parts that are the same brand as that of the pump. Parts should not be interchanged from different manufacturers.

Let-down — Let-down, also called the milk-ejection reflex, is the term used to describe what happens in the breasts when milk is released from the milk glands into the milk ducts ([figure 2](#)).

Let-down is a conditioned response usually brought on by the infant sucking at the breast and stimulating the release of the hormone oxytocin in the mother's brain. This causes cells in the breast to eject the milk. Some women experience let-down at other times, by just thinking about their baby or hearing their baby cry. For women who are dependent on the pump exclusively for breast stimulation (mothers of hospitalized infants), just seeing or hearing the breast pump may cause milk ejection.

Let-down usually occurs within the first minute or two of nursing or pumping. Some women feel a sense of heaviness or tingling in the breasts during let-down while other women cannot feel let-down at all.

Some women have difficulty with let-down while pumping. In this situation, only drops of milk are seen rather than streams of milk flowing from the nipples. Tips to promote let-down include:

- Gently massage the breasts before pumping
- Apply a warm, wet cloth to the breasts before pumping
- Pump in a quiet, darkened room to avoid distractions
- Look at a picture of the baby or smell the baby's blanket
- Warm the flange of the breast pump with warm water, or wrap a warming pack around the flange

Pumping at work — Women who return to work after birth and want to continue breastfeeding will need to express their milk several times during their working hours. Pumping will allow you to maintain your milk production and provide your expressed breast milk to your infant while you are separated. Pumping on a schedule similar to the infant's feeding pattern is usually sufficient; for most women, this means pumping two to three times over eight hours. If possible, returning to work in the middle of the work week will help to ease the transition.

It can be challenging to find the time and space to pump, especially for women who do not have a private office. You should discuss your need for a private space with your employer prior to returning to work. It may be helpful to speak with coworkers who have returned to work and pumped to determine if a private space is available. Some employers offer a "pump room" or other private area.

The Patient Protection and Affordable Care Act signed into law in March 2010 mandates employers to provide "reasonable break time for an employee to express breast milk for her nursing child for one year after the child's birth each time such employee has need to express the milk". Provisions by employers for "a place other than a bathroom, that is shielded from view and free from intrusion from coworkers and the public, which may be used by an employer to express breast milk" is also mandated [7]. A fact sheet outlining the provisions of this act is available online at [http://op.bna.com/dlrcases.nsf/id/vros-87mrpv/\\$File/breaktime.pdf](http://op.bna.com/dlrcases.nsf/id/vros-87mrpv/$File/breaktime.pdf).

The United States Center for Disease Control and Prevention has published a number of articles that address the need for support of breastfeeding women who work, citing the health as well as economic benefits of breastfeeding. These articles are available online at www.cdc.gov/breastfeeding/resources/guide.htm.

Pumping for a premature or ill infant — Women whose infants are hospitalized due to prematurity or illness following birth must rely on a breast pump to stimulate their milk production. The first few weeks following delivery are critical in establishing a milk supply that meets the needs of their infants. Several important hormonal and structural changes take place within the breast during this time.

The amount of breast stimulation during this time is critical to this process. Women should start pumping early (ideally within the first hour after delivery, and no later than six hours after delivery) [8,9], and frequently (eight to ten times per day, including at least once during the night), for about 15 minutes each time until their milk volume increases (usually around the third or fourth day after delivery). Thereafter, she should pump at least eight times daily and express milk for about two minutes after milk flow stops, to maintain an adequate milk supply. (See "[Breast milk expression for the preterm infant](#)".)

One way that mothers who are pumping for their hospitalized infants can stimulate and increase supply is by "hands on pumping." Mothers initiate pumping as soon as possible after delivery. Mothers massage both breasts prior to the start of pumping. They then pump both breasts at the same time, while massaging and compressing the breasts during pumping as much as possible. Some mothers will use a hands-free pumping device to make this easier. Once the milk flow is reduced to drops, mothers should stop the pump and further massage their breasts. Mothers then finish the session by hand expression into the collection container or using the electric pump with massage to fully empty the breasts. The following is a link to a video demonstrating ways to increase milk production for mothers who are pumping ([Stanford School of medicine: Maximizing milk production with Hands on Pumping](#)).

Tracking daily milk volumes — Mothers who use a breast pump exclusively, or partially to maintain lactation, want to ensure they continue to produce enough milk for their infant. To track your progress, it is useful to keep a pumping log to track the number of times and volume of milk expressed. Pumping logs are available in written form or smart phone applications. For women who are pumping to provide exclusively breast milk for their infant,

the goal should be a target milk volume of 20 to 24 ounces per day by the end of the second week. A premature infant needs somewhat less than this daily milk volume at first, but will need more milk as he or she grows.

