

Premature Babies Delivered by Assisted Reproductive Technology and Their Family Care Experience

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ABSTRACT

Currently, the majority of couples who choose assisted reproductive technology (ART) have waited for and experienced the disappointment of natural conception. With the assistance of ART, they are finally able to "carry a baby to term." This is wonderful for first-time parents. This case report involves a woman who delivered a premature baby weighing 1,520 g at 30⁺ weeks using ART and her family care experience. During the period of care from October 23, 2016 to December 9, 2016, data were collected on this case through systemic assessment, clinical observation, and parental interview. Problems including gas exchange disorder, caregiver role tension, and the potential risk of parent-child attachment disorder were identified. In addition to providing appropriate medical care to maintain stable vital signs, we hoped to reduce the occurrence of comorbidities through a complete nursing assessment and comprehensive developmental care. We also attempted to build trust and to reduce parental anxiety and stress by providing relevant medical information and psychological support through active and proactive nursing care. The performance of "kangaroo care" with stable vital signs enhances parent-child attachment and a sense of involvement in the ongoing care of the infant. This strengthens the mother's motivation and self-confidence in her caregiving role, enhances her sense of accomplishment as a mother, and promotes the growth and development of the infant after returning home. The weight of the infant reached 2,430 g before discharge. Before discharge, the mother was able to cite at least two caregiving skills and her eyes were no longer red from sobbing. We hoped that the parent-child attachment was well developed and that "kangaroo care" will assist the mother to face the future with a positive attitude after returning home. This article can be used as reference for nursing practitioners to improve the quality of care for premature babies.

Keywords

Assisted reproductive technology, Premature Deliveries, Nursing practitioners, Infants.

Introduction

According to Duvall's family development theory, first time parenthood represents the initiation of the parenting phase of the family life cycle [1]. The addition of a newborn to a couple represents a significant change in the family system. The arrival of a premature child that will require extensive care necessitates further adjustment. The uncertainty of a premature child's survival

when its' condition is not yet stable can result in shock, frustration, and anxiety in the parents [2]. Furthermore, the fear of loss due to rapid changes in the premature infant's condition may also pose a hidden risk to parent-child attachment. It is worth noting that while parents may begin to learn caregiving skills during hospitalization, a different situation arises when they return home to care for the premature infant themselves. Without the experience of caring for a premature infant, they fear they will fail, and they are often anxiety-ridden during the hospitalization period [3]. Anxiety and lack of skill can lead to extended hospital stays or readmission after discharge [4]. Holistic nursing care provided by nursing

practitioners can improve the condition of the premature infant, reduce anxiety of the parents, and promote a positive parent-child relationship between the premature infant and parents. This care can improve the future quality of life of the premature infant and his or her family [5]. These factors illustrate the importance of this case study.

This case report describes a woman who conceived with the assistance of assisted reproductive technology (ART) and delivered a premature baby weighing 1,520 g at 30⁺ weeks. Due to respiratory distress and unstable vital signs in the early stages of life, the infant received maintenance care in the intensive care unit (ICU). This caused the mother to be nervous and anxious and to have an emotional reaction regarding parent-child separation and her future care of the infant. The mother's eyes were red, and she repeatedly asked questions regarding the infant's care during family meetings. This situation motivated the author to explore the issue on a deeper level. The goal was to conduct a complete nursing assessment during the hospital care period from October 23, 2016 to December 9, 2016. As a result of this assessment, the mother should be able to provide optimal care for her premature infant. This would reduce the occurrence of comorbidities, enable "kangaroo care" with stable vital signs to enhance the parent-child attachment, strengthen the mother's motivation and self-confidence, and maintain the parent-child attachment after returning home. These skills would enable the parents to face the future with a positive attitude. It is the goal of this research to serve as a reference for clinical nursing practitioners when caring for premature infants and to improve the quality of associated nursing services.

Literature review

This literature review focuses on three major health care issues: premature babies and related comorbidities, holistic care for premature babies, and support for parents facing the stress of caring for a premature infant.

