Lincoln Pediatrics
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Care of the Very Small Premature Infant

Very small premature babies weigh less than 3 pounds and are usually born more than 8 weeks early (after less than 32 weeks of pregnancy). These babies:

- have very red, thin skin and very little fat
- have perfectly formed internal and external organs
- have organs that, though perfectly formed, are not mature enough to function well for several weeks
- need special care in the hospital for at least 3 to 4 weeks and often much longer until they are mature enough to be cared for at home.

Very premature babies may need to be cared for in the hospital until close to their due dates. If they do well, they may be discharged as early as 4 to 5 weeks before their due date. If they have more problems than average, they may stay in the hospital past their due date.

What causes prematurity?

There are many causes of extreme prematurity. Sometimes a baby may need to be delivered early because the pregnancy is causing a health problem for the mother. Sometimes there is an infection in the birth canal that causes the mother's water to break early or to go into labor too early. Abnormalities of the mother's cervix or uterus can also cause early delivery. Twins are often born early.

What happens after the baby is born?

Because your baby is so small and premature, your baby will be cared for in the special care nursery (SCN) for many weeks. Many premature infants are sickest right after birth and gradually get better as they get older. However, the very smallest infants may have problems for the first 6 weeks. Ups and downs are a normal part of a premature baby's early life, but they are very hard on mom and dad.

The SCN seems to be a noisy and confusing place at first. However, with time you get used to it. The staff in the SCN try to make your baby as comfortable and secure as possible.

- **Special beds** At first the baby is kept on an open warmer, a bed that keeps the baby warm by heating the surrounding air. Open warmers are used for babies who have just been born or need a lot of care so that they can be reached and cared for more easily. Once the baby's breathing rate is OK, the baby is placed in an Isolette. The Isolette is a plastic box with controlled air temperature to keep the baby warm. Babies grow fastest if they are kept warm. When it is easier for a baby to maintain his own temperature and the baby weighs about 4 pounds, he is placed in an open crib.
- **Monitors** All babies are attached to a heart and respiratory monitor while they are in the SCN. These monitors sound an alarm if there is a significant change in the baby's heart or breathing rate. This alerts the staff to immediately check the infant. The baby is also attached to a pulse oximeter, which records the oxygen level in the baby's skin. In addition, there are temperature alarms for the warming beds and Isolettes.
- **Health care providers** Many people will help care for your baby during her stay in the SCN. The neonatologist is a pediatrician who has special training in the care of premature infants. The neonatologist directs the overall care of the baby. Nurses and physician assistants help the neonatologist oversee the baby's progress. Nurses deliver most of the hands-on care during each shift. A very sick baby may have one nurse devoted solely to her care. More stable babies may share a nurse with one or two other babies. The respiratory therapist oversees the breathing needs of babies who need oxygen or are on ventilators. The social worker helps families deal with the emotional stress of having a sick baby. The occupational therapist evaluates the infant's developmental progress and plans a developmental program for your child. All of these people will be happy to talk with you at any time about your baby.
- **Visiting** The SCN staff welcome parents and families to visit their babies as often as possible. The family's presence is very important for the baby's growth and recovery. Sometimes the baby is so sick at first that you may not be able to hold him until he is better. However, touching, holding his hand, talking, and watching are always welcome. The nurse will be your best guide as to how much stimulation your baby can take at one time. The older and more mature your baby is, the more you will be able to handle and care for him. Phone calls are a good way to keep in touch with the nursery staff and are welcome at any time, day or night.

What problems do premature babies have?

Care of the Very Small Premature Infant
Page

There are many problems that a preterm baby faces during the first weeks. The nursery staff expect these problems to occur and watch for them. Most problems of prematurity improve as the baby grows.

Respiratory problems

- Respiratory distress syndrome (RDS) Many babies born prematurely have not yet started making surfactant. Surfactant is a substance that helps keep the lungs open when breathing. Babies who have RDS need oxygen and need help with their breathing until the lungs make surfactant. A ventilator is used for 5 to 7 days to help the baby breathe. The baby is given artificial surfactant to help him breathe until the lungs make their own surfactant.
- Apnea Apnea means "forgetting to breathe". Every small premature baby has some apnea. Apnea occurs because the brain is still immature. It improves as the brain matures. In the meantime, the baby is given help to keep breathing. Medicine (for example, aminophylline or caffeine) is given to stimulate breathing. A device called a nasal cannula or a nasal CPAP may be used to help give your baby extra oxygen and stimulate breathing. Sometimes the baby is put on a respirator, which breathes for her until she is able to breathe more reliably. Babies who are born 12 weeks or more prematurely may not breathe well for several weeks.
- Chronic lung disease Many very preterm babies develop chronic lung problems. These lung problems result from the underdevelopment of the lungs and inflammation of the lungs caused by RDS, oxygen, and respirators. These babies may need extra oxygen for weeks to months. Sometimes a baby's lungs fill with extra fluid. If this happens the baby is given diuretics, a medicine that makes the baby urinate more and get rid of extra water. Most children outgrow these lung problems during the first several months of life. Some children may continue to have problems with wheezing and infections, but usually get better as they get older.