STORING BREAST MILK

Storage temperature — The temperature at which milk is stored depends upon the intended duration of storage prior to feeding, and on whether the infant is healthy.

- **Healthy infants** – For infants who are healthy and living at home, breast milk may be safely stored as follows:
 - At room temperature (approximately 77 to 79°F [25 to 27°C]) – Up to four hours [\[10-12\]](#).
 - In the refrigerator – Ideally three to five days (although storage for up to eight days has been shown to be safe if collected under very clean conditions) [\[12-14\]](#).
 - In the freezer – Up to nine months. Thawed breast milk can be safely stored in a standard refrigerator for up to 24 hours. Milk that was frozen and then thawed can be refrozen [\[11\]](#).
- **Hospitalized infants** – Storage guidelines are stricter for infants who are hospitalized because of prematurity or other conditions. Most neonatal intensive care units (NICUs) permit storage of milk in the refrigerator for up to 96 hours (four days) [\[13\]](#), but check with the staff on the storage guidelines for your NICU or hospital. (See ["Breast milk expression for the preterm infant"](#).)

Breast milk storage containers — Breast milk should be placed in a sealed, clean, glass or rigid plastic bottle designed for storing food products. Although plastic breast milk storage bags are not recommended for hospitalized infants due to the loss of some nutrients [\[3\]](#), plastic bags can be used to store breast milk for healthy infants.

Milk should be stored in small amounts (one to four ounces) and labeled using permanent ink and a waterproof label. The label should indicate the date the milk was pumped. Milk from different pumping sessions may be combined; the milk should be cooled in the

refrigerator before it is combined. Milk that is warm or refrigerated should not be added to frozen milk. The oldest milk should be used first. NICUs may have stricter guidelines.

PREPARING PUMPED BREAST MILK FOR FEEDING

Thawing and warming breast milk — Milk can be warmed gradually to approximately 98°F (37°C) in a warm water bath (not to exceed 20 to 30 minutes). One should avoid submerging bottles in water when using the warm water bath method. After warming the milk, the temperature should be tested immediately before it is given to an infant; the milk should feel lukewarm or at room temperature, but never hot. Milk should be gently swirled to redistribute the cream that often rises to the top during refrigeration. Waterless milk warmers are available to warm breast milk prior to feeding. It is important to follow the manufacturer's guidelines when using these devices.

Rapid heating or microwaving adversely affects the breast milk's immunologic and nutritional properties. Microwaving also heats milk unevenly, which may potentially burn an infant's mouth [15].

Although freshly pumped breast milk has antibacterial properties, milk stored in a refrigerator for more than a day or two begins to lose some of these properties [16-19].

HOW MUCH MILK SHOULD I OFFER?

Many women who exclusively pump or pump while at work are unsure how much breast milk their infant will need at each feeding.

The volume of breast milk a baby needs increases with age; infants who are exclusively breastfed require approximately 23 to 24 ounces of breast milk daily at one month of age, and 24 to 30 ounces at six months of age. After six months, most infants begin to consume other foods, and less milk may be needed [20].

One way to estimate the amount of milk a baby needs for a feeding is to multiply the baby's weight in pounds by 2.5, which will give you an estimate of the volume of milk that the baby will consume in 24 hours [21]. You can then divide that by the number of feedings/day to estimate the volume of milk that the baby will consume in one feeding. This is a general

guideline, with the understanding that some babies will want more and others less, and that the volume at each feeding can vary as well.

Feeding breast milk with a bottle — Babies feed very differently from a bottle compared with the breast. Milk flow from a bottle is fast and the baby usually eats very quickly, sometimes by gulping. Many mothers feel that their infant drinks more milk when he or she is fed with a bottle than when nursed at the breast. It is common to worry that you will not pump enough milk to keep up with this volume.

Babies have little control over milk flow from a bottle while they have full control over milk flow from the breast. To minimize this problem, it may help to pace the baby while bottle feeding by taking frequent breaks. Slow flow bottle nipples are available and may help to minimize the differences in flow between bottle and breast feeding. A feeding should take 10 to 15 minutes or more, just like at the breast.

WHAT IF I HAVE QUESTIONS?

Your healthcare provider or your child's healthcare provider is the best source of information for questions and concerns related to breastfeeding, pumping, storage of milk, or bottle feeding your infant. Certified lactation consultants (international board certified lactation consultants, IBCLCs), are available to mothers and infants at most hospitals as well as privately, and can be a valuable resource for instruction and for addressing any problems. (See '[Finding a lactation consultant](#)' below.)

