



REVIEW ARTICLE

Nursing Care in the Pediatric Hemodialysis Room: an integrative review

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ABSTRACT

Chronic kidney disease in pediatrics is a complex health condition and presents several challenges regarding management, treatment and care in order to promote the well-being and quality of life of children. Hemodialysis is the most widely used treatment method. This study aims to address chronic kidney disease, nursing care in the pediatric hemodialysis room and the emotional impacts on the quality of life of children undergoing hemodialysis. This is an integrative review of content selected through a bibliographic survey of published articles, qualitative research. The results presented three thematic categories: hemodialysis in pediatrics and the emotional impacts on the quality of life of children, quality of life of children undergoing hemodialysis and nursing care in the pediatric hemodialysis room. Concluding that the quality of life of children undergoing hemodialysis is a context that involves physical, emotional and social aspects. Nursing care in pediatric hemodialysis is the most diverse and determines a combination of technical knowledge and skills to meet the physical and emotional health demands of the patients being assisted. Thus, the role of nurses has peculiar and essential characteristics to provide qualified care, preserving the safety of children and minimizing clinical risks regarding the assessment of signs and symptoms and the management of therapeutic treatment.

Keywords: Chronic Kidney Disease, Chronic Kidney Failure, Hemodialysis, Renal Dialysis, Continuous Renal Replacement Therapy, Pediatrics.

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1. Introduction

Pediatric chronic kidney disease (CKD) is a complex health condition that affects multiple body systems and presents unique challenges in terms of management and treatment. CKD in children can arise from several etiologies, including obstructive uropathies and congenital anomalies, such as renal aplasia, hypoplasia, and dysplasia, and glomerulopathies. These conditions account for a high incidence of CKD in children and often result in renal failure from the first years of life^{1,2}.

The epidemiology of pediatric chronic kidney disease varies significantly between different geographic regions, and there are several associated factors, such as environmental, etymological, genetic and cultural factors. In places where renal replacement therapy is readily available, kidney transplantation is the preferred treatment modality for all pediatric age groups. In contrast, high mortality in countries with limited health resources reduces the prevalence of chronic kidney disease¹. When it comes to managing CKD in children, it can increase the health risks for the person with the disease, and involves significant comorbidity factors, such as cardiovascular diseases, nutritional and growth disorders, neurocognitive development and the overall burden of the disease³.

Malnutrition and inadequate growth are complications that occur in most cases, exacerbated by dysfunction of the growth hormone/insulin-like growth factor I (IGF-I) axis, metabolic acidosis, anemia, renal osteodystrophy, and inflammation⁴. Therefore, assessment of nutritional status and adjustment of enteral nutrition are categorical actions to optimize growth in children with chronic kidney disease^{4,5}.

It is important to consider that CKD is also associated with a significant increase in mortality among affected children, which is 30 to 150 times higher compared to the general pediatric population. Identifying the disease process, early diagnosis, and treating comorbidities can minimize disease progression and improve long-term outcomes³. However, the transition from pediatric

to adult care is a critical aspect of the management of CKD in adolescents, requiring a careful approach to ensure continuity of care and minimize complications during this transition phase⁶.

The prevalence of CKD in children varies universally, with estimates ranging from 21 to 108 per million population. Epidemiological studies have highlighted the high prevalence of CKD in agricultural communities in El Salvador, suggesting a possible contribution of environmental toxins to the epidemic observed in these areas. These findings highlight the need for primary preventive measures from a very early age to alleviate the impact of CKD in pediatric populations exposed to more vulnerable situations⁷.

When CKD occurs in children, hemodialysis is the most commonly used treatment method to cleanse the blood of excess waste products and remove excess fluid. The hemodialysis machine removes the child's blood through a central venous catheter (CVC) that is placed in a large blood vessel or an arteriovenous fistula (AVF) created by a surgical procedure. The blood passes through an artificial kidney or dialyzer where excess water and waste products are removed⁸.

