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A Primer on Preemies

About Preemies

Premature infants, known as preemies, come into the world earlier than full-term babies. Prematurity occurs when a pregnancy lasts less than 37 weeks; full-term infants are born 37 to 42 weeks after the mother's last menstrual period (LMP).

Often, the cause of preterm delivery is unknown and not within a mother's control. Sometimes it's caused by the mother's health conditions during pregnancy, such as gestational diabetes, hypertension, heart or kidney problems, an infection (particularly involving the amniotic membranes, or genital or urinary tracts), or bleeding due to abnormal positioning of the placenta.

Other times preterm birth can be caused by a mother's lifestyle choices, such as poor nutrition, smoking, illicit drug use, or excessive alcohol consumption during pregnancy.

Also, early deliveries can be due to a structural abnormality or overstretching of the uterus from carrying more than one fetus (twins, triplets, or more).

Preterm deliveries are more common in women younger than 19 or older than 40, and those with a previous preterm delivery. However, any pregnant woman may deliver prematurely and many who do have no known risk factors.

Preemies have many special needs that make their care different from that of full-term infants, which is why they often begin their lives after delivery in a neonatal intensive care unit (NICU). The NICU is designed to provide an atmosphere that limits stress to the infant and meets basic needs of warmth, nutrition, and protection to ensure proper growth and development.

Due to many recent medical advances, more than 90% of premature babies who weigh 800 grams or more (a little less than 2 pounds) survive. Those who weigh more than 500 grams (a little more than 1 pound) have a more than 60% chance of survival, although their chances of complications are greater.

A Preemie's Basic Needs

Warmth

Premature babies lack the body fat necessary to maintain their body temperature, even when swaddled with blankets. So incubators or radiant warmers are used to keep them warm in the NICU.

Incubators are made of transparent plastic, and completely surround babies to keep them warm, decrease the chance of infection, and limit fluid loss. Radiant warmers are electrically warmed beds open to the air. These are used when the medical staff needs frequent access to the baby for care. A tiny thermometer taped to the baby's skin senses his/her body temperature and regulates the heat.

Nutrition and Growth

Premature babies have special nutritional needs because they grow at a faster rate than full-term babies and their digestive systems are immature. Neonatologists (pediatricians who specialize in the care of sick full-term and preterm infants) measure their weight in grams, not pounds and ounces. Full-term babies usually weigh more than 2,500 grams (about 5 pounds, 8 ounces), whereas premature babies weigh anywhere from about 500 grams (about 1 pound, 1 ounce) to 2,500 grams.

So, what are premature babies fed? Breast milk is an excellent source of nutrition, but premature infants are too immature to feed directly from the breast or bottle until they're 32 to 34 weeks gestational age. Most premature infants have to be fed slowly because of the risk of developing necrotizing enterocolitis (NEC), an intestinal infection that primarily affects preemies.

Breast milk can be pumped by the mother and fed to the premature baby through a tube that goes from the baby's nose or mouth into the stomach. For women who can't provide breast milk (or can't provide enough of it), doctors may recommend giving the baby pasteurized human breast milk from a milk bank, which is considered a safe alternative. Formula also may be given to babies whose mothers are not able to provide breast milk when donor breast milk is not available.

Breast milk has an advantage over formula because it contains proteins that help fight infection and promote growth. Special fortifiers may be added to breast milk (or to formula if breastfeeding isn't desired), because premature infants have higher vitamin and mineral needs than full-term infants.

Nearly all premature babies receive additional calcium and phosphorus either by adding fortifier to breast milk or directly through special formulas for preemies. The baby's blood chemicals and minerals — such as blood glucose (sugar), salt, potassium, calcium, phosphate, and magnesium — are monitored regularly, and the baby's diet is adjusted to keep these substances within a normal range.

Some preemies who are very small or very sick cannot use their digestive systems to process food. These babies require intravenous (IV) feedings — called TPN, or total parenteral nutrition — made up of fats, proteins, sugars, and nutrients. TPN is given through a small tube inserted into a large vein through the baby's skin or umbilical stump.

Common Health Problems of Preemies

Premature infants are prone to a number of problems, mostly because their internal organs aren't completely ready to function on their own. In general, the more premature the infant, the higher the risk of complications.

Hyperbilirubinemia

A common treatable condition is hyperbilirubinemia, which affects 80% of premature infants. Babies with hyperbilirubinemia have high levels of **bilirubin**, which is produced by the normal breakdown of red blood cells. This high bilirubin level leads to jaundice, a yellow discoloration of the skin and whites of the eyes.

Although mild jaundice is fairly common in full-term babies (about 60%), it's much more common in premature babies. Extremely high levels of bilirubin can cause brain damage, so premature infants are monitored for jaundice and treated quickly, before bilirubin reaches dangerous levels. Jaundiced infants are placed under special blue lights that help the body eliminate bilirubin. Rarely, blood exchange transfusions are used to treat severe jaundice.

Necrotizing Enterocolitis

Necrotizing enterocolitis (NEC) is the most common and serious intestinal disease among preemies. It happens when tissue in the small ("entero") or large ("colo") intestine is injured or begins to die off ("necrotizing"). This causes the intestine to become inflamed ("itis") or, in rare cases, develop a hole.

When this happens, the intestine can no longer hold waste, so bacteria and other waste products pass through the intestine and into a baby's bloodstream or abdominal cavity. This can make a baby very sick, possibly causing a life-threatening infection.

