



Guardian Angels Who Arrive Early

Dr. Zhao Lu-Lu and Taipei Tzu Chi Hospital Neonatology Team

By Jheng Ran-Shi

The term “premature birth” refers to babies who are born between 20th and 37th weeks of pregnancy. Newborns weighing less than 2,500 grams are low-weight premature infants; those less than 1,000 grams are extremely low-weight

premature infants. About 30 to 35 percent of preterm births can be medically anticipated. Preeclampsia, early placental dissection, fetal distress, and dysplasia are common medical indications of a likely premature birth. There are nearly



Xiaohong's family happily took a group photo with the medical team.

200,000 newborns every year in Taiwan of which about 10% are premature babies. Nearly 20,000 premature babies are born in Taiwan each year unprepared due to early arrival in this world. At Taipei Tzu Chi Hospital, led by Zhao Lu-Lu, Director of the Neonatology Department of the Department of Pediatrics, the medical team works day and night to protect every premature baby who comes unprepared into the world early.

Premature Babies Experience Many Dangers within the First Two Weeks

In January 2006, Beibei, who weighed only 770 grams, came into the world unexpectedly at 27 weeks. Her heartbeat and breathing were very weak, and she even developed respiratory distress syndrome. Fortunately, after emergency care from the rapid response members of the neonatology team, Beibei, covered in tubes, was put into an incubator. But a week later, Beibei suddenly experienced severe pulmonary hemorrhage due to complications from an open ductus arteriosus. Director Zhao Lu-Lu gave emergency medication and then used the respirator to accelerate the alveoli at a pseudo-high frequency of 90 beats per minute to help Beibei to breathe.

“At that time, the Taipei Tzu Chi Hospital had just opened, and high-flow

respirators had not yet been introduced. As a result, the medical team adjusted traditional respirators to mimic high-frequency lung circulation support. At that time, I was almost always by Beibei's side, manually adjusting the oxygen flow,”



When Beibei was discharged from the hospital, Director Zhao Lu-Lu held little Beibei's hand to record this precious moment.



Runrun's body is covered with lines for monitoring and maintaining life signs.



Director Zhao Lu-Lu said.

Unexpectedly, just when everyone thought Beibei's vitals were finally stable, director Zhao Lu-Lu discovered during an ultrasound examination that Beibei's brain had severe intraventricular hemorrhaging due to emergency treatment. The blood clot blocked the flow of cerebrospinal fluid and required drainage to reduce brain pressure. However, because Beibei is only the size of an adult's hand, it was impossible to use ordinary drainage tubes to drain the cerebrospinal fluid into the abdominal cavity for absorption. Therefore, the medical team used a special drainage method to regularly extract cerebrospinal fluid directly from the brain with disposable injection needles.

Under the careful care of the medical team, little Beibei survived and her health improved. The respirator was completely removed two months after she was born. When she was three months old, her weight reached 1,800 grams, and she successfully left the incubator. When Beibei's parents learned that their little baby's condition was stable, Beibei's mother shed tears of excitement and held Director Zhao Lu-Lu's hand tightly. She was grateful to the medical team for giving her daughter the opportunity to explore the world.

Director Zhao Lu-Lu said that premature infants are prone to serious complications after birth due to



Runrun's father's paintings are still hanging in the reception room of the neonatal intensive care unit, hoping to bring some strength to all parents of premature babies.

underdevelopment of all organs. Within the first two weeks of birth, respiratory distress syndrome, open ducts and intraventricular hemorrhage are the most common complications.

Respiratory Distress Syndrome

When the fetus grows and develops in the mother's body, the acquisition of oxygen and the elimination of carbon dioxide are achieved through the placenta via the mother's body. The fetus's lungs do not yet function as respiratory organs. In premature fetuses born before 37 weeks, the lungs are still immature and cannot immediately take over the function of exchanging gases in and out, resulting in development of respiratory distress syndrome.

Open Duct

Similarly, most of the fetal blood in the mother's body flows into the aorta through the ductus arteriosus and then is transported to the whole body. Generally speaking, the ductus arteriosus will close after the baby is born, but premature babies will develop ductus arteriosus due to poor muscle contraction. If it remains



Ms. Chu Chiu-Hua commutes by bicycle whenever possible to make a valid contribution to energy conservation and carbon reduction.

open, it is known as “open ductus arteriosus”.

