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Evaluating Nursing Knowledge and Management in Pediatric Hemodialysis: A Study of Qsunt Pediatric Nephrology Department

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ABSTRACT

Hemodialysis requires specialized care and advanced nursing knowledge to ensure safe treatment for patients with end-stage renal disease. Competent nurses, who apply evidence-based practices, play a key role in technical management and infection prevention. Globally, hemodialysis is among the most common therapies for chronic kidney disease, and nursing care strongly influences patient outcomes and safety. In Albania, limited studies have assessed dialysis care. This study investigated the knowledge, practices, and challenges of hemodialysis nursing at QSUT Hospital.

A cross-sectional observational design was applied with 30 nurses in the Hemodialysis Unit. Data collection combined structured questionnaires with direct observation of practice. Descriptive statistics were used to summarize demographic characteristics, professional practices, and adherence to infection-control protocols.

Results showed full compliance (100%) with technical procedures such as equipment preparation, patient assessment, and monitoring during hemodialysis. However, adherence to infection-prevention measures was inconsistent. Glove use was high (>90%), but compliance with wearing aprons (23%) and face shields (20–23%) was low. Hand hygiene was strong before procedures (80%) but decreased after completion (33%). More experienced nurses demonstrated higher adherence to safety protocols.

The findings highlight strong technical competence among nurses but significant gaps in infection-control practices. Reinforcement of protective equipment use, consistent hand hygiene, and continuous professional development are essential to align with WHO and CDC standards. Strengthening infection-control policies and ensuring adequate resources will further improve patient safety and quality of dialysis care.

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Review of Literature

Hemodialysis (HD) remains one of the most widely used therapies for patients with end-stage renal disease (ESRD) and requires both technical precision and continuous patient monitoring. The role of nursing staff is critical, as they are directly responsible for preparing the dialysis equipment, ensuring infection-control practices, monitoring patients during treatment, and responding to complications. International studies consistently highlight that the quality of nursing care in HD units strongly influences treatment outcomes, patient survival, and quality of life.

Several authors emphasize that consistent adherence to clinical protocols—such as vascular access management, fluid balance monitoring, and complication prevention—is essential to reducing adverse events [1]. Similarly, evidence shows that infection prevention, particularly hand hygiene and the use of personal protective equipment, remains a cornerstone of safe practice. Still, compliance rates vary depending on resources and workload pressures.

Workforce-related factors such as nurse-to-patient ratios and years of professional experience are also associated with the quality of care. Experienced nurses are generally more confident in managing emergencies and ensuring strict adherence to safety protocols, whereas staff shortages may increase workload and compromise care quality. Furthermore, patient education and communication are recognized as key elements in promoting adherence to treatment and improving overall satisfaction with dialysis care.

In Albania, there is limited published research exploring the performance of HD nursing care and the challenges faced in clinical practice. Addressing this gap, the present study focuses on the practices of nurses working in the Hemodialysis Unit at QSUT Hospital, with particular attention to patient safety, ethical principles, and collaborative care.

Materials and Methods

Study Design

This research was designed as a cross-sectional observational study, combining survey data with direct observation of clinical practice.

Setting

The study was carried out in the Hemodialysis Unit of QSUT Hospital, a tertiary care facility that provides renal replacement therapy to both adult and pediatric patients.

Participants

The study targeted all 30 nurses employed in the Hemodialysis Unit. A structured questionnaire was distributed, and only the nurses who completed it were included in the final dataset. In addition, their professional practices were observed during routine clinical duties to complement the self-reported data.

Data Collection

Data were collected through two approaches:

- **Structured Questionnaire** – assessing demographic characteristics, knowledge, perceptions of care quality, and adherence to ethical principles.
- **Direct Observation** – monitoring nursing activities and professional behaviors during hemodialysis procedures to evaluate the accuracy and consistency of reported practices.