Feedings

Getting the baby to grow is the single most important thing to be done to help him outgrow the problems of prematurity. Feedings are very important. At first the baby may be too weak or have too much trouble breathing to nurse or feed from a bottle. However, there are ways the baby can get fluids and calories for growth without breast or bottle-feeding. Later, when he is stronger, he can breast or bottle-feed.

- Intravenous fluids (IVs) Your baby will be given intravenous fluids (IVs) right after birth. This IV fluid contains sugar to give the baby energy. When a baby has serious breathing problems, he is not well enough to begin feedings right away. All babies lose weight during the first days of life because their bodies get rid of extra water. Once the baby is given food (either by IV or milk feedings), he will begin to gain weight slowly. The smallest babies may take several weeks to regain their birth weight.
- Hyperalimentation Your baby will begin receiving hyperalimentation fluids soon after birth to support her growth. These fluids are given intravenously (IV). They contain sugar, protein, fat, minerals, and vitamins. These fluids will give your baby calories to start growing. Milk feedings will be gradually increased and the hyperalimentation fluids decreased over several days to weeks. Very small premature babies often need several weeks of hyperalimentation before they are ready to take all their milk feedings. Because their veins are very small and thin and wear out quickly, the very smallest babies need a central line, called a PIC line, for hyperalimentation. A central line is an IV which is placed in a central vein in the body. If possible, an IV is put into a vein in the arm or leg and then threaded into a major blood vessel. Sometimes surgery is needed to place a central line in a neck or groin vein. A central line allows the baby to be given higher concentrations of sugar and calories for growth.
- Milk feedings Feeding methods: When the baby is ready, milk feedings are begun. All babies of this size are too small and weak to suck on the breast or bottle. Several methods of tube feeding allow dripping the milk into the stomach or intestine without stressing the baby. Gavage feedings involve passing a tube through the mouth or nose and into the stomach. Milk is dripped in by gravity. Because most small premature babies are fed every 3 hours, the tube may be taped in place so that it does not have to be put into the stomach each time the baby is fed. Very small babies may be fed small amounts continuously so the stomach is never overfilled. A feeding tube that passes through the nose and the stomach and into the intestine is called a nasojejunal tube. It allows milk to be fed directly into the intestine and avoids filling the stomach. Milk for premature infants: Breast milk: Your breast milk is a very important food for your premature infant. It has many important factors that protect your baby against infection and it is also easily digested. Because your premature baby can not nurse you will need to pump your breasts to provide breast milk for your infant. Your nurse can help show you how to pump milk. Your breast milk may be "fortified" with extra protein and calories to help your baby grow faster. Premature formulas: There are formulas made specifically for small premature infants. These formulas contain extra protein, calories, and minerals to stimulate growth in a very tiny baby. Special formulas: Sometimes a baby needs a special formula because of an allergy to milk protein or because he cannot absorb nutrients from his intestine. Examples of such formulas are Nutramigen or Pregestimil. Your baby's doctor will talk to you about which kind of milk he or she thinks is best for your baby. Feeding by breast or bottle: Premature babies are not able to suck and swallow until they reach a gestational age of 32 weeks. Even then they may be very weak and tire quickly when trying to suck. Babies need to learn how to suck, swallow, and breathe all at the same time. This takes many feedings to practice. Do not get discouraged if it takes several weeks for your baby to learn what to do.

Breast-feeding is harder than bottle feeding for a premature baby to master. The baby often has to suck harder to get milk out from the breast than the bottle. But as your baby gets stronger and bigger, breast-feeding will get easier for you and your baby. Your nurse and the lactation consultant can help you practice breast-feeding with your baby. Most of the time a baby will go home taking both breast and bottle-feedings and will switch to full breast-feeding over several weeks.

- Feeding intolerance The premature baby's intestinal tract often doesn't work very well at first. The baby's stomach may empty very slowly, and it may be hard for the infant to pass bowel movements. The baby may vomit often because of looseness of the valve between the stomach and esophagus (gastroesophageal reflux). It is easy for the baby to get distended (the bowel gets

filled with gas). These are all signs that the intestinal tract is immature. The amount of milk a baby is fed is usually increased very slowly. It is important to make sure that the baby can manage each increase well. There may be many starts and stops in the feeding process. The baby's intestinal function improves as she gets older. It may be several weeks before the very smallest infants can take full milk feedings.

Necrotizing enterocolitis (NEC)

Necrotizing enterocolitis is a serious intestinal infection, which some premature babies get. When a baby gets this infection, the feedings don't pass through the intestine well and there is blood in the bowel movements. If this infection is suspected, x-rays are taken of the baby's intestines, feedings are stopped, and the baby is given antibiotics. If the baby does have necrotizing enterocolitis, antibiotics are continued and the baby is not fed for 7 to 10 days. Sometimes surgery is needed. Once the baby starts to recover from the infection and possibly surgery, he will be fed with IV fluids until he is ready to start milk feedings again.