For instance, in Beibei's case, as her respiratory condition improved, excess blood flowed to her lungs via the ductus arteriosus, causing damage to lung functions.

Intraventricular Hemorrhage

As for intraventricular hemorrhage, it is due to the fact that the germplasm structure of the fetal brain chamber has not completely degenerated due to premature birth. It is easy for the brain to undergo changes in blood pressure or hypoxia due to emergency treatment, leading to blood vessel rupture.

The Most Difficult Complication of Premature Infants - Necrotizing Enteritis

When a premature baby is about a week old and their condition gradually stabilizes, breastfeeding will slowly replace intravenous nutrition injections to supply the baby with the nutrients he needs. Similarly, the gastrointestinal system of premature babies is not yet mature. Not only are the intestinal diameters small and blood perfusion insufficient, but some important digestive enzymes have not yet begun to be secreted. Therefore, the gastrointestinal mucosa is easily



damaged. A baby drinking too much milk may experience necrotizing enteritis.

Runrun, another angel who arrived early, is an example. Runrun originally grew in her mother's womb with her twin brother; however, she didn't expect that her mother would suffer a sudden miscarriage due to uterine contractions at the 28th week. After emergency treatment by the medical team, only Runrun was lucky enough to survive. There were no complications in Runrun's brain or heart after birth. In the eyes of the medical staff, she was an energetic little angel. However, a worrying situation appeared a week later. Runrun developed abdominal distension, low energy, and bloody stools. Director Zhao Lu-Lu suspected that it was a precursor to necrotizing enteritis. To prevent the condition from worsening, the medical team temporarily stopped Runrun from drinking milk. After three days of close observation, Runrun's gastrointestinal problem was successfully resolved, and her condition became better and healthier.

Necrotizing enteritis is a severely destructive intestinal disease and the most common complication in premature infants, with a mortality rate of 10 to 30%. Clinically, it can be divided into a suspected stage, a confirmed stage and a worsening stage, according to systemic symptoms, intestinal symptoms and abdominal X-ray manifestations.

In the suspected stage, there would be abdominal distension, decreased vitality, and fecal occult blood. Next, in the confirmed stage, bowel sounds will



XiaoHong is about to be discharged from the hospital. Director Zhao Lu-Lu explains basic care and precautions to his parents.



The medical team prepared a diary to record every detail of Xiao Hong's growth. Director Zhao Lu-Lu shared the contents of the diary with Xiao Hong's father.

disappear, and X-ray examination will show signs of intestinal wall pneumatosis or hepatic portal vein pneumatosis. Lastly, in the worsening stage, the baby may experience intestinal perforation and peritonitis, and sepsis may develop, leading to unconsciousness.

Director Zhao Lu-Lu pointed out: “The course of necrotizing enteritis progresses very quickly. It may develop to the third stage within two to three days, and there is often a 30% chance of death within a few hours. Infants who experience necrotizing enteritis are at a higher risk of cognitive and developmental delays in the future. “Low birth weight is the most common cause, and the younger the premature baby is, the more likely it is to suffer from this disease. Once this disease occurs, the sick child usually needs to fast immediately and be given extensive antibiotic treatment. Even if the condition is stable, the infant still needs to be switched to total intravenous nutrition injection. However, if the condition worsens or exhibited symptoms such as intestinal perforation and peritonitis occur, surgery will be required to remove the necrotic intestine.

Although Runrun’s parents were eagerly anticipating twins, the sudden miscarriage and premature birth left them with mixed emotions. But Runrun’s lucky survival gave them hope. Although the baby had encountered necrotizing

enteritis, Runrun’s mother was still full of hope. Gratefully, she said: “Fortunately, the medical team was careful and sensitive and observed the signs of the disease in time, so Runrun could recover safely without undergoing surgery, which also made me feel less distressed and guilty.” After Runrun was discharged safely, her parents would regularly return with her to Taipei Tzu Chi Hospital’s early intervention care clinic. There, under the care of teams from various departments, Runrun’s growth indicators gradually increased, even catching up with the progress of full-term babies.

