

Adherence to Hemodialysis Safety Protocols and Perceived Quality of Nursing Care Among Dialysis Nurses

Maria Buema L. Dapitan

Student, Medina College – Ozamiz City

Abstract— Hemodialysis requires consistent observance of safety protocols while ensuring accurate, responsive, and patient-centered nursing care. This study determined dialysis nurses' adherence to hemodialysis safety protocols, their perceived quality of nursing care, and the relationship between these variables. A descriptive-correlational research design was employed among dialysis nurses assigned to selected healthcare facilities with hemodialysis units. Data were gathered using a researcher-developed questionnaire covering five dimensions of safety-protocol adherence and five dimensions of perceived nursing-care quality. Mean and standard deviation were used for descriptive analysis, while Pearson Product-Moment Correlation was employed to determine the relationship between the variables. Findings revealed that the dialysis nurses demonstrated Very High Adherence to hemodialysis safety protocols, with infection prevention and control emerging as the strongest dimension, while monitoring and management of hemodialysis-related complications was comparatively lower. The nurses perceived the overall quality of nursing care as High, with accuracy and consistency of nursing care emerging as the strongest dimension and patient education and communication as the comparatively weakest. A moderate positive and statistically significant relationship was established between adherence to hemodialysis safety protocols and perceived quality of nursing care; hence, the null hypothesis was rejected. The study concludes that stronger adherence to hemodialysis safety protocols is associated with better perceived quality of nursing care, although protocol adherence alone does not account for all aspects of quality hemodialysis nursing.

Keywords— hemodialysis, dialysis nurses, safety protocols, protocol adherence, quality of nursing care, patient safety.

I. INTRODUCTION

Background of the Study

Hemodialysis is a complex and highly specialized treatment that requires nurses to provide continuous, precise, and safety-oriented care to patients whose conditions may change throughout the treatment process. Dialysis nurses have critical roles to play in the areas of infection control, patient identification, vascular access management, medication administration, operation of dialysis equipment, and monitoring and management of treatment-related complications. Failure to follow these procedures may result in preventable patient injury, so it is important that nurses follow safety guidelines when performing hemodialysis. At the same time, quality nursing care extends beyond technical safety and includes responsiveness to patients' needs, accuracy and consistency of care, patient education and communication, promotion of safety and comfort, and

continuity and coordination of care. Adherence to safety protocols and quality nursing care are therefore important aspects of professional dialysis nursing, as the former establishes safeguards for clinical practice while the latter reflects how effectively, consistently, and responsively nursing responsibilities are carried out.

Safety measures and systematic quality measures in hemodialysis nursing are emphasized in recent literature. Albreiki et al. (2023) conducted a systematic review on strategies to enhance patient safety in hemodialysis units and found that strategies to improve patient safety included staff training, proactive identification of risks, root cause analysis, hemodialysis checklists, communication and supportive leadership. Their findings demonstrate that safe hemodialysis care requires the consistent application of preventive practices and protocols

rather than their mere availability. Likewise, Chen et al. (2023) created a set of nursing-sensitive quality indicators (NSQIs) for hemodialysis that include structural, process, and outcome indicators, emphasizing the significance of nursing processes like hand hygiene and vascular access management in assessing the safety and quality of hemodialysis nursing care. In the Philippines, Cabungcal et al. (2024) studied the compliance of nurses to patient care quality in selected dialysis centers located in Batangas Province, Philippines and focused on the adherence of the nurses to patient care standards which include infection control, medication administration, safety precautions and the nursing process. Their findings additionally document the importance of maintaining consistent application of patient-care standards in local dialysis practice.

Although the issue of safety and quality has gained greater focus in the field of hemodialysis, a key question persists regarding the relationship between safety and quality in nursing practice. Studies that have examined safety culture, nurses' compliance with certain quality measures and standards for patient care, and nursing-sensitive quality indicators have all focused on specific aspects and have been conducted independently. Albreiki et al. (2023) focused on how to improve the safety culture, Chen et al. (2023) discussed how to build indicators to assess the quality of hemodialysis nursing, and Cabungcal et al. (2024) analyzed the compliance with selected patient-care standards. Therefore, there is a need for context-specific evidence to explore dialysis nurses' adherence in multiple domains of hemodialysis safety and their perception of quality of nursing care. It is crucial to find out whether these variables are significantly related or not as the presence of safety protocol does not guarantee the protocols to be followed while the protocols alone do not necessarily measure the quality of nursing care as a multi-dimensional phenomenon.