Thus, it is evident that CKD in pediatrics is a disease that has varied and peculiar characteristics, thus requiring a comprehensive approach for early diagnosis, treatment management, quality of care provided and prevention of the disease and pre-existing complications. Therefore, fundamental factors emerge, such as adequate nutrition, management of comorbidities, attentive transition of care and early prevention are essential elements to improve the quality of life and clinical outcomes of children affected by chronic kidney disease.

Regarding the activities of nurses in the field of pediatric hemodialysis care, they involve direct care for patients, guidance and education for their families, helping nurses establish spaces for interaction with the person being cared for, enabling individualized care, clarifying doubts about chronic kidney disease and hemodialysis. In addition, there is a need for care related to

maintenance and handling of the catheter and arteriovenous fistula (AVF), evaluation and conservation of hemodialysis accesses, interpretation of laboratory tests and decision-making in agreement with the multidisciplinary team, as well as the prevention, identification and treatment of complications presented by patients before, during and after the procedure, maintaining a calm and peaceful environment for good treatment⁹.

The study presents as a guiding question: how does nursing care occur in the pediatric hemodialysis room in terms of holistic care, considering physical, social and emotional well-being? To address this issue, the objectives of this study are to address chronic kidney disease, nursing care in pediatric hemodialysis rooms, and the emotional impacts on the quality of life of children undergoing hemodialysis.

Thus, the scope of the study was to outline the factors associated with care for children undergoing hemodialysis, with variables based on comprehensive care, both physical, social, and emotional, as well as the impacts caused on the quality of life of children during hemodialysis treatment.

Therefore, it is important to emphasize that the relevance of this research is a systematic and careful process of searching, analyzing, and interpreting information and scientific evidence on the topic in question to obtain knowledge and contribute to the advancement of understanding about the object of study in order to contribute to the advancement of understanding about a complex topic such as pediatric care in hemodialysis rooms.

2. Methods

This is an integrative literature review, based on content selected through a bibliographic survey of published articles. This type of study aims to synthesize data on a chosen topic in a coordinated manner and in compliance with the ethical and legal principles of the authors examined. It is characterized as integrative because it provides more comprehensive information on a given

scientific subject, thus constituting a synthesized body of knowledge in a given area.

This research has a qualitative approach, as it focuses on the subjective nature of the understanding, detailing parts of it without the rigor of numerical representation.

To search for articles, reliable scientific databases were used, using the health descriptors: "Chronic Kidney Disease", "Chronic Kidney Failure", "Hemodialysis", "Renal Dialysis", "Continuous Renal Replacement Therapy", "Pediatrics", applied individually or in combination using the Booleans "AND" and "OR".

The inclusion criteria were articles made available electronically, without a specific time frame, given the importance of the study theme. Articles that addressed the study theme, published in scientific databases. The exclusion criteria were articles not available online, statements, reviews, loose messages, news reports and non-indexed articles. After applying the inclusion and exclusion criteria, 17 studies were selected for the preparation of this manuscript.

3. Results

The steps for carrying out this work were the identification of the problem focused on the research objectives, evaluations and definitions of the information that was extracted from the studies, prioritizing the analysis and interpretation of data and presentation of discussion for the synthesised preparation of study results.

For better understanding, the selected studies were organized in a representative table, specifying: authors and year of publication, titles and summary of results, as shown in table 1.