Data Analysis

Data were entered and processed using Microsoft Excel. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize demographic variables and survey responses. Tables and charts were generated to visualize findings. Due to the small sample size, inferential statistical testing was limited, and the analysis focused primarily on descriptive insights.

Table 1: Participants and Demographic Data

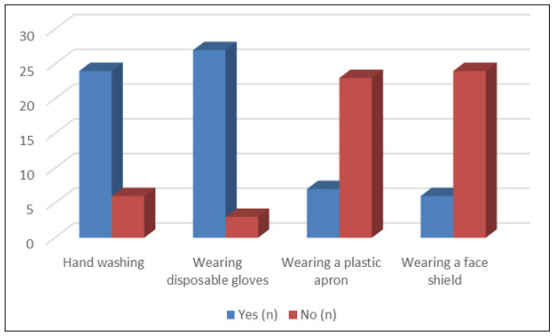
Gender	Age	Marital Status	Education Level	Work Experience
Female	24 years	Single	MSc in General Nursing	3 years
Female	39 years	Married	Higher Education	15 years
Female	23 years	Single	MSc in General Nursing	1 year
Female	26 years	Married	Master	2 years
Male	25 years	Married	Bachelor	3 years
Female	24 years	Single	Scientific Master	1 year
Female	58 years	Married	Bachelor	4 years
Female	22 years	Single	Scientific Master	1 year
Male	33 years	Married	Bachelor	7 years
Female	37 years	Married	Higher Education	16 years
Male	28 years	Married	Higher Education	4 years
Female	25 years	Single	Higher Education	3 years
Female	40 years	Married	Higher Education	15 years
Female	45 years	Married	Higher Education	20 years
Female	27 years	Single	Professional Master	4 years
Female	28 years	Married	Professional Master	5 years
Female	28 years	Married	Scientific Master	3 years
Female	37 years	Married	Bachelor	15 years
Male	45 years	Married	Higher Education	20 years
Male	55 years	Married	Higher Education	30 years
Female	55 years	Married	Higher Education	15 years
Female	44 years	Married	Higher Education	8 years
Female	23 years	Single	Higher Education	3 months
Female	25 years	Single	MSc in General Nursing	2 years
Female	24 years	Single	MSc in General Nursing	1 year
Female	34 years	Married	Higher Education	6 months
Female	23 years	Single	Scientific Master	1 year
Female	60 years	Married	Higher Education	38 years
Female	26 years	Single	MSc in General Nursing	3 years

This table presents the demographic characteristics of the nurses included in the study, including gender, age, marital status, educational level, and years of professional experience.

The findings indicate that the hemodialysis nursing staff at QSUT is predominantly **female, relatively young, and academically well-prepared**, with a substantial portion having advanced degrees. The variation in professional experience—from novice to highly experienced nurses—highlights both the potential for knowledge exchange and the need for continuous professional development to ensure consistent standards of care.

Table 2: Nursing Actions Before the Hemodialysis Procedure

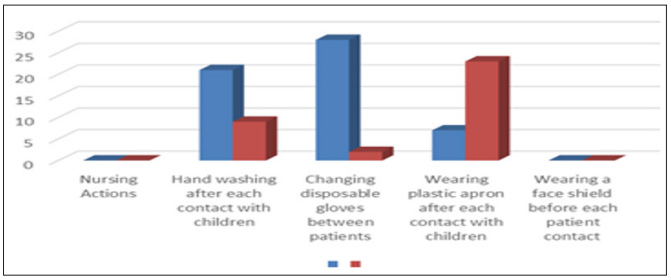
Nursing Actions	Yes (n)	No (n)
Hand washing	24	6
Wearing disposable gloves	27	3
Wearing a plastic apron	7	23
Wearing a face shield	6	24



This table shows compliance with basic infection control measures before the start of the hemodialysis procedure.