In response to this gap, the present study sought to determine dialysis nurses' adherence to hemodialysis safety protocols and their perceived quality of nursing care and to establish whether a significant relationship existed between these variables. Adherence was examined in terms of infection prevention and control,

patient identification and verification, vascular access care, medication administration and safety, and monitoring and management of hemodialysis-related complications. Perceived quality of nursing care was assessed in terms of responsiveness to patients' needs, accuracy and consistency of nursing care, patient education and communication, safety and comfort of patients, and continuity and coordination of care. The study aimed to analyze these dimensions in order to identify dimensions of good nursing practice and dimensions that needed to be strengthened, as well as to provide evidence that can help enhance clinical supervision, nurse professional practice, patient safety practice, and the quality of hemodialysis nursing care.

Theoretical Framework

This study is anchored on the Structure–Process–Outcome Model of Donabedian (1966), a framework developed for evaluating the quality of healthcare. The model suggests that the quality of healthcare can be measured by three aspects: structure, process and outcome. Structure is the setting and resources available for healthcare, such as facilities, equipment, staffing, systems, and skills of healthcare professionals. Process is the actual practice of healthcare professionals when delivering their care, such as assessment, interventions, communication, implementation of safety procedures, and other clinical aspects. Outcome is the outcome or results of the healthcare offered, such as changes to patient condition, safety, satisfaction and other measures that reflect the quality of the healthcare. The model implies that if structures are appropriate, they will enable effective care processes to take place and sound care processes will enhance the chances of positive health outcomes.

The Donabedian Model is well suited to the current study because the compliance of dialysis nurses with the safety measures for hemodialysis is the process variable of quality care. The activities that nurses undertake in providing hemodialysis care include infection prevention and control, patient identification and verification, vascular access care, administration and safety of medications, monitoring and management of complications of hemodialysis. Quality and safety of nursing processes are reflected

by consistency of these practices. The second variable, perceived quality of nursing care, reflects nurses' evaluation of the quality manifested through their responsiveness to patients' needs, accuracy and consistency of care, patient education and communication, safety and comfort, and continuity and coordination of care. This framework then offers a rational foundation for exploring the relationship between higher level of compliance with key safety practices and improved perceptions of nursing care quality.

Recent literature confirms the ongoing importance of the Donabedian Model to nursing-quality evaluation. McCullough et al. (2023) conducted a systematic review to evaluate the evidence of the evaluation of nursing services in primary health care based on the Donabedian framework which is divided into three elements: structure, process, and outcome and highlighted that nursing processes and outcomes need to be taken into account when evaluating nursing services. More directly related to the present investigation, Chen et al. (2023) employed Donabedian's framework in developing nursing-sensitive quality indicators specifically for hemodialysis. Their resulting system comprised structural, process, and outcome indicators and was proposed as a comprehensive basis for evaluating the quality and safety of hemodialysis nursing. Furthermore, in a systematic review on quality and safety in nursing, Patrician et al. (2024) cited key dimensions that impact nursing quality and safety such as communication, adverse events, leadership, patient experience, quality improvement, safety culture, staffing and workload, and technology, which further highlighted that quality nursing care is a multidimensional phenomenon.

In this study, the framework suggests the quality of the nursing care is related to the process of delivering care. Expectation that better perceptions of quality of patient care would be associated with consistent observation of infection-control measures, checking patient and dialysis needs, managing vascular access, administering medications safely and monitoring and responding to dialysis complications. This theoretical relationship does not imply that adherence to safety

protocols alone determines quality, since structural, organizational, professional, interpersonal, and patient-related factors may also influence nursing care. Rather, the Donabedian Model provides the theoretical basis for determining whether variations in nurses' adherence to hemodialysis safety protocols are significantly associated with variations in their perceived quality of nursing care. The model thus directly supports the study's hypothesis of the relationship between the two major variables.

II. RESEARCH METHODOLOGY

The study employed a descriptive-correlational research design to determine dialysis nurses' adherence to hemodialysis safety protocols, their perceived quality of nursing care, and the relationship between these variables. It was conducted in selected healthcare facilities with hemodialysis units, with registered nurses directly involved in hemodialysis patient care.

Data were gathered using a researcher-developed questionnaire consisting of two parts that measured adherence to safety protocols in terms of infection prevention and control, patient identification and verification, vascular access care, medication administration and safety, and management of hemodialysis-related complications, as well as perceived quality of nursing care in terms of responsiveness, accuracy and consistency, patient education and communication, patient safety and comfort, and continuity and coordination of care.