Table 1 – Representation of articles selected for the study

Article No.	Authors / Year	Titles	Summary of Results
01	Warady BA. et al, 2007	Frequent Hemodialysis in Children	The experience with children who have undergone procedures such as "daily" intensive hemodiafiltration and nocturnal hemodialysis has been positive, with permission for unrestricted diets and fluid intake, no need for phosphate binders, excellent metabolic and blood pressure control, and, in the case of hemodiafiltration , excellent growth.
02	Abreu IS, et al, 2014	Children and adolescents on hemodialysis : attributes associated with quality of life	Seven themes were identified: water and food restrictions, limitations imposed by treatment, time dedicated to treatment, changes in body image related to vascular access and growth, stigma, self-care and hope for kidney transplantation. Relevant aspects of the participants' experience in relation to the disease and treatment were captured, seeking to understand how this process is associated with their quality of life.
03	Kaur A, Davenport A, 2014	Hemodialysis for infants , children , and adolescents.	Optimizing nutritional status with the support of specialist pediatric nutritionists is essential for the treatment of children receiving hemodialysis. The effects of chronic disease on growth and school performance, as well as on the psychological, emotional and social development of the child should not be underestimated.
04	Mieto FS, Bouso RS, 2014	The mothers ' experiences in the pediatrics hemodialysis unit	The results of the study provide a theoretical basis for planning care that meets the real needs of mothers, identifying aspects that require intervention.
05	Hothi DK, Stronach L, Sinnott K., 2016	Home hemodialysis in children .	It describes the experience and results of centers that manage pediatric patients and offers recommendations and practical tools to assist clinicians in providing daily dialysis to children, including infrastructure and staffing needs, equipment and prescriptions, and patient selection and training.
06	Silva. MNP, et al, 2017	Nursing Care In The Hemodialysis Room: Integrative Review	The changes that occur in the life of a chronic kidney patient are diverse, such as fear of death, feeling excluded from socializing with friends, gaining weight because the body is unable to excrete toxins and liquids, and being tied indefinitely to the dialysis machine.

Article No.	Authors / Year	Titles	Summary of Results
07	Almeida, Patty Fidelis de, et al, 2018	Care Coordination and Primary Health Care in the Unified Health System	As strengthening PHC is one of the most powerful pro-coordination measures, the reduction in investments and priority in the Family Health Strategy represents the weakening of the consolidation of systemic arrangements capable of guaranteeing comprehensive care.
08	Alhusaini OA. et al, 2019	Comparison of quality of life in children undergoing peritoneal dialysis versus hemodialysis	Male HD patients had a significantly better QOL on the interaction subscale (70.83 ± 15.95 compared with 30.00 ± 24.00 for women [$p=0.023$]).
09	Al Shahawy AK, et al, 2020	Assessment of cognitive functions and adaptive behavior in children with end-stage renal disease on regular hemodialysis .	Vineland test scores were significantly lower among patients than controls. The study suggests that children with ESRD had lower IQ, adaptive behavior, and executive functions than healthy control children.
10	Rotella , Ana Amélia Fayer et al, 2020	Emotional repercussions and quality of life in children and adolescents undergoing hemodialysis or after kidney transplantation	In the QoL questionnaires, the total score was higher in the opinion of transplant patients and their caregivers, indicating a perception of better QoL after kidney transplantation. There were no differences between the groups of patients in the emotional, social and school aspects, but the caregivers of transplant patients noticed a difference in QoL in the school aspect.
11	Andrade, AFSM de, et al, 2021	Nursing care for hemodialysis patients: a comprehensive investigation	Several Brazilian states suffer from chronic kidney disease , which has become a public health problem. Many individuals are unaware of the disease, making diagnosis difficult , and careful screening is necessary for people who have one or more risk factors for CKD.
12	Rocha, Gabriela Araújo et al, 2021	Vascular access care for hemodialysis: integrative review.	It was identified that the most frequent vascular access care is related to arteriovenous fistula, demonstrating its great representation in the treatment of chronic renal patients.
13	Da Silva Evaristo et al, 2021	Complications during a hemodialysis session	The most common underlying diseases were diabetes mellitus and arterial hypertension, while anemia predominated among comorbidities. The main complications found were hypotension, headache and malaise, with no statistical association between the number of complications and age, sex, underlying disease and the presence of anemia.

Article No.	Authors / Year	Titles	Summary of Results
14	Silveira, LS et al, 2022	The role of the nurse in pediatric hemodialysis	The nurse cannot just be an executor of technical care for the patient, he/she needs to provide treatment that is less traumatic, minimizing the suffering caused to the child due to his/her illness and treatment.
15	Fontoura, AM; Sales, RC, 2023	Emotional repercussions and quality of life of young patients with chronic renal failure undergoing hemodialysis	Dialysis treatment significantly alters the development process and social interaction. The search for quality of life includes actions, through these young people, that are understood as understanding and accepting their pathological condition. Nurses must contribute, in the best way, so that patients with chronic renal failure feel safer and can face the current situation they are experiencing in a positive and confident way.
16	Santos, S, AM L; Donda , AC, 2023	The importance of nursing care in patients with chronic kidney disease undergoing hemodialysis treatment	Nursing monitoring of these patients provides personalized and humanized treatment, which facilitates a greater understanding of clinical symptoms and favors adherence to treatment.
17	Ali, FKE, et al, 2024	Assessment of Anxiety and Stress Levels in Children Undergoing Hemodialysis	Children undergoing hemodialysis, most of them suffer from severe anxiety, and more than half of them have high stress levels. Meanwhile, there was a significant relationship between the total anxiety level of children and their gender, residence and duration of hemodialysis sessions.