Premature babies and related comorbidities

Premature babies have undeveloped organs and are less able to adapt to the external environment than full-term babies are. This results in a high mortality rate. Premature babies with fewer weeks of pregnancy or lower birth weights are prone to pulmonary disease, visual impairment, and cerebral hemorrhage [6]. They are also susceptible to comorbidities such as respiratory distress and sepsis [7]. Potential comorbidities are divided into the following three categories: (1) The respiratory system: The alveolar epithelial cells are immature and are not able to secrete sufficient surfactant, which leads to respiratory distress [8]; (2) The central nervous system: Intraventricular hemorrhage is the most common of the cerebral lesions. Premature babies weighing less than 1,500 g or attaining less than 32 weeks of gestation have a 30%–40% chance of developing intraventricular hemorrhage [9]; (3) The immune system: Inadequate antibodies and complements, defective phagocytosis, and the use of numerous life-saving devices increase the chance of infection [10].

Highlights of holistic care for premature babies

The development of supportive care is based on the systemic comorbidities of premature infants to minimize harmful stimuli, to meet the needs of premature infants, and to assist them in adapting to the environment outside the womb. The principles of holistic care include: (a) Avoidance of harmful stimuli: (1) Use of nesting and containment to maintain a flexion position (mimicking the position in the womb) to promote appropriate brain development [11]; (2) Control of the environment (e.g., reducing light and sound stimuli) [12]; (3) Involving parents in the infant's care to promote the establishment of parent-child attachment. As an example, the use of "kangaroo care" can stabilize vital signs, reduce crying, lower oxygen consumption, and promote weight gain and the development of neurological functions. Moreover, it promotes the establishment of an intimate relationship between parents and children and reduces the tension and anxiety of the caregiver [12]. (b) Infection prevention: (1) Provide a sterile atmospheric environment in the incubator to give premature babies adequate protection, clean skin folds of the head, neck, and armpits, and clean hands to reduce 30%–80% of nosocomial infections [9]. (2) Premature infants have poorly developed connective tissue between the epidermis and dermis, low immunoglobulin levels, and poor ability to defend against viruses and bacteria; (3) Jaundice is a symptom in 50% of premature infants, and the protective eye shields used for blue light exposure often become a breeding ground for bacteria and viruses. This increases the potential for cross-infection; (4) When the infant's vital signs are stable, nurses must wash their hands thoroughly with soap and water before touching the infant and avoid wiping their eyes, nose, or mouth directly with their hands [13].

Care measures for parents facing the stress of caring for a premature infant

Attachment refers to the strong and enduring emotional connection between an individual and a significant other. Attachment enables them to remain connected over time [14]. This is a critical emotional factor in parent-child bonding. In obstetrics and gynecology, attachment theory highlights the importance of parent-child bonding. Parents are prone to insecurity and anxiety regarding the health status of their unexpected premature infant. They lack knowledge regarding the care of their baby. They have concerns regarding the subsequent disability of their child. They also may experience difficulties in caring for the infant due to the infant's delayed development. These factors add to parental stress, which in turn affects their confidence in their role as parents [15]. Research has shown that effective health training programs can improve parental caregiver and communication skills [16]. In clinical practice, parent-child bonding, identifying the sources of anxiety and learning caregiving skills can reduce the impact of the anxiety parents face caring for a premature infant. In obstetrics and pediatrics, attachment theory specifically highlights the importance of parent-child bonding and emphasizes the concept of family-centered care. Nursing practitioners provide family-centered care to assist parents in effectively practicing the positive concepts of parent-child attachment through gentle touch, eye contact (such as "kangaroo care"), interactive touch, skin-to-skin contact, visual contact, and other stimuli. These interventions

promote earlier development and strengthen the attitudes and motivation of motherhood [14].

Nursing assessment

Case introduction

The infant was delivered spontaneously on October 23, 2016 at 30⁺⁵ weeks premature, with a birth weight of 1,520 g (50th percentile). The Apgar score was 2 at 1 min and 6 at 5 min; the heart rate was below 60 bpm. Endotracheal intubation and chest compressions were performed. When the vital signs were stable, the infant was transferred to the neonatal intensive care unit (NICU) for further treatment. On November 15, 2016, parent-child attachment was established with “kangaroo care” as allowed by the infant’s condition. On December 9, 2016, the baby was stable and was transferred to a moderate ICU for further observation. The diagnoses were pneumothorax (no treatment needed) and respiratory distress syndrome grade 3. The mother continued to stay in the hospital in the confinement center after delivery (she visited the baby every day). She showed care for the infant by touching him. Figure 1 shows the family tree.

