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Review Article

Parent Child Interaction Model (Kathryn Elaine Barnard) and Nursing Care of Infants with Congenital

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Highlights

- Family-centered care enhances developmental outcomes and parental adaptation in infants with congenital anomalies.
- Parental involvement positively influences neonatal health and psychosocial well-being.
- The Barnard Model serves as a clinical framework for strengthening parent-infant attachment.

Abstract

Purpose: This study aimed to integrate the Parent-Child Interaction Model into the nursing care of infants with congenital anomalies, focusing on enhancing mother-infant bonding, strengthening parental role competence, and addressing both developmental and psychosocial needs in the neonatal intensive care unit (NICU).
Design and methods: A case study design was employed. Data were collected through clinical observations and structured interviews with the mother of an infant diagnosed with congenital diaphragmatic hernia (CDH). Nursing interventions were developed based on functional health patterns, emphasizing nutritional support, emotional care, parent-infant interaction, and family role adaptation.
Results: The application of the Parent-Child Interaction Model led to improvements in infant nutrition and weight gain, enhanced maternal coping, reinforced mother-infant bonding, and helped restore family dynamics. Nurse-led interventions and environmental adjustments played a crucial role in these outcomes.
Conclusion: Integrating the Parent-Child Interaction Model into neonatal nursing care supports infant development and improves parental psychological well-being. This approach enhances the quality of NICU care by promoting a holistic, family-centered nursing practice.
Practice Implications: This model provides a structured framework for neonatal nurses to foster parent-infant interaction, guide emotional and educational support for parents, and optimize developmental care outcomes in infants with congenital anomalies.
Keywords: Congenital anomaly, child, mother-child interactions, nursing care.

Introduction

Congenital diaphragmatic hernia (CDH) is a serious congenital anomaly characterized by herniation of abdominal organs into the thoracic cavity as a result of a developmental defect in the diaphragm. The incidence ranges from 0.8 to 5 per 10,000 births. Neonates with CDH have significant respiratory distress in the first hours after birth and this is often associated with oxidative stress. This necessitates prolonged hospitalization and a multidisciplinary treatment approach (Sanchez Mejia & Rodgers, 2019; Lakshminrusimha & Vali, 2020).

Recognizing the emotional and psychosocial needs of parents of infants being treated in the neonatal intensive care unit (NICU) facilitates effective communication with health professionals, reduces parental stress and improves the quality of the care process. Separation of the mother from her baby may lead to negative emotions such as anxiety, feeling of emptiness, helplessness and insensitivity. Especially mothers of premature infants are reported to experience difficulties in the role of mother and adaptation problems in family life due to reasons such as inability to breastfeed and active participation in infant care (Fowler et al., 2019; Özer et al., 2022). In addition, physical separation from the baby is a stressful process for both parents and the baby (Karlsson, Blomqvist & Ågren, 2022).

NICUs are clinical settings equipped with advanced technology and managed by specialized teams. However, parents are often not sufficiently involved in the care process and remain only as "visitors". This can lead to negative emotions such as anxiety, helplessness, depression and loss of control (Burgos et al., 2019). In the literature, there are statements suggesting that supporting parent-infant interaction can have positive effects on both infant health and parents' psychological well-being (Fig 1) (Sarı, 2019; Demirbağ, 2021).

Family-centered care models encourage the active participation of parents in the process and offer important clinical gains such as weight gain in infants, reduction in infection rates, reduction in readmissions, increase in breastfeeding rates and reduction in parental stress (Treyvaud, 2019). In this context, approaches that reduce parent-infant separation through practices such as skin-to-skin contact should become a priority. Programs such as FICare (Family Integrated Care) improve parents' self-efficacy and strengthen their bonds with their babies (Franck, Waddington & O'Brien, 2020). In addition, single-family rooms have been shown to have positive effects such as

reducing neonatal sepsis rates, increasing breastfeeding frequency and reducing parental stress. Skin-to-skin contact and family-centered care practices accelerate infant weight gain and increase exclusive breastfeeding rates after discharge (Stelwagen et al., 2021).

Mothers may experience intense stress, anxiety and role confusion, especially due to reasons such as preterm labor and uncertain prognosis (Zhang et al., 2021). In this process, nursing support plays an important role in reinforcing the sense of trust by encouraging mothers' participation in the care process. Neonatal nurses can improve mothers' skills in infant care through education and role modeling; however, the continuity of this support may not always be ensured in busy clinical settings (Maleki et al., 2022). Nurses' practices that support parent-child interaction contribute to the formation of emotional bonds by providing first contact and encouraging breastfeeding (Almeida et al., 2022).