Source: Organized by the author, 2024

4. Discussion

After analyzing the articles selected for preparation and discussion of the results, it was possible to develop three thematic categories according to their similarity, thus they were defined as: Hemodialysis in Pediatrics and the Emotional Impacts on Children's Quality of Life, Quality of Life of Children on Hemodialysis and Nursing Care in the Pediatric Hemodialysis Room.

4.1 HEMODIALYSIS IN PEDIATRICS AND THE EMOTIONAL IMPACTS ON CHILDREN'S QUALITY OF LIFE

Chronic renal failure is a slow process in which there is a total and irreversible loss of kidney function. Faced with this serious health problem,

the patient has three alternatives to prolong life: Hemodialysis, Peritoneal Dialysis and Kidney Transplant. Hemodialysis is the most commonly used, constituting a process of ultrafiltration of the blood, which occurs through an arteriovenous fistula that connects to the dialysis machine, allowing the flow, in which the blood is carried by a circulation system that removes toxins and accumulated fluids, keeping the body in balance. These sessions are on average three times a week and last up to four hours, depending on the patient's needs¹⁰.

Pediatric hemodialysis is an effective therapeutic approach for the management of children with advanced chronic kidney disease (CKD). When dialysis becomes necessary in children and

adolescents with chronic kidney failure, it has a significant impact on their lives and on the lives of their families and caregivers, often the mothers, who assume the bulk of the care related to treatment. Hemodialysis, although vital, is not curative and is often an intermediate stage until kidney transplantation can be performed¹¹.

When it comes to diagnosing and managing anemia in children during hemodialysis, the evaluation of the soluble transferrin receptor (sTfR) is a valuable tool. Studies recommend that sTfR levels can help distinguish between anemia of chronic disease (ACD) and iron deficiency anemia (IDA), in addition to adequately monitoring iron levels in patients undergoing hemodialysis treatment¹².

It is important to emphasize that children on hemodialysis face a high risk of behavioral and psychological disorders. Studies have shown a high frequency of behavioral disorders, such as internalizing and externalizing symptoms, as well as attention deficit/hyperactivity disorder (ADHD), compared to healthy controls. Managing these disorders is crucial to improving the quality of life of these children, since the duration of dialysis is directly associated with an increased incidence of these problems¹³.

Another significant factor in children undergoing hemodialysis is anxiety and stress. Thus, the assessment of anxiety and stress levels revealed that a significant majority of children present severe levels of these emotional situations, thus highlighting the need for psychosocial counseling programs and educational and emotional support for these children and their families, so that these actions can contribute to reducing the negative impact of hemodialysis on their mental health and well-being in general¹⁴.

In addition to the psychological challenges, the adequacy of dialysis is a critical factor for the effectiveness of the treatment. The results of the study showed that 55% of the children studied had severe levels of stress, while 42% of them had moderate levels of stress and 2.6% had mild levels of stress. In addition, there was a positive

correlation between the total level of anxiety of the children and their total level of stress. It was therefore evident that most children undergoing hemodialysis suffer from severe anxiety, and more than half of them have high levels of stress¹⁵.

This study aimed to evaluate cognitive functions and adaptive behavior in children with end-stage renal disease (ESRD) on regular HD (control). The results indicated that the assessment of adaptive behavior, assessment of executive functions using the Wisconsin Card Sorting Test; and continuous performance test showed that the mean IQ and Vineland test values were significantly lower among patients than controls. The study suggests that children with ESRD had lower IQ, adaptive behavior and executive functions than healthy control children¹⁶.