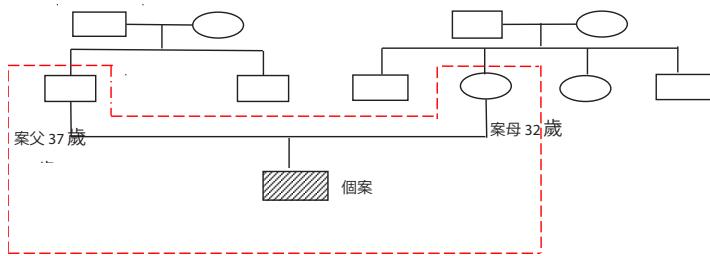


Figure 1: Family tree.

Health assessment

During the hospital care period, the health challenges of the infant and caregivers were confirmed through systemic assessment, clinical observation, and parental interview.

Physical assessment of the premature infant

Appearance

The facial features were normal, the skin was thin; the veins were clearly visible to the naked eye; and there were a few Mongolian spots on the buttocks. The front and back fontanelles were not closed; there was no bulging or depressions; the features were symmetrical; there was no cleft lip or palate; and the limbs were intact, without polydactyly or defects. The breasts were symmetrical, with no discharge or lumps; the testicles were undescended on both sides; and the genitalia were normal in appearance, with no discharge or skin damage.

Cardiovascular system

The heart rate was below 60 bpm at birth; after an endotracheal tube was placed, the heart rate was 140–160 bpm on October 25, 2016, with regular rhythm. A cardiac ultrasound on October 26, 2016 showed an open arterial catheter, no cardiomegaly, the blood pressure was 55/22 (36) mmHg. The vital signs were stable during treatment: a heart rate of 142–156 bpm, respirations of 24–50 bpm, and blood pressure of 55/32 (38) mmHg. A cardiac ultrasound on

November 9, 2016 showed that the open arterial duct was closed.

Respiratory system

An endotracheal tube was placed at birth, and a chest radiograph showed respiratory distress syndrome grade 3, bilateral lung ground glass, a clear demarcation between the heart and lungs, and white mucous sputum in the endotracheal tube. A chest radiograph on October 25, 2016 showed a small amount of pneumothorax in the left upper lung, which required no immediate treatment. Vital signs were stable on November 2, 2016. The endotracheal tube was removed and the ventilator device was set to non-invasive positive pressure ventilations (NIPPV) to assist breathing. The vital signs were stable from November 2, 2016 to November 9, 2016; blood oxygen concentration was approximately 95%–98%. The infant’s breathing was smooth and regular without effort, and there was no respiratory pause or slowing of the heartbeat. Thus, the NIPPV was adjusted to nasal continuous positive airway pressure (NCPAP). The infant was assessed as having a gas exchange disorder.

Gastrointestinal system

The infant fasted after birth. There was orogastric tube decompression and a soft abdomen. A 10% intravenous glucose drip, supplementation with total parenteral nutrition (TPN) and fat emulsion (20% SMOF Lipid) resulted in slow bowel movements and 3–5 g of dark green meconium 2–3 times per day. On November 3, 2016, we attempted to feed the infant 2 mL of breast milk every 6 h with an orogastric tube. Subsequently, the number of daily feedings were increased. On November 6, 2016, 6 mL of breast milk every 3 h was infused through an orogastric tube. The infant’s stool changed from a transitional stool to a soft yellow paste with 6–10 g of stool 4–5 times a day. The total day fluid (TDF) (TDF: 130 Kcal/kg/day) was achieved on November 13, 2016. A total of 30 mL of breast milk was provided every 3 h. Only a small amount of air was pumped without milk, and the supplementation of TPN and fat emulsion was discontinued. A complete breast milk feeding by orogastric tube or oral cavity is possible during hospitalization.

Neurological and Musculoskeletal system

The infant showed weak muscle tone, frog-like spreading of the limbs, a flat spine, and no latent hair, dimples, or bulges on its’ back. A brain ultrasound on October 25, 2016 showed a second hemorrhage in the left ventricle, which required routine follow-up.