Although Katheryn E. Barnard based her Parent-Child Interaction Model on the foundations of psychology and human development, she built the core of her theory on the basic concepts of nursing: environment, nursing, person and health/disease. Barnard especially emphasized the concept of environment and mother-infant interaction. In this model, environmental factors and the quality of parent-child interaction are considered as the main determinants in supporting the development of the baby (Yıldız et al., 2017; Sarı, 2019).

Pediatric nurses, who assume one of the most important roles in the healthy development of mother-infant interaction, should spend time with mothers and babies, observe the baby's behaviors, and play a supportive, consultative and educational role in how mothers interpret and react to these behaviors (Yıldız et al., 2017).

The active participation of parents in the care process of infants with congenital anomalies is critical for both infant health and psychological adjustment of parents. The Parent-Child Interaction Model, developed in this direction, offers a holistic approach that focuses on parent-infant interaction in nursing care. By strengthening the relationship between parents and their infants, the model supports infant development and has positive effects on parents' mental health.

This study aims to address the nursing care structured on the basis of the Parent-Child Interaction Model in the care processes of infants with congenital anomalies in the neonatal intensive care unit (NICU).

Design and methods

This study employed a case study (case report) design. Prior to data collection, informed consent was obtained from the mother both verbally and in writing in accordance with ethical research standards. Data were collected through clinical observations and structured interviews conducted with the mother of an infant diagnosed with congenital diaphragmatic hernia (CDH). Clinical observations focused on the mother's behaviors, the infant's responses, and caregiver-infant interactions during routines such as feeding, holding, and communication. The structured interviews were conducted using a semi-structured questionnaire to explore the mother's emotional responses, perceived parenting competence, and experiences with neonatal intensive care unit (NICU) staff. The interviews lasted approximately 30 minutes, were audio-recorded with consent, and subsequently transcribed. Nursing interventions were developed based on the Functional Health Patterns framework, emphasizing nutritional support, emotional care, parent-infant interaction, and adaptation to the parental role.

Case report

S.B. is a male newborn diagnosed with congenital diaphragmatic hernia (CDH). His mother was 31 years old, married, mother of two children and worked full time. S.B. is the second child of the family and was diagnosed with CDH at 37 weeks of gestation before birth. The mother gave her first birth at the age of 18 years and her other child did not have any congenital anomaly. S.B. was born weighing 3,000 grams at birth.

The baby underwent laparoscopic primary diaphragmatic repair using a patch on the fifth day of life. He received nitric oxide inhalation therapy for a total of 6 days before and after surgery. Due to the respiratory status of the baby, he was followed up on a mechanical ventilator for a total of 27 days. Pressure sores developed in the occipital region due to prolonged ventilator use.

Long-term nutritional problems were experienced due to malposition of the stomach due to diaphragmatic hernia. During the mechanical ventilation process, enteral nutrition attempts via nasogastric catheter were unsuccessful. Therefore, nasoduodenal tube was inserted and enteral nutrition was continued by this route. After extubation, the baby was tried to be breastfed by his mother.

On the 45th day of her life, S.B. was removed from the neonatal intensive care unit because her respiratory and cardiac stability was achieved and her nutritional status improved and she was taken to the ward with her mother. However, his body weight decreased to 2,700 grams due to inadequate nutrition for a long time.

Data using the Parent Child Interaction Model

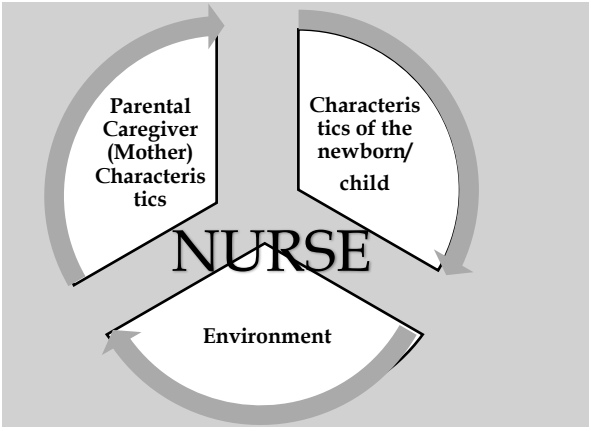

Figure 1. Created by the researchers in line with the literatüre.

1. Parental caregiver (mother) characteristics

- **Emotional Difficulties and Unhappiness:** The mother expressed that she felt bad and unhappy because her baby was born with a congenital anomaly and had undergone a series of surgical procedures. She expressed that she was worried that she thought her baby was hungry because she could not breastfeed her baby and that this made her think that the baby did not want to breastfeed her.
- **Maternal Role and Feelings of Guilt:** She stated that although she had two children, she could not see either of

them during the time she was in the hospital, which created a sense of guilt in her and she thought that she could not be an adequate mother to both of her children.