NEC typically affects babies born before 32 weeks gestation, but can occur in full-term infants who have health problems, like a heart defect. Babies with NEC usually develop it within the first 2 to 4 weeks of life. Treatment may involve stopping normal feedings and giving babies intravenous (IV) nutrition for a period of time, draining the stomach and intestines, and/or giving antibiotics. Sometimes surgery is needed to remove a diseased portion of the intestines.

Most infants who develop NEC recover fully and do not have further feeding problems.

Apnea

Apnea is another common health problem among premature babies. During an apnea spell, a baby stops breathing; the heart rate may decrease; and the skin may turn pale, purplish, or blue. Apnea is usually caused by immaturity in the area of the brain that controls the drive to breathe. Almost all babies born at 30 weeks or less will experience apnea. Apnea spells become less frequent with age.

In the NICU, all premature babies are monitored for apnea spells. Treating apnea can be as simple as gently stimulating the infant to restart breathing. However, when apnea occurs frequently, a baby may require medication (most commonly caffeine) and/or a special nasal device that blows a steady stream of air into the airways to keep them open.

Anemia

Many preemies lack the number of red blood cells (RBCs) necessary to carry adequate oxygen to the body. This complication, called anemia, is easily diagnosed through lab tests. These tests can determine the severity of the anemia and the number of new red blood cells being produced.

Preemies may develop anemia for a number of reasons. In the first few weeks of life, infants don't make many new RBCs. Also, a baby's red blood cells have a shorter life than an adult's. And the frequent blood samples that must be taken for testing make it difficult for RBCs to replenish. Some premature infants, especially those who weigh less than 1,000 grams, need red blood cell transfusions.

More Common Health Problems

Low Blood Pressure

Low blood pressure (hypotension) is a relatively common complication that may occur shortly after birth. It can be due to infection, blood loss, fluid loss, or medications given to the mother before delivery. It's treated by increasing fluid intake or prescribing medications. Infants who have low blood pressure due to blood loss may need a blood transfusion.

Respiratory Distress Syndrome

One of the most common and immediate problems facing premature infants is difficulty breathing. Many things can cause breathing difficulties in premature infants, but the most common is respiratory distress syndrome (RDS).

In RDS, the baby's immature lungs don't produce enough of an important substance called **surfactant**. Surfactant allows the inner surface of the lungs to expand properly when the infant goes from the womb to breathing air after birth. Fortunately, RDS is treatable and many infants do quite well.

When premature delivery can't be stopped, most pregnant women can be given medication just before delivery to hasten the production of surfactant in the infant's lungs and help prevent RDS. Then, immediately after birth and several times later, surfactant can be given to the baby if needed.

Although most premature babies who lack surfactant will require a breathing machine, or ventilator, for a while, the use of surfactant has greatly decreased the amount of time they spend on the ventilator.

Bronchopulmonary Dysplasia

Bronchopulmonary dysplasia (BPD), or chronic lung disease, is a common lung problem among preemies, especially those weighing less than 1,000 grams (2.2 pounds) at birth. The exact mechanism for this disease is still unclear, but extreme prematurity, severe RDS, infections before and after birth, and the prolonged use of oxygen and/or a ventilator needed to treat a lung disease all play a major role in the development of BPD.

Preemies are often treated with medication and oxygen for this condition. Their lungs usually improve over the first 2 years of life, but many of them continue to have asthma-like symptoms.

Infection

Infection is a big threat to preemies because they're less able than full-term infants to fight germs that can cause serious illness. Infections can come from the mother before birth, during the birth process, or after birth. Practically any body part can become infected. Reducing the risk of infection is why frequent hand washing is necessary in the NICU.

Bacterial infections can be treated with antibiotics. Other medications are prescribed to treat viral and fungal infections.

Patent Ductus Arteriosus

The **ductus arteriosus** is a blood vessel that is an essential part of fetal blood circulation, allowing blood to bypass the lungs, because oxygen for the blood comes from the mother and not from breathing air.

In full-term babies, the ductus arteriosus closes shortly after birth, but it frequently stays open in premature babies. When this happens, excess blood flows into the lungs and can cause breathing difficulties and sometimes heart failure.

Patent ductus arteriosus (PDA) is often treated with a medication called indomethacin or ibuprofen, which is successful in closing the ductus arteriosus in more than 80% of infants requiring these medications. However, if medical therapy fails, then surgery may be required to clamp the ductus.

Retinopathy of Prematurity

A preemie's eyes are especially vulnerable to injury after birth. A serious complication is retinopathy of prematurity (ROP), which is abnormal growth of the blood vessels in an infant's eye. About 7% of babies weighing 1,250 grams (2.75 pounds) or less at birth develop ROP, and the resulting damage may range from mild (the need for glasses) to severe (blindness).

The cause of ROP in premature infants is unknown. Although it was previously thought that too much oxygen was the primary problem, further research has shown that oxygen levels (either too low or too high) play only a contributing factor in the development of ROP. Premature babies receive eye exams in the NICU to check for ROP.

After the NICU

Preemies often require special care after leaving the NICU, sometimes in a high-risk newborn clinic or early intervention program. In addition to the regular well-child visits and immunizations that all infants receive, premature infants receive periodic hearing and eye examinations.

Careful attention is paid to the development of the nervous system, including the achievement of motor skills like smiling, sitting, and walking, as well as the positioning and tone of the muscles.

Speech and behavioral development also are important areas during follow-up. Some premature infants may need speech therapy or physical therapy as they grow up. Babies who had complications in the NICU may need additional care from medical specialists.

Family support is also important. Caring for a premature infant is even more demanding than caring for a full-term baby, so the high-risk clinics pay special attention to the needs of the family as a whole.

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