Urinary tract

The average daily urine output was 1–3 mL/kg/h, the color was light yellow and clear, and the specific gravity of urine was between 1.008 and 1.010. No urinary problems were identified after the assessment.

Immune system

The postnatal WBC (white blood cell) count was 18.40 K/ μ L, C-reactive protein level was 0.04 mg/dL, and the axillary temperature was 36.3–36.7°C. The blood culture was negative. There were invasive lines on the infant’s body, such as peripherally placed central venous catheters and arterial catheters. Assessment results: The infant had a potential risk of infection due to invasive medical treatments.

Family adaptation assessment

Family system assessment

The family structure was small. The mother was a company secretary, and the father was a banker. The family was economically comfortable. The primary decision-maker in the family was the father. The mother had no specific illnesses or a family history of disease. On November 10, 2016, the mother stated, "I have been married for many years and could not conceive naturally; therefore, I requested artificial fertilization, which was successful. Since it was my first pregnancy, I had high hopes for the birth of my baby." She had a routine maternity examination at a maternity clinic since conception. Her amniotic fluid ruptured at 30^{+5} weeks, and she gave birth in our hospital on the advice of her physician. The parents had a harmonious relationship and a positive attitude; however, both expressed great anxiety regarding the care and future development of their infant. During the period of hospital care from October 23, 2016 to October 28, 2016, the mother repeatedly asked questions and often sobbed. She was assessed as having anxiety concerning care for the infant. This was the result of tension regarding her role as a caregiver.

Psychological assessment of the infant's parents

The parents stated on October 24, 2016, "The baby is so small, and there are so many tubes in him. I do not dare to touch him. I am afraid I will be too rough and hurt him if I touch him." The father

stated: "I am worried that the baby will not survive this dangerous period." The mother stated on October 26, 2016, "It is my first child, and I have no experience with a birth and care. I was happy to have a baby, and the whole family was waiting to welcome him. I talked to him every day, hoping he would grow up safe and healthy, although now he is born prematurely and weighs so little. Apart from worrying about him being separated from me at such a young age, I do not know how to take care of him in the future; therefore, what can I do?" The father stated on October 29, 2016, "When will the intravenous drip end? Will the drip be bad for him in the future? I really wish to share some of the burden with the baby." The mother stated on November 2, 2016, "I do not dare to hold such a small child." The mother said on November 3, 2016, "How to feed him? How to take care of him?" After finishing these words, she looked up at the ceiling and rubbed her hands. After the assessment, caregiving problems and risks were identified arising from alterations in the parent-child attachment.

Problem Identification

During the period of care from October 23, 2016 to December 9, 2016, data were collected through systemic assessment, clinical observation, parental interview, and direct care. The following health related problems were identified: (a) gas exchange disorder; (b) potential risk of alterations in the parent-child attachment; (c) caregiver role tension; and (d) potential risk of infection. Due to space limitations, only three health care issues are discussed in detail.

Nursing measures

Problem 1: Gas exchange disorder related to pneumothorax.