Infection

Premature babies cannot protect themselves against infections very well because their defenses are weak. Once infected, the baby can get sick very quickly. For this reason your health care provider will look closely for signs of infection whenever there is an important change in the baby's behavior and will treat your baby with antibiotics. Examples of such changes include increasing apnea spells, other changes in breathing, and poor digestion of feedings. Your baby may have several courses of antibiotics during his hospital stay.

Intraventricular hemorrhage (IVH)

Very premature infants are at risk for bleeding in the brain (intraventricular hemorrhage). Several ultrasounds of your baby's head will be done during the first week to check for any sign of bleeding. If bleeding occurs, your health care provider will continue using ultrasounds to look for any signs of problems.

Retinopathy of prematurity (ROP)

While inside the mother, the baby lives in a low-oxygen, dark place: the uterus. After birth, the baby is exposed to more oxygen and light. The eye responds to these changes by growing extra blood vessels. This process is called retinopathy of prematurity. The younger the baby is, the more sensitive the retina (back of the eye) is. Every baby who is born at a gestational age less than 28 weeks will have some retinopathy. This blood vessel growth begins around 6 weeks after birth and usually increases until 10 to 12 weeks after birth. Then the blood vessels begin to go away.

If the blood vessels grow too much, there can be pulling on the retina, which may cause the retina to separate from the back of the eye. In its worst form, retinopathy can cause severe problems with vision or even blindness.

Every baby born more than 8 weeks early will be examined by an ophthalmologist (eye specialist). The first exam will be 6 weeks after birth. The exams will continue until the blood vessels have gone away. If the blood vessel growth starts to cause problems, treatment with a laser or freezing (cryosurgery) can be done to keep the retina from separating from the back of the eye.

Anemia

Every preterm baby becomes anemic (has too few red blood cells) during the first 2 months of life. The baby loses blood from frequent blood tests and when her red blood cells get old. She cannot make new blood to replace the lost blood until 2 months after birth. Most babies who are sick and need frequent blood tests, or who weigh less than 3 pounds at birth, will need a blood transfusion to keep the blood count normal. Your health care provider will talk to you about why your baby needs a transfusion when the time comes and tell you the risks and benefits of transfusion.

Preterm babies are given extra iron in their diet so when their bodies can make blood, they have plenty of iron for making new red blood cells.

When can my baby go home?

Each baby recovers and grows at a different rate. There is no firm rule for when a baby can leave the hospital. Generally, a baby is ready to go home when he can keep his temperature in an open crib, take all his feedings from the bottle or breast, and has been free of apnea spells for a week.

If you need to have special equipment at home, the SCN staff will help you arrange for it. They will teach you everything you need to know about caring for your baby at home.

If you visit your baby frequently in the hospital, you will learn how to feed and care for your baby long before he is ready to go home. It is very important for your pediatrician to see your baby often after going home from the hospital. Someone in the SCN will make sure that you have an appointment with a pediatrician after discharge.

What follow-up care does my child need?

Care of the Very Small Premature Infant
Page

Most very premature babies grow up to be normal, healthy children. However, low-birth-weight babies are at greater risk for developmental problems than babies that are not premature. Premature babies also may need special medical attention during their first year of life.

- **Pediatric follow-up** Premature babies need to see their pediatrician often after they leave the hospital. The pediatrician needs to make sure that they are gaining weight well. It is also very important that they get childhood immunizations to protect them against infection. Premature babies with chronic lung problems may need to be examined often to be sure that they do not have problems with wheezing or lung infections. It is not uncommon for these babies to go back to the hospital if they get a bad cold that causes wheezing and trouble with breathing. It is less likely after the first year. Visits to the pediatrician will become less frequent as your baby gets older and healthier.
- **Neurodevelopmental follow-up** A very small premature baby should be examined at a special clinic that follows the baby's growth and progress. If a child shows signs of developmental problems, special education or therapy programs may help the child's development.
- **Vision and hearing** All very small premature babies should have their eyes examined for retinopathy. They should also have vision exams regularly. Children who were premature may be at increased risk for eye muscle problems and may need glasses. All premature babies should have their hearing tested at least once during their first year to make sure they do not have hearing problems.
- **Care at home** Once home, your baby will still need special care, such as more frequent feedings. However, you will see your baby quickly grow and become very healthy and strong. This will reassure you that your baby is recovering and will be normal. As is true for all babies, do not expose your baby unnecessarily to children or adults with colds or the flu. Babies with chronic lung disease are more likely to get upper respiratory infections. It may not be a good idea to take your child to a group day-care home or center may not be advisable in the first year. As your baby grows you can treat him more and more like a normal infant. Try not to be overprotective. Your pediatrician will be able to guide you as your baby grows and thrives.