WHERE TO GET MORE INFORMATION

Your healthcare provider is the best source of information for questions and concerns related to your medical problem.

This article will be updated as needed on our web site (www.uptodate.com/patients). Related topics for patients, as well as selected articles written for healthcare professionals, are also available. Some of the most relevant are listed below.

Patient level information — UpToDate offers two types of patient education materials.

The Basics — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.

[Patient education: Pumping breast milk \(The Basics\)](#)

[Patient education: Breastfeeding \(The Basics\)](#)

[Patient education: Weaning from breastfeeding \(The Basics\)](#)

[Patient education: What to expect in the NICU \(The Basics\)](#)

[Patient education: When a baby is born premature \(The Basics\)](#)

Beyond the Basics — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.

[Patient education: Common breastfeeding problems \(Beyond the Basics\)](#)

[Patient education: Breastfeeding guide \(Beyond the Basics\)](#)

[Patient education: Maternal health and nutrition during breastfeeding \(Beyond the Basics\)](#)

[Patient education: Deciding to breastfeed \(Beyond the Basics\)](#)

Professional level information — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

[Breastfeeding: Parental education and support](#)

[Common problems of breastfeeding and weaning](#)

[Infant benefits of breastfeeding](#)

[Maternal nutrition during lactation](#)

[Nutrition in pregnancy](#)

[Nutritional composition of human milk for full-term infants](#)

[Safety of infant exposure to antidepressants and benzodiazepines through breastfeeding](#)

[Breast milk expression for the preterm infant](#)

[Prevention of HIV transmission during breastfeeding in resource-limited settings](#)

Other breastfeeding resources include:

[Stanford School of medicine: Maximizing milk production with Hands on Pumping](#)

Academy of breastfeeding Medicine: Human milk storage

The following organizations also provide reliable health information.

- National Library of Medicine
(www.nlm.nih.gov/medlineplus/healthtopics.html)
- The Center for Disease Control and Prevention
(www.cdc.gov/breastfeeding)
- American Academy of Pediatrics
(www.healthychildren.org/english/ages-stages/baby/breastfeeding)
- Working and Pumping
(www.workandpump.com)

Finding a lactation consultant — International Board Certified Lactation Consultants (IBCLCs), are available at most hospitals as well as privately, and can be an invaluable resource for instructions about breastfeeding, pumping, milk storage, and bottle feeding breast milk. The websites listed below have information about finding a lactation consultant or breastfeeding counselor.

- La Leche League
(www.lalecheleague.org)
- International Board of Lactation Consultant Examiners
(www.iblce.org)

phone: 703-560-7330

- International Lactation Consultant Association
(www.ilca.org)

phone: 919-861-5577

Finding a breast pump — Quality breast pumps, both hospital grade and personal use, are available at various sites (retail stores, pharmacies, and hospitals) for rental and purchase. Speak with someone knowledgeable about breast pumps and their capabilities before making your decision. The website listed below provide information about various types of breast pumps, and the manufacturer's websites provide information about models and pricing. Talk to your insurance provider regarding coverage.

- United States Food and Drug Administration (FDA)

(<http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/HomeHealthandConsumer/ConsumerProducts/BreastPumps/>)