Care objectives	1. Maintain stable vital signs with SpO_2 above 90% (10/23–11/01) using the respirator. 2. Disconnect the respirator as soon as possible.																																																													
Subjective data	1. 10/24: Father, "He's breathing so hard, why is he like this". 2. 10/24: Father, "He seems to have a concave chest? The monitor shows that the breathing numbers are jumping around, and now they are jumping to 66? What does this mean? We are so nervous." 3. 10/26: Father, "The baby looks like he is still breathing very hard and his chest is still very concave! Will the pneumothorax get worse?" "Baby! You have to do your best! Daddy and mommy are with you every day. You have to get better so that you can take off the breathing tube and breathe on your own sooner!"																																																													
Objective data	1. 30^{+5} weeks premature, low weight, sternal rib depression, moaning while breathing, cyanotic skin and low muscle tone, heart rate below 60 bpm, and blood oxygen concentration of approximately 60%. 2. 10/23: Chest X-ray: Respiratory distress syndrome grade 3, surfactant, bilateral lung ground glass, clear demarcation between heart and lungs, and white mucous sputum in the endotracheal tube. 3. 10/24: Respiratory distress with pneumothorax, and breathing sounds showed bilateral wet rales. 4. 10/25: The sternal rib depression remained obvious, blood oxygen concentration was approximately 80%–85%, the heart rate was 160 bpm, and respiratory rate was 80–100 bpm. 5. 10/24: Antibiotics were given. An X-ray revealed pulmonary infiltrates and slight inflammation. 6. 10/26–11/01: Lung X-ray changes were as follows: <table border="1"><thead><tr><th>Date</th><th>Lung X-ray changes</th></tr></thead><tbody><tr><td>10/26</td><td>Pulmonary infiltrates and slight inflammation</td></tr><tr><td>10/27</td><td>Pulmonary infiltrates and slight inflammation</td></tr><tr><td>10/29</td><td>No pulmonary infiltrates and slight inflammation was present</td></tr><tr><td>10/31</td><td>No pulmonary infiltrates and no inflammation</td></tr><tr><td>11/01</td><td>No pulmonary infiltrates and no inflammation</td></tr></tbody></table> 7. Arterial gas analysis: <table border="1"><thead><tr><th>Date</th><th>10/23</th><th>10/24</th><th>10/25</th><th>10/26</th><th>11/1</th><th>11/2</th></tr></thead><tbody><tr><td>pH</td><td>7.283</td><td>7.351</td><td>7.353</td><td>7.356</td><td>7.361</td><td>7.358</td></tr><tr><td>PaCO₂</td><td>67.7</td><td>34.5</td><td>34.8</td><td>36.9</td><td>36.7</td><td>34.8</td></tr><tr><td>PaO₂</td><td>56</td><td>88.7</td><td>93.1</td><td>90.1</td><td>94.3</td><td>93.6</td></tr><tr><td>HCO₃</td><td>23.8</td><td>22</td><td>23</td><td>23.6</td><td>23.6</td><td>23.8</td></tr><tr><td>BE</td><td>-4</td><td>+1</td><td>+1</td><td>-1</td><td>+1</td><td>+1</td></tr><tr><td>Remarks</td><td>Respiratory acidosis</td><td>Normal</td><td>Normal</td><td>Normal</td><td>Normal</td><td>Normal</td></tr></tbody></table>	Date	Lung X-ray changes	10/26	Pulmonary infiltrates and slight inflammation	10/27	Pulmonary infiltrates and slight inflammation	10/29	No pulmonary infiltrates and slight inflammation was present	10/31	No pulmonary infiltrates and no inflammation	11/01	No pulmonary infiltrates and no inflammation	Date	10/23	10/24	10/25	10/26	11/1	11/2	pH	7.283	7.351	7.353	7.356	7.361	7.358	PaCO ₂	67.7	34.5	34.8	36.9	36.7	34.8	PaO ₂	56	88.7	93.1	90.1	94.3	93.6	HCO ₃	23.8	22	23	23.6	23.6	23.8	BE	-4	+1	+1	-1	+1	+1	Remarks	Respiratory acidosis	Normal	Normal	Normal	Normal	Normal
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Nursing measures	Result assessment
<p>1. 10/23: Assisted the physician in providing surfactant and monitored changes in the vital signs.</p> <p>2. Monitored the arterial blood gas analysis values according to the physician's orders. Used the above as a basis for adjusting the ventilator settings and immediately informed the doctor of any abnormality.</p> <p>3. Monitored and recorded vital signs and blood oxygen concentration every hour, adjusted the ventilator settings if necessary, and maintained the blood oxygen concentration above 90%. When it was less than 90%, immediately identified the cause (such as whether the line was dislodged, twisted, pressurized, or obstructed by sputum).</p> <p>4. Assessed the fixed position of the endotracheal tube and the function of the ventilator each shift to ensure they were correct. Operated the ventilator properly and evaluated its' effect. Was attentive to the warning bell and resolved any issues.</p> <p>5. Provided proper support for the tubing to avoid tugging on the nasal or oral cavity. Changed the artificial skin or the stretchable tape whenever it became wet.</p> <p>6. Assisted in turning the infant every 2–3 hours. Provided chest physiotherapy, postural drainage, and sputum pumping according to the doctor's orders, and observed and recorded sputum volume, color, and properties.</p> <p>7. Continually monitored the vital signs during sputum pumping and provided subsequent containment care to promote the rapid recovery of vital signs.</p> <p>8. Provided intensive care, avoided unnecessary stimulation, and adjusted and maintained the optimal oxygenation position.</p> <p>9. Performed ventilator removal training as prescribed by the physician and observed and recorded the infant's vital signs.</p> <p>10. The health care team worked together daily to evaluate the possibility of removing the endotracheal tube.</p>	<p>1. 10/23: After the surfactant was provided, the blood oxygen concentration was 90%–95%, breathing was effortless without sternal rib depression, and the respiratory rate was 60–90 bpm.</p> <p>2. Prior to removing the endotracheal tube, the arterial blood gas analysis values were: pH: 7.358, PaCO₂: 34.8, PaO₂: 93.6, HCO₃⁻: 23.8, BE: +1, and the blood acid-base imbalance was corrected.</p> <p>3. 10/23–10/29: The endotracheal tube was fixed in the correct position, with no slippage, and a medium amount of sputum and white mucus was observed.</p> <p>4. 11/2: Breathing was smooth with no intercostal depressions. The breathing sounds were clean, therefore the endotracheal tube was removed and replaced by NIPPV. The respiratory rate was 30–50 bpm, blood oxygen concentration was maintained at 90%–95%, and there was a medium amount of white mucus in the sputum.</p> <p>5. 11/2–11/15: NCPAP assisted breathing, vital signs were stable, respiratory rate was 30–56 bpm, oxygen concentration was 90%–97%, and sputum contained a small to medium amount of white mucus.</p> <p>6. 11/17: Room air was provided and nasal cannula air of 2 L/min was used alternately. No nasal flutter, effort, or sternal rib depression was noted. Blood oxygen concentration was 92%–98%, respiratory rate was 30–60 bpm, and sputum contained a small to medium amount of white mucus.</p>