Table 3: Nursing Actions During the Hemodialysis Procedure

Nursing Actions	Yes (n)	No (n)
Hand washing after each contact with children	21	9
Changing disposable gloves between patients	28	2
Wearing plastic apron after each contact with children	7	23
Wearing a face shield before each patient contact	—	—



Hand Washing After Each Contact
21/30 (70%) complied; 9/30 (30%) did not. Compliance is moderate, requiring improvement.

Changing Gloves between Patients
28/30 (93%) complied; strong adherence observed.

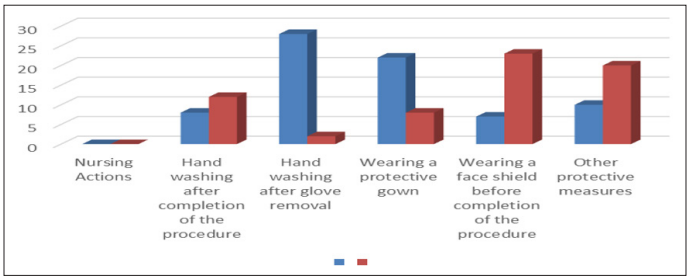
Wearing plastic Apron
Only 7/30 (23%) complied; low adherence indicates neglect of protective measures.

Wearing Face Shield
0/30 (0%) compliance; complete lack of adherence.

Compliance was highest for glove changing, moderate for hand washing, and very low for the use of aprons and face shields. Results highlight the need for stricter infection-control training and reinforcement of PPE use.

Table 4: Nursing Actions After the Hemodialysis Procedure

Nursing Actions	Yes (n)	No (n)
Hand washing after completion of the procedure	8	12
Hand washing after glove removal	28	2
Wearing a protective gown	22	8
Wearing a face shield before completion of the procedure	7	23
Other protective measures	10	20

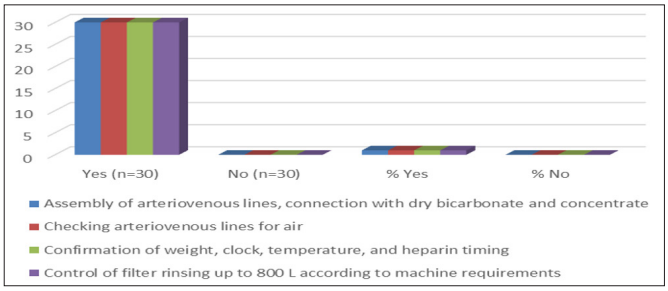


This table shows compliance was highest for hand washing after glove removal (93%) and moderate for wearing protective gowns (73%). In contrast, adherence to hand washing after procedure completion (40%), use of face shields (23%), and other protective measures (33%) was low, indicating inconsistent infection-control practices.

Overall, the findings suggest that while basic hygiene practices such as glove use and hand washing are relatively well-followed, the use of full protective equipment (aprons, face shields) remains insufficient. This highlights the need for targeted training and stricter enforcement of infection control protocols in the Hemodialysis Unit.

Table 5: Results: Preparation of the Hemodialysis Machine

Preparation Step	Yes (n=30)	No (n=30)	% Yes	% No
Assembly of arteriovenous lines, connection with dry bicarbonate and concentrate	30	0	100%	0%
Checking arteriovenous lines for air	30	0	100%	0%
Confirmation of weight, clock, temperature, and heparin timing	30	0	100%	0%
Control of filter rinsing up to 800 L according to machine requirements	30	0	100%	0%