In summary, hemodialysis in pediatrics involves several complex and heterogeneous elements and aspects ranging from clinical management and technical approach to psychological and emotional support aimed at optimizing the quality of life and clinical results of children with chronic kidney disease undergoing hemodialysis treatment.

4.2 QUALITY OF LIFE OF CHILDREN ON HEMODIALYSIS

The quality of life of children on hemodialysis is a complex issue that involves physical, emotional and social aspects. Although hemodialysis treatment is essential for the survival of children with chronic kidney disease (CKD), it can significantly impact different aspects of their lives.

When referring to Nutrition associated with Adequate growth is considered fundamental to the quality of life of children with CKD. Optimal enteral nutrition is important to promote the long-term growth and cognitive development of children, so specific adjustments to the nutritional regimen, including selection of appropriate products, limitation of harmful nutrients, and consideration of the psychosocial needs of the family, are vital. However, barriers to achieving adequate nutritional intake are numerous and can negatively affect children's quality of life¹⁷.

Another important factor for quality of life is anemia, which is often a common complication in children with chronic renal failure and can have a significant impact on quality of life. A study conducted in hemodialysis units in Jordan demonstrated a significant negative correlation between hemoglobin levels and total quality of life scores, indicating that low hemoglobin levels are associated with a worse quality of life and higher levels of fatigue. Therefore, appropriate management of anemia is essential to improve the quality of life of these children who go through this process of illness¹⁸.

When it comes to Mental and Behavioral Health related to hemodialysis treatment in young people, the prevalence of mental health problems, such as depression and anxiety, is high among children on hemodialysis. Dialysis treatment significantly alters the process of psychosocial and intellectual development, cognitive improvement, growth physical and body shape, as well as aspects of social interaction. These implications become more aggravating when related to young patients, as they live with a chronic disease and a challenging treatment. Hemodialysis treatment is a means of survival for those with chronic renal failure, however, it also brings unexpected changes to the daily lives and lifestyle of young people undergoing dialysis treatment¹⁹.

Hemodialysis treatment is associated with some limitations and restrictions that interfere with children's lives, including dietary and fluid restrictions, changes in body image due to vascular access, and the stigma associated with the disease, which are important factors that affect children's quality of life. These restrictions can limit daily activities and social involvement, leading to a feeling of isolation and decreased quality of life. This study showed that most of the children studied had severe anxiety and that more than half of the children studied had high levels of stress¹⁵.

Thus, given the complexity and the impacts caused on the quality of life of children on hemodialysis, both physical, social and emotional, some factors

and attitudes are essential to minimize the suffering of these children, such as family support in adapting to treatment, qualified assistance involving in a holistic way the physical, social, emotional and spiritual well-being, are categorical to improve the quality of life of these children in the face of the challenges faced at such a young age.

4.3 NURSING CARE IN THE PEDIATRIC HEMODIALYSIS ROOM

Pediatric hemodialysis is a necessary intervention for children with chronic kidney failure that requires a specialized nursing approach to ensure treatment efficacy and patient safety. The complexity of this process highlights the need for detailed care and a deep understanding of the specific needs of pediatric patients. Nursing care in pediatric hemodialysis is multidimensional and requires a combination of technical knowledge and interpersonal skills to meet the health and emotional demands of patients²⁰.

Continuous assessment of vital signs is an essential aspect of hemodialysis care. Accurate monitoring of blood pressure, heart rate, temperature, and oxygen saturation allows early detection of complications such as hypotension or electrolyte imbalance. Constant monitoring of vital signs is essential to quickly adjust therapy and prevent adverse events during the hemodialysis session. The ability to identify and intervene early can make a significant difference in patient safety²¹.

Verification of vascular access, whether an arteriovenous fistula or a central catheter, is another critical aspect of care. Access-related complications, such as thrombosis or infection, can compromise the effectiveness of hemodialysis and pose additional health risks to the child. Nurses should perform regular inspections and meticulous care of vascular access to minimize complications and ensure continuity of care. Strict aseptic techniques and constant inspection are necessary to maintain functional access and free of infection²².