Problem 2: Potential risk of alteration in the parent-child attachment.

Care objective	Assist parents in understanding prematurity and establish a sound parent-child attachment.
Subjective Data	<p>1. 10/24: Father, "I am worried that the baby will not survive this dangerous period."</p> <p>2. 10/24: Parents, "The baby is so small and there are so many tubes in him. I do not dare to touch him. I'm afraid I'll be too rough and hurt him if I touch him."</p> <p>3. 10/29: Father, "When will the intravenous drip end? Will the drip be bad for him in the future? I really want to share some of the burden with the baby."</p> <p>4. 11/12: Father, "How long will it take? When can I hold him?"</p>
Objective data	<p>1. 10/23: The infant was separated from his parents in the intensive care unit immediately after birth. Therefore, parent-child attachment could not be established immediately.</p> <p>2. 10/24: The infant's mother cried continuously during the first visit.</p> <p>3. 10/25: When the infant's tubing was twisted or the oxygen level dropped to 67% and the bedside monitor warning sounded, the parents looked anxious and overwhelmed. They asked the nurse for information.</p> <p>4. 11/02: The father visited the infant and just stood by the incubator and watched him. The nurse told the father that he could open the incubator and touch the hands, feet, and body of the infant. However, the father retreated and stated that he was afraid that the infant would be infected and/or injured.</p>