The instrument underwent expert content validation, pilot testing, and reliability testing using Cronbach's alpha before administration. Permission from the appropriate authorities and applicable ethical clearance were secured, informed consent was obtained, and respondents' voluntary participation, anonymity, confidentiality, and privacy were observed throughout the study.

Completed questionnaires were checked, coded, tabulated, and analyzed using mean and standard deviation to determine the levels of the variables and Pearson Product-Moment Correlation Coefficient to test their significant relationship at the 0.05 level of significance.

III. PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

Table 1.1. *Level of Adherence to Hemodialysis Safety Protocols in Terms of Infection Prevention and Control*

Indicators	Mean	SD	Interpretation
1. Performs hand hygiene before and after providing care to each hemodialysis patient.	3.38	0.88	Very High Adherence
2. Uses appropriate personal protective equipment when there is possible exposure to blood or body fluids.	3.43	0.86	Very High Adherence
3. Maintains aseptic technique when handling vascular access sites and dialysis-related equipment.	3.44	0.80	Very High Adherence
4. Ensures that patient-care surfaces and dialysis equipment are properly disinfected.	3.38	0.81	Very High Adherence
5. Properly disposes of used needles, sharps, and other contaminated materials.	3.43	0.85	Very High Adherence
Grand Mean	3.41	0.60	Very High Adherence

Scale: 3.26–4.00 – Very High Adherence; 2.51–3.25 – High Adherence; 1.76–2.50 – Low Adherence; 1.00–1.75 – Very Low Adherence

Table 1.1 presents the level of adherence of dialysis nurses to hemodialysis safety protocols in terms of infection prevention and control. The grand mean was 3.41 (SD = 0.60) which represents Very High Adherence, meaning that the prescribed infection-prevention practices were consistently followed by the respondents. This suggests that infection control was strongly integrated into their routine hemodialysis nursing practices, particularly in activities involving hand hygiene, personal protective equipment, aseptic procedures, environmental disinfection, and safe disposal of contaminated materials. The result is consistent with the study's operationalization of infection prevention and control as practices intended to minimize infection risks during hemodialysis.

Among the indicators, maintaining aseptic technique when handling vascular access sites and dialysis-related equipment obtained the highest mean of 3.44 (SD = 0.80). This indicates particular attention to preventing contamination during procedures involving direct access to the patient's vascular system. Meanwhile, hand hygiene before and after patient care and proper disinfection of patient-care surfaces and dialysis equipment both obtained the lowest mean of 3.38, although both remained within the Very High Adherence category. The narrow difference between

the lowest and highest scores suggests that generally, adherence was well achieved but not focused on one aspect of the infection-control practices. However, the reasonably low scores for hand hygiene and environmental disinfection suggest that there is still a need for routine reinforcement in these areas with high adherence, as they represent basic barriers to prevent the spread of infection in the dialysis setting.

The study results are consistent with those of Albreiki et al. (2023) who conducted a systematic review that concluded, infection is a major safety issue in hemodialysis, as re-access to blood is required with needles and catheters many times during the therapy. The authors stressed on the need to implement prevention guidelines and protocols and highlighted proactive identification of the risk of infection and the training of staff as strategies that improve the safety culture in hemodialysis centers.

Likewise, Cabungcal et al. (2024) assessed the adherence of nurses with the patient care standards in selected dialysis centers of Batangas Province and infection control was among the patient care standards measured in the nursing practice of the hemodialysis centers. The nurses' study in the Philippines highlights the need for nurses to follow healthcare protocols to ensure the safety and well-being of hemodialysis

patients. These studies collectively support the current result that regular implementation of infection-

prevention practices are an essential aspect of safe hemodialysis nursing care.

Table 1.2. *Level of Adherence to Hemodialysis Safety Protocols in Terms of Patient Identification and Verification*

Indicators	Mean	SD	Interpretation
1. Verifies the patient's identity using appropriate patient identifiers before initiating hemodialysis.	3.30	0.91	Very High Adherence
2. Confirms that the prescribed dialysis treatment corresponds to the correct patient.	3.28	0.89	Very High Adherence
3. Verifies the prescribed dialysis parameters before initiating hemodialysis.	3.26	0.87	Very High Adherence
4. Confirms the patient's identity before administering medications associated with treatment.	3.36	0.82	Very High Adherence
5. Rechecks patient and treatment information whenever a discrepancy or unclear information is noticed.