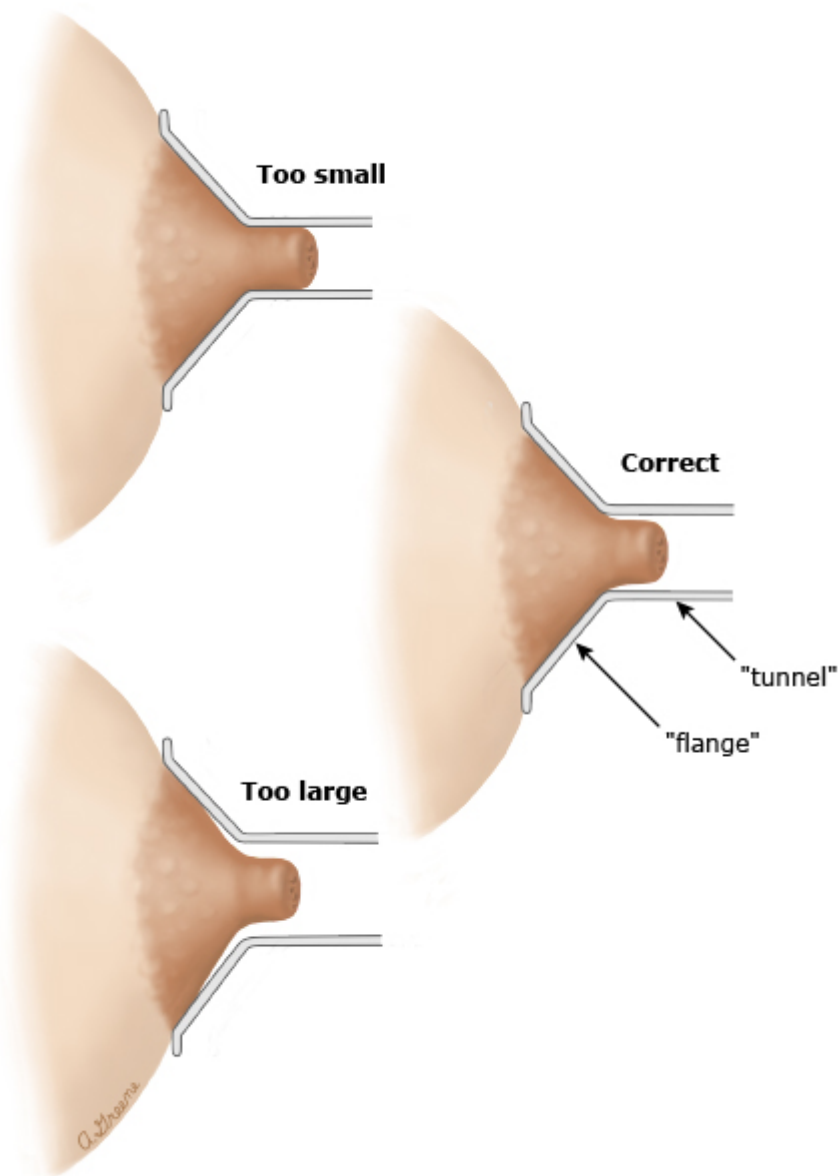
[[1,3-6,10,14-20,22,23](#)].

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GRAPHICS

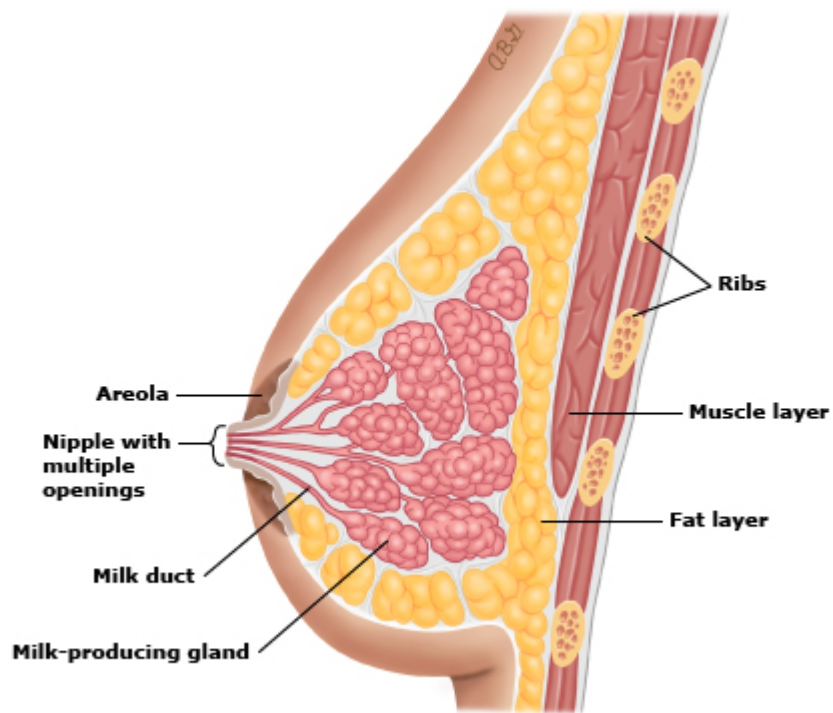
Correct fit of a breast flange for pumping breast milk



This drawing shows the proper fit of a flange for pumping breast milk. (The flange is the cone-shaped piece that fits over the breast and connects to the pump.) The nipple should be centered and move easily within the tunnel. If the flange is too small, the nipple will rub against the sides of the tunnel. This can cause pain and even injury to the nipple. If the flange is too large, air can leak out the sides, and milk won't flow as well.

Graphic 109992 Version 2.0

The breast



Graphic 72583 Version 5.0