Nursing measures	Result assessment
<p>1. The nurses proactively introduced themselves and established a trusting relationship with the parents. They encouraged them to talk and thereby established an effective interaction.</p> <p>2. The nurses introduced themselves and actively conducted health education regarding the characteristics and physical changes of preterm infants.</p> <p>3. The nurses proactively provided care and support and encouraged the parent's questions and concerns. They listened and supported the feelings of the parents.</p> <p>4. The nurses encouraged the parents to participate in caregiving to promote the establishment of parent-child attachment.</p> <p>5. The nurses stayed with the mother when she cried and patted her shoulder. They encouraged her to express her feelings and provided empathetic listening.</p> <p>6. When the nurses met with the family, the curtain was drawn to provide a quiet environment, a respect for the patient's privacy, and to build a sense of trust.</p> <p>7. The nurses encouraged the parents to speak softly to their infant and, demonstrated how to gently touch the baby. They encouraged touching, and guided active touching of the infant to increase the parent-child interaction and to strengthen the emotional connection with their baby.</p> <p>8. 11/15: The nurses provided time for the parents to attempt "kangaroo care" to enhance the parent-child attachment.</p>	<p>1. 11/5: The parents proactively reached out and touched the hands and feet of their infant and spoke softly to him. They encouraged their baby to, "Keep going! We have to go home soon."</p> <p>2. 11/7: The mother called to say that she had begun to read the premature baby care manual provided by the hospital. She stated she was grateful for the assistance in developing a further understanding of premature babies. This reduced her fear and anxiety. The father took the initiative to interact with the preemie and shared that his brother would smile at him, which made him happy. It was also very moving.</p> <p>3. 11/15: The father participated in the care of the preemie. If he saw the baby squirming, he soothed the infant with a pacifier and took the initiative to talk to the infant. He told the baby to be good and not to cry.</p> <p>4. 11/15: The mother began to perform "kangaroo care." Initially, her body was stiff, and she dared not move, however she would say to the infant, "Baby, we are going to start becoming kangaroos! Let's do it together".</p> <p>5. 11/22: The father would automatically pick up the baby and lie him on his chest when he visited. He would make eye contact and talk to the baby. At the same time, the father was able to state what more than one infant behavior meant and was confident that he could take the baby home.</p>

Problem 3: Caregiver role tension/lack of understanding of the future care of the premature infant.

Care objectives	1. 11/03: The parents can clearly state the source of their anxiety when caring for their infant. 2. 11/15: After stabilization of vital signs, the parent's anxiety can be reduced through "kangaroo care" parent-child attachment building. 3. 11/20: At least two techniques of preterm care can be described. 4. 11/25: Caregiving skills are correctly applied to caregiving situations. 5. The infant weighs more than 2,200 grams before transferring out of the unit.
Subjective data	1. 10/26: Mother, "It is my first child, and I have no experience with a birth or infant care. I was happy to have a baby, and the whole family was waiting to welcome him. I talked to him every day, hoping he would grow up safe and healthy, but now he is born prematurely and weighs so little. Apart from worrying about him, he is separated from me at such a young age, I do not know how to take care of him in the future, so what can I do?" 2. 11/2: Mother, "I do not dare to hold such a small child." 3. 11/3: Mother, "How to feed him? How to take care of him?"
Objective data	1. During the care period from 10/23 to 10/28, the mother often repeatedly sobbed and asked questions. 2. 11/2–11/3: During the care period, after talking with the nurse, she looked up at the ceiling and rubbed her hands together. 3. 11/3: The mother expressed breast milk as much as the infant's gastrointestinal system would allow. The baby was fed a small amount of breast milk through the orogastric tube, 2 mL/8 h. 4. 11/6: The infant was breastfed 6 mL/3 h. 5. 10/23–12/9: The baby's weight increased before transfer:
Nursing measures	<p>1. When the parents came to visit the nurses smiled and asked questions. They understood the parent's needs and established a therapeutic relationship.</p> <p>2. The nurses provided psychological support to the caregivers (parents) and provided them with the opportunity to talk at any time to reduce their anxiety and stress.</p> <p>3. The nurses established good communications between the doctors and parents and provided support systems such as the Premature Child Foundation website, newsletters, and health education leaflets on prematurity.</p> <p>4. The nurses encouraged the father to participate in home care and come to the hospital together with the mother to learn caregiving skills and share the stress of caring for the infant to increase the mother's confidence in caregiving.</p> <p>5. The nurses provided information and taught skills related to preterm care, such as bathing, breastfeeding, breathing and skin color assessment, as well as other precautions.</p> <p>6. The nurses provided a step-by-step approach for the use of "kangaroo care". They slowly instructed the mother to hold the baby to her chest allowing the baby to feel the mother's heartbeat and breathing through skin-to-skin contact. This created a similar environment to the womb, so that the premature baby could grow in the embrace and care of his parents. This technique allowed the infant to develop with the love and affection of his parents. It helped to build an intimate relationship between the parents and the child and reduced the stress and anxiety for both parents.</p> <p>7. The nurses provided the parents with opportunities to care for the baby themselves, such as changing diapers, bathing, etc., so that they could become familiar with these caregiving skills. They provided verbal praise when the parents were able to respond correctly to their instructions to increase the parent's confidence in caring for the infant.</p> <p>8. The nurses taught step-by-step newborn care skills during family meetings using the Premature Discharge Preparation Care Manual. For example: (1) Post-discharge care skills; (2) Management of milk choking, etc.</p> <p>9. The nurses listened to and understood the caregiver's perception of the infant.</p> <p>10. The nurses explained the respiratory pattern, oxygen level changes, and feeding status to reduce the anxiety of the caregivers (parents).</p> <p>11. The nurses encouraged the caregivers to participate in the technical care of the infant, such as: cyanosis management, observation of respiratory distress, bathing, sputum patting, breastfeeding, spillage management, observation of lip color, principles of oxygen use, and actual use of adjunctive care, etc. They subsequently evaluated the results.</p>
Result assessment	<p>1. The mother can state her sources of anxiety on 11/3: (1) "The child is too young for me to know how to hold him"; (2) "The child is too young for me to know how to take care of him"; (3) "I do not know how to take care of the child in the future".</p> <p>2. On 11/15, after an assessment of stable vital signs, the "kangaroo-style" parent-child attachment relationship was established to relieve anxiety, and the mother stopped sobbing and her eyes were no longer red.</p> <p>3. 11/20: The mother gave two guidelines for caring for her preterm baby: Mother: (1) The mother can use kangaroo care to keep the baby asleep and stable; (2) The mother knows how to feed the infant using the milk-seeking reflex.</p> <p>4. 11/25: The parents can learn to perform basic care skills for the infant and apply them correctly. For example: 11/15: Began "kangaroo care," initially with the mother who was too stiff to move; 11/18: The mother still had trembling hands and was nervous when trying to hold the infant; 11/20: The mother had a relaxed body when holding the infant, however she did not dare to be more relaxed and did not dare to talk to the infant normally; 11/25: The mother placed both hands around the baby and could look at the infant in his eyes. She sang and talked to the baby, saying things like, "Keep going! My baby," etc.</p> <p>5. 11/29: The parents took the initiative to ask to feed the infant on their own during the parent's meeting. They fed 28mL of milk orally in the company of the nurse, and they clearly informed the nurse of the change in lip color and the handling of spillage during the feeding process.</p> <p>6. 12/9: Under the care of the nurses, the baby weighed 2,430 g before transferring out of the unit.</p>