- **Feeling of Uncertainty:** The mother stated that she experienced uncertainty about her baby's illness and how long the intensive care process would last, and that this situation created mixed feelings for her.
- **Future Anxieties:** As stated in the literature, it is observed that psychological needs increase in mothers of infants undergoing long-term treatment and uncertainties about the health status of their children cause anxiety. This phenomenon reveals that these concerns affect the mental state of the mother.
- **Breastfeeding Difficulty:** The difficulties experienced by the mother in breastfeeding her baby was a very distressing situation for her. In this context, it is recommended that nurses should emphasize to mothers to be patient and support mothers of infants with LBW by expressing milk before directly starting breastfeeding.
- **Change in the Role of Motherhood:** This sub-theme emphasizes the change in the mother's parenting role. The feeling of loss in the maternal function and lack of information were among the sources of stress frequently mentioned by the mother. This clearly demonstrates the need to support parents.

2. Characteristics of the newborn/child

- S.B. is a male newborn born by caesarean section at 38 weeks of gestation. He weighed 3,000 grams and was 48 cm long at birth. Born with a congenital anomaly, S.B. was immediately admitted to the neonatal intensive care unit (NICU) where he underwent a series of surgical operations.
- The baby experienced weight loss because he could not provide adequate oral intake with breast milk and could not tolerate enteral formula support; his body weight decreased to 2,700 grams. During the neonatal intensive care period, the mother's physical and emotional interaction with the baby was limited, which negatively affected the healthy development of mother-infant interaction.

3. Environment

- The fact that the baby was born with a congenital anomaly complicated the care process.
- The continuation of the treatment process in the neonatal intensive care unit limited parent-infant interaction.
- The physical conditions of the neonatal unit were not adequate to support continuous and healthy interaction between mother and baby, which negatively affected the attachment process.
- The fact that S.B. had undergone multiple surgical interventions due to her illness was an environmental factor that complicated both the health status of the baby and the development of the mother-infant relationship.

4. Nurse

- Neonatal nurses increase sensitivity to interaction cues between mother and baby through good observation skills to initiate and support mother-infant interaction.
- It also provides a favorable environment for interaction by regulating environmental conditions.
- The nurse contributes to the healthy progress of the process by observing and evaluating this interaction between mother and baby.

Table 1.
Nursing history and nursing care plan in line with the parent-infant interaction model (Birol, 2005; Lj, C. M. 2005).

Patient: S.B. Age: 2 Months Gender: Male Diagnosis: Congenital Diaphragmatic Hernia (Cdh),					
Functional Health Pattern	**Descriptive Characteristics**	**Nursing Diagnosis**	**Expected Patient Outcomes**	**Nursing Interventions**	**Evaluation**
(Neonatal) Activity Exercise Format		Hospitilazyona and body "**Growth and Development**" due to under-nutrition **Risk of Delay"**	The ability of the newborn to show age-appropriate growth and development.	• The adequacy of nutrition should be monitored regularly; daily calorie and fluid needs should be met. • Sensitivity to signals of mother-infant interaction should be increased and the mother should be informed. • Environmental factors that may interfere with mother-infant interaction should be identified and appropriately regulated (e.g. physical environment improvements, increased frequency of visits).	+,-
(Neonatal) Nutritional Metabolic Status	Presence of congenital anomalies. Primary repair with laparoscopic mesh.	"**Ineffectiveness in the feeding pattern"** of the newborn due to respiratory distress and fatigue	Ensuring adequate and regular nutrition in accordance with the daily caloric needs of the newborn;	• The newborn is regularly monitored for weight and weight changes are evaluated. • Breast milk is expressed and given orally every 3 hours with an appropriate container (e.g. spoon, syringe or bottle).	+,-

	Dependence on mechanical ventilators		prevention of weight loss and improvement in nutritional performance.	• After each feeding, the amount of milk taken, the duration of feeding and the sucking performance of the newborn are carefully observed and recorded. • Difficulties experienced during the feeding process are identified and appropriate interventions are planned (if necessary, the feeding method is changed).	
(Neonatal) Nutritional Metabolic Status	Surgical operations and hospitalization in the neonatal intensive care unit.	**"Interrupted Breastfeeding"** due to surgical operations and hospitalization in the neonatal intensive care unit	Supporting and maintaining mother-infant interaction through breastfeeding; effective and regular breastfeeding.	• Direct breastfeeding is supported if the newborn has a developed sucking reflex and respiratory status is stable. • If breastfeeding is not possible, the mother's milk is expressed regularly and the newborn is fed every 3 hours with a suitable container (spoon, bottle, syringe, etc.). • Guidance and psychological support is provided to the mother throughout the breastfeeding process. • Skin-to-skin contact (kangaroo care) practices that increase mother-baby interaction are encouraged. • The breastfeeding process and the baby's feeding responses are regularly observed and recorded.	+,-
(Mom) Coping How To Cope With Stress	The mother stated that she experienced stress, anxiety and emotional difficulties due to her baby's illness, prolonged intensive care period and uncertainty about the future.	"**Inability to cope with stress"** in the mother due to the perception of inadequacy and uncertainty caused by her child's illness**.**	By becoming aware of the stress and anxiety she is experiencing, the mother develops coping skills and transitions to a more emotionally balanced process.	• The mother is given the opportunity to express herself about the pregnancy process, the birth experience and who supports her in caring for her baby. • The mother is encouraged to talk about the responsibilities of having a child with an anomaly and the feelings it creates in her. • The mother is guided to communicate with people from whom she receives spiritual support. • Interaction between mother and infant is encouraged by sensitizing them to interaction cues. • Environmental factors that may prevent interaction are identified and appropriate	+,-