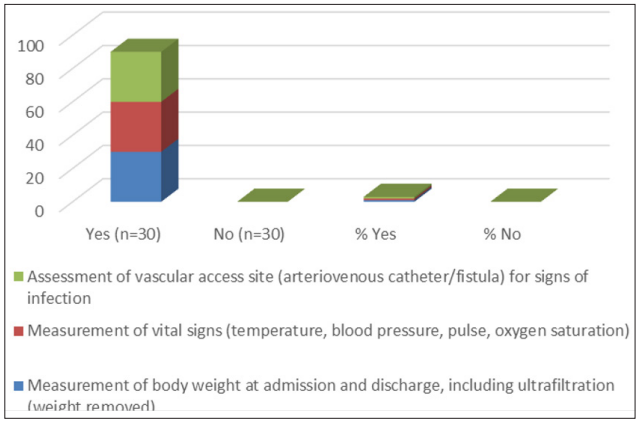
The results indicate complete adherence to all preparation steps for the hemodialysis machine among the nursing staff, demonstrating 100% compliance. This high level of consistency reflects strong technical knowledge, effective training, and adherence to standardized clinical protocols. Such uniformity in practice highlights the professional responsibility of nurses and their ability to ensure safe and accurate machine setup. Full compliance at this stage is essential for minimizing risks, preventing complications, and safeguarding patient safety during the hemodialysis procedure.

Preparation of the Hemodialysis Machine

The preparation of the hemodialysis machine was carried out in a systematic and standardized way. The main steps included the assembly of arteriovenous lines, checking the lines for the presence of air, confirming dialysis parameters (patient weight, time, temperature, and heparin administration), and rinsing the filter up to 800 L as required by the machine. These actions ensured the proper functioning of the device and reduced risks related to technical errors during treatment.

Table 6: Results: Preparation of Pediatric Patients for Hemodialysis

Preparation Step	Yes (n=30)	No (n=30)	% Yes	% No
Measurement of body weight at admission and discharge, including ultrafiltration (weight removed)	30	0	100%	0%
Measurement of vital signs (temperature, blood pressure, pulse, oxygen saturation)	30	0	100%	0%
Assessment of vascular access site (arteriovenous catheter/fistula) for signs of infection	30	0	100%	0%



The table shows **100% compliance** by all 30 nurses in measuring body weight, monitoring vital signs, and assessing vascular access before hemodialysis, indicating strong adherence **to safety protocols and standardized practice**.

Preparation of Pediatric Patients

The preparation of pediatric patients focused on clinical assessment and safety before initiating hemodialysis. Key steps included measuring body weight at admission and discharge (to determine ultrafiltration), monitoring vital signs (temperature, blood pressure, pulse, and oxygen saturation), and evaluating the vascular access site (catheter or arteriovenous fistula) for potential signs of infection. These procedures are critical for preventing complications and ensuring the effectiveness of the hemodialysis session.

Table 7: Patient Assessment and Monitoring of the Hemodialysis Equipment

Monitoring Action	Yes (n=30)	No (n=30)	% Yes	% No
Measurement of vital signs (temperature, body weight, O_2 saturation, pulse, blood pressure, AV fistula pressures – every hour)	30	0	100%	0%
Checking heparin infusion time on the hemodialysis machine	30	0	100%	0%
Priming of arteriovenous lines with 0.9% sodium chloride solution	30	0	100%	0%
Monitoring for possible complications	30	0	100%	0%
Observation of the patient's general condition	30	0	100%	0%