Discussion and Conclusion

This study describes the delivery of a premature child conceived with ART and his resultant family care. Due to the mother's lack of experience in caring for her first child, she was afraid to touch her weak baby and the limited visiting time in the ICU affected the establishment of a parent-child attachment. In the process of hospital care, holistic developmental care measures proposed by Hopwood [17] were adopted, including containment care, reduction of light and sound stimulation, maintenance of good quality of care, and performance of "kangaroo care" to promote early parent-child attachment [18], to strengthen the mother's

attitude and motivation for caring for the infant. These measures also promoted the development of a positive parent-child attachment. Specifically, the mother was able to reduce her tension and anxiety and face the future with a positive outlook.

However, in retrospect when the father mentioned that he was worried that the baby would not survive this dangerous period, the author, who is a mother and also a nursing practitioner, felt the father's helplessness. Therefore, I put aside my personal emotions and assisted the parents in dealing with their stress and anxiety. I also understood the pressure the parents felt regarding

the fear of not taking good care of their baby. These emotions and feelings touched my heart time and again. Therefore, during the care process, I offered encouragement and psychological support to the parents at all times using active care, listening, and empathy, in order to reduce their anxiety and stress as well as to shift their attitude from negative to positive. This was a double “affirmation” for me as a mother and a nursing practitioner.

The ultimate goal of caring for a premature baby is to promote good development. Thus, in addition to the medical team's dedication to the developmental and supportive care of premature infants, the active participation and education of parents is indispensable for the future development and growth of the child. It is suggested that, in the future in addition to actively utilizing the unique functions of nursing care, such as helping the parents to understand their premature child, the concept of developmental and supportive care should be applied to establish a good parent-child attachment, reduce parent's anxiety and stress, enable parents to adapt to their change in roles in advance, and to develop their abilities and confidence in caring for their premature infant after discharge from the hospital.

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