				environmental arrangements are made.	
(Mom) Role Relationship Style	The mother felt guilty for not being able to see her other child during her hospitalization and stated that she could not fulfill her role as a mother sufficiently due to the overloading of roles at home on her husband.	"**Disruption in the Continuity of Family Processes "** due to the effects of prolonged hospitalization on the family	Restoring communication and cooperation among family members, balancing family roles and creating a sustainable support system.	• Identifying factors that disrupt family processes and providing support to mitigate these effects. • Enabling parents to actively participate in the baby's care, thus supporting them to regain their role. • Providing appropriate time and means (interviews, video calls, etc.) for the mother to stay in contact with her other child despite being in hospital. • Providing guidance to increase cooperation and understanding among family members to support task-sharing within the family.	+,-
(Mom) Self Perception – Way Of Understanding	The mother expressed her fears, feelings and thoughts about her baby's illness and stated that this situation negatively affected parent-child interaction.	"**Inadequacy in Parenting"** due to the inability to fulfill the role of motherhood adequately due to the lack of interaction that develops due to parent-child separation	The mother feels more competent and confident to fulfill her parental role; her interaction with her baby increases and she is able to sustain this interaction.	• The mother's positive behaviors during interaction with her baby (talking to her baby, soft touches, smiling, etc.) are carefully observed. • These positive parenting behaviors are recognized, encouraged and reinforced by the nurse. • The mother is informed about the positive effects of her interaction with her baby on the baby's healing process. • By actively involving the parent in the care process, the role of motherhood is supported and confidence is enhanced.	+,-

Note: (+) The determined nursing goal has been successfully achieved. (–) nursing interventions should be reviewed and supportive practices should be enhanced.

Conclusion

Infant-parent separation in the neonatal period limits the bidirectional development of physical, emotional and psychological bonds between parents and infants; this situation negatively affects the mental health of parents. The applicability of the Parent-Infant Interaction Model to different health care systems facilitates its adoption by health professionals. The use of this model in an integrated manner with nursing care will directly contribute to the improvement of neonatal nursing care quality.

This study presents a holistic nursing approach to the care process of infants with congenital anomalies treated in the neonatal intensive care unit, covering both the life findings and developmental needs of the newborn and the emotional, social and psychological needs of the mother. Nursing diagnoses determined on the basis of functional health patterns focus on multidimensional problems such as nutritional deficiencies, growth-development risk, breastfeeding difficulties, inability to cope with stress in the mother, difficulties in parenting roles and impairments in family functioning. Nursing interventions planned in this context aim to strengthen mother-infant interaction, eliminate environmental barriers, support family dynamics and increase parental role competence. This care process carried out by nurses through effective observation, psychosocial support,

education and environmental regulation supports the healthy development of the newborn, increases the psychological resilience of the mother and contributes to the protection of family integrity. In addition, this multifaceted nursing model increases the quality of newborn care services and offers scientific contributions specific to the nursing profession.

Conflict of interest disclosure

The authors declare that they have no competing interests.

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Data availability statement

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval statement

Ethics committee approval was not required for this case report, as per the institutional guidelines. Written informed consent was obtained from the patient's legal guardian for the publication of this report and any accompanying images. The research was conducted with utmost sensitivity and adherence to the principles outlined in the Declaration of Helsinki.

Patient consent statement

The mother was informed about the purpose of the study. Informed consent was approved by the mother.

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CRediT authorship contribution statement

H. Oğuzhan: Conceptualization; Data curation; Formal analysis; Methodology; Visualization; Roles/Writing - original draft; and Writing - review & editing. **G. Akay:** Conceptualization; Data curation; Formal analysis; Methodology; Visualization; Roles/Writing - original draft; and Writing - review & editing. **ES Koç:** Conceptualization; Data curation; Formal analysis; Methodology; Visualization; Roles/Writing - original draft; and Writing - review & editing.

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