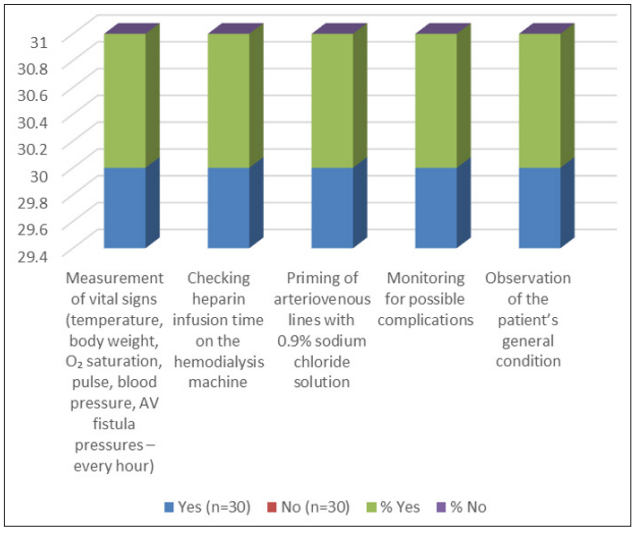
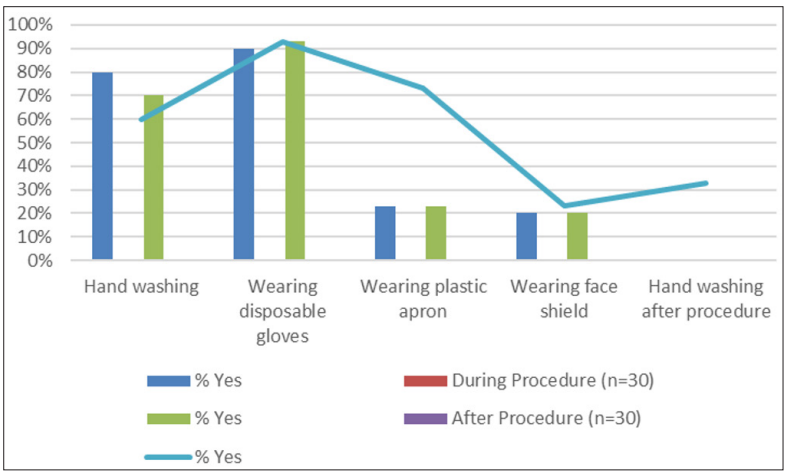


Table 8: Results: Nursing Actions Before, During, and After the Hemodialysis Procedure

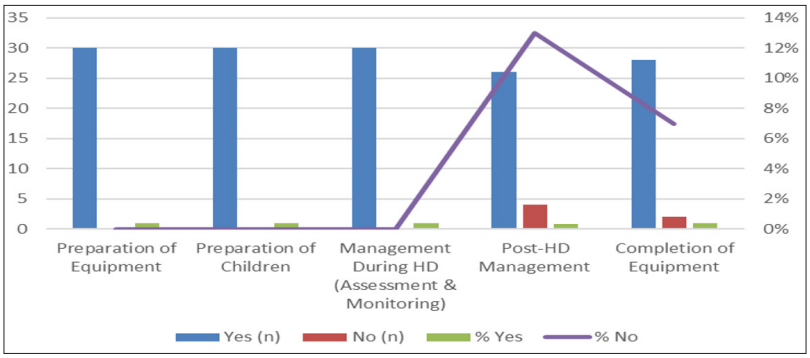
Nursing Action	Before Procedure (n=30)	% Yes	During Procedure (n=30)	% Yes	After Procedure (n=30)	% Yes
Hand washing	24 Yes / 6 No	80%	21 Yes / 9 No	70%	18 Yes / 12 No	60%
Wearing disposable gloves	27 Yes / 3 No	90%	28 Yes / 2 No	93%	28 Yes / 2 No	93%
Wearing plastic apron	7 Yes / 23 No	23%	7 Yes / 23 No	23%	22 Yes / 8 No	73%
Wearing face shield	6 Yes / 24 No	20%	6 Yes / 24 No	20%	7 Yes / 23 No	23%
Hand washing after procedure	—	—	—	—	10 Yes / 20 No	33%



The results show variable compliance across different nursing actions during the hemodialysis procedure. Hand hygiene decreased from 80% before the procedure to 60% after, indicating a gap in consistent practice. The use of disposable gloves was high throughout (over 90%), whereas wearing protective equipment such as plastic aprons and face shields remained low, particularly before and during the procedure. Notably, only 33% of nurses reported hand washing after the procedure, highlighting a critical area for improvement in infection control practices

Table 9: Results: Preparation and Management of Hemodialysis Procedure

Nursing Actions / Phases	Yes (n)	No (n)	% Yes	% No
Preparation of Equipment	30	0	100%	0%
Preparation of Children	30	0	100%	0%
Management During HD (Assessment & Monitoring)	30	0	100%	0%
Post-HD Management	26	4	87%	13%
Completion of Equipment	28	2	93%	7%



The findings reveal full compliance (100%) in equipment preparation, pediatric preparation, and monitoring during hemodialysis. Post-hemodialysis management (87%) and equipment completion (93%) showed slightly lower adherence, indicating minor gaps that may benefit from reinforcement through training and standardized protocols.