In addition to physical care, emotional support is critical for pediatric hemodialysis patients. Children and their families often face significant stress and anxiety due to ongoing treatment. Providing

emotional and educational support is important to help children and their families cope with the psychological impact of hemodialysis. Nursing staff should be equipped to provide a supportive environment and support patients' mental health²³. Parental involvement in the care process is equally important. Educating parents about treatment management and what to expect can increase adherence to the treatment plan and improve the child's overall experience. Including parents in the care plan not only improves understanding and adherence to treatment, but also strengthens the child's support network. Guidelines should be tailored to be understandable and helpful, helping parents feel more confident and empowered²⁴.

Personalizing care according to the child's age and development is essential. Children at different ages have different needs and capabilities, and the nursing approach should reflect these differences. Care strategies should be tailored to the specific needs of each age group, ensuring that treatment is appropriate and effective²⁵.

Prevention of complications associated with hemodialysis also requires special attention. Monitoring for adverse effects, such as allergic reactions to medications or electrolyte imbalances, is an essential part of care. Proactive surveillance and early intervention are necessary to prevent and manage complications, ensuring the efficacy and safety of treatment. Nursing staff must be prepared to quickly identify and treat any problems that arise during the session²⁶.

Ongoing education of nursing staff is essential to maintaining quality care. Hemodialysis practices and technologies are constantly evolving, and ongoing training helps professionals stay current. Ongoing education and training are essential to ensure that nurses are up to date with best practices and new technologies in hemodialysis care. Investing in ongoing training contributes to improved outcomes and patient safety²¹.

Family-centered care is an approach that improves the child's experience of treatment. It involves not only supporting the child but also recognizing and

meeting the needs of family members. A family-centered approach helps improve treatment adherence and the patient's quality of life by providing more comprehensive and inclusive support. Active family participation in the care process can facilitate a smoother adaptation to hemodialysis²².

Ongoing assessment and adjustment of the care plan are essential to meet the child's changing needs. Care should be adjusted based on the child's response to treatment and any changes in his or her clinical status. The nursing team should conduct regular assessments and modify interventions as needed to ensure the best possible experience and outcome for the child²³.

According to the findings of the studies studied, nursing care in the pediatric hemodialysis room is essential to ensure safety in the care process, regarding checking vital signs, vascular access, general therapeutic care, patient comfort and the well-being of children during hemodialysis treatment. Thus, the role of nurses has varied and unique characteristics, ranging from the technical management of the procedure to emotional support for both children and their families.

5. Conclusion

Chronic kidney disease (CKD) in pediatrics is a complex health condition that affects multiple body systems and presents challenges in terms of management and treatment. Chronic kidney failure is a slow process in which there is a total and irreversible loss of kidney function, requiring the adoption of alternative treatments to maintain life. Hemodialysis is one of the most widely used. However, in pediatrics, it causes emotional impacts on the quality of life of children undergoing hemodialysis and they face a high risk of behavioral and psychological disorders. Thus, hemodialysis in pediatrics involves several complex elements and aspects, ranging from clinical management and technical care to psychological and emotional support, aiming to optimize the quality of life and clinical outcomes of children with chronic kidney disease undergoing hemodialysis.

Regarding the quality of life of children on hemodialysis, it is a context that involves physical, emotional and social aspects. Although hemodialysis treatment is essential for the survival of children with chronic kidney disease (CKD), it can significantly impact different dimensions of their lives. Given the complexity and the impacts caused on the quality of life of children on hemodialysis, some factors and attitudes are essential to minimize suffering, such as family support in adapting to treatment, qualified assistance involving in a holistic way the physical, social, emotional and spiritual well-being.

Nursing care in pediatric hemodialysis is multidimensional and requires a combination of technical knowledge and skills to meet the health and emotional demands of patients. Thus, nursing care in the pediatric hemodialysis room must

ensure safety in the care process, with regard to therapeutic care in general, patient comfort and the well-being of children during hemodialysis treatment. Thus, the role of nurses has unique and essential characteristics, from the technical management of the procedure to the emotional support for both children and their families.

Conflict of Interest:

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