In a blink of an eye, Runrun turned two years old. Her parents took her to the outpatient clinic of Director Zhao Lu-Lu. The lovely Runrun was invited by the neonatology team to visit the Newborn exhibition. When Director Zhao Lu-Lu walked into the exhibition, the first thing she saw was a painting that moved her deeply - it was a picture of a baby sleeping soundly on her stomach. It turned out that Runrun’s father is a painter. He was full of stress when Runrun had just been born, so he would relieve his emotions by painting. Runrun’s father said: “What I painted was Runrun’s appearance in the incubator. He painted her especially fat because he wanted his daughter to grow up safely.” Later, he donated this precious painting to Director Zhao Lu-Lu, and it still hangs on the wall of the reception room of



the pediatric intensive care unit, hoping to give all parents of premature babies some strength.

Guarding These Early Angels to Grow

With the advancement of neonatal medical care, the survival rate of premature infants has greatly improved. However, there are some premature infants whose gestation weeks are less than 32 weeks or whose birth weight is less than 1,500 grams, because of premature birth or related complications, which inhibits neuromuscular, mental and language development, affecting future learning ability and behavioral performance. Therefore, the neurobehavioral development of premature infants will be evaluated by the rehabilitation department while they are hospitalized in the intensive care unit. The examination can usually be carried out after the medical condition is stabilized.

The developmental performance assesses body muscle tone, primitive reactions such as sucking, grasping and stepping, as well as the ability to maintain alertness, behavioral responses to external stimuli and self-quieting. Director Zhao Lu-Lu pointed out: "Premature infants will need more time to develop and adapt than full-term infants. At this time, it is necessary to use the assessment

standard for premature infants - corrected age, to track gross motor movements, fine motor movements, language and cognitive skills before the age of two, also including processing and social development. "

Generally speaking, the discharge eligibility evaluation of premature babies is mainly based on the baby's breathing ability, swallowing ability and weight growth. After the doctor assesses that the baby is eligible for discharge, the parents or primary caregivers will be invited to learn basic post-discharge care, including understanding the baby's behavior and language, practical operations of kangaroo care, and basic infant CPR first aid. After educating family members regarding basic care knowledge, arrangements will then be made for the baby to be discharged and returned home.

Of course, there are some relatively lucky premature babies who will not experience the above-mentioned dangerous symptoms. In early June 2023, Xiao Hong was born prematurely at just 24 weeks due to incomplete closure of the mother's cervix. Fortunately, Xiao Hong did not suffer any serious complications, with the exception of needing a respirator and an orogastric tube to assist with breathing and eating. Three months later, his weight gradually increased from 715 grams to 2,300 grams. He was able to breathe on his own and drink milk. As a result of the baby's progress, Xiao Hong's father

reported to the ward every day to learn basic care from the nurses and helped Xiao Hong be fully prepared for discharge.

Xiaohong's father skillfully demonstrated the kangaroo care and neonatal CPR to Director Zhao Lulu and the nurses. He said proudly: "Look! This naughty guy calmed down as soon as he was in my arms. It seems that I am very suitable to be a Kangaroo Dad!" Director Zhao Lu-Lu said with a smile: "Kangaroo dad, please take good care of the little joey in your arms. Xiao Hong will be discharged from the hospital soon. You must be proficient in these basic courses!"

Dr. Lu-Lu's Mission: to Make Little Lives Safe and Healthy

I am a twin, and my mother named our sisters Lulu and Shuang-shuang. Perhaps at that time, it was destined that in the future I would take care of these little new lives just like morning dew fertilizes the seedlings..." After graduating from medical school, Zhao Lu-Lu received specialist training in the Department of Pediatrics at National Taiwan University. In the middle of the night during my second year residency, I saw the premature baby I was caring for, looking at me with wide eyes, as if to say - "I want to survive, so I need to leave the incubator to see the outside world"... Zhao Lu-Lu was moved by the premature baby's wide



Director Zhao Lu-Lu inspects the conditions of premature babies in the intensive care unit daily.

eyes communicating to her, and therefore determined to move towards the direction of neonatology in the future.

"As long as the baby can be safe and healthy, then I am willing to devote all my efforts." Taking care of premature babies is not an easy task. Director Zhao Lu-Lu has already regarded it as a lifelong challenge in the 17 years she has served at Taipei Tzu Chi Hospital. Accordingly, she continues to improve her professional knowledge and skills, listens to the Dharma carefully and practices it to enrich her humanistic quality through her dedication and providing the greatest support to families of premature babies, and assisting more premature babies to grow up safely and healthy.