Results

Based on the data collected, the results show that the majority of nursing practices in the pediatric hemodialysis unit are in line with the essential principles set by international health organizations. Full compliance was achieved in equipment preparation, patient evaluation, and monitoring during treatment, which reflects strong professional responsibility and adherence to safe practices. On the other hand, some deficiencies were identified in post-hemodialysis management, especially in hand hygiene and the consistent use of protective equipment, which remain below the standards recommended by WHO and CDC. These findings emphasize the importance of continuous professional education and reinforcement of standardized protocols in order to guarantee maximum safety for both patients and healthcare staff.

Discussion

This study evaluated the knowledge and practices of nurses in the Pediatric Hemodialysis Unit at QSUT Hospital regarding infection control, technical preparation, and patient management. The results revealed consistently high compliance with core technical procedures such as equipment preparation, monitoring of vital signs, and management of complications, reflecting strong professional competence and adherence to international dialysis standards. These findings are consistent with previous studies that emphasize the technical expertise of hemodialysis nurses in ensuring patient safety and treatment quality [1].

Despite this strength, the study identified important gaps in infection-prevention practices. The use of protective equipment, including aprons and face shields, was notably low, particularly before and during dialysis. This pattern aligns with findings from other low- and middle-resource healthcare settings, where shortages of protective gear and workload pressures limit full compliance. Given the vulnerability of hemodialysis patients to infection through frequent vascular access use, this represents a critical area for improvement.

Hand hygiene practices showed variability, with strong compliance before procedures but significantly lower adherence after their completion. This contrasts with WHO recommendations that emphasize consistent hand hygiene as the most effective measure for preventing healthcare-associated infections [2]. Such findings suggest the need for targeted interventions, including refresher training, audits, and institutional policies to strengthen adherence.

Experience also appeared to influence adherence, with more experienced nurses demonstrating stronger compliance with infection control. This supports evidence that continuous education and mentorship play an important role in sustaining high standards of care.

In summary, while the results confirm strong technical competence among nurses in the hemodialysis unit, inconsistent use of protective measures and gaps in post-procedure hand hygiene highlight areas requiring reinforcement. Addressing these weaknesses through training, adequate resource allocation, and institutional support will be essential to achieve full alignment with WHO and CDC protocols and ensure optimal patient safety.

Limitations, Conclusion, and Recommendations

- **Limitations:** The study was limited to a single hospital and a relatively small sample size, which may affect generalizability.

Conclusion

Hemodialysis care at QSUNT Hospital demonstrates effective nursing practices but requires further support in staffing and resource allocation.

Recommendations: Based on the study findings, several recommendations can be made:

- **Strengthening Infection Control Practices** – Reinforcing the use of protective equipment (aprons, face shields) through targeted training sessions, audits, and feedback mechanisms.
- **Continuous Professional Development** – Implementing structured in-service training and mentorship programs to enhance adherence to evidence-based practices, particularly for less experienced nurses.
- **Resource Allocation** – Ensuring consistent availability of personal protective equipment (PPE) and adequate staffing levels to reduce workload and improve compliance with care standards.
- **Multi-Center Studies** – Conducting larger, multi-institutional studies to confirm these findings and provide broader insights into nursing practices in hemodialysis care across Albania and beyond.
- **Patient Education Programs** – Integrating structured patient education initiatives to improve awareness of infection prevention and encourage collaborative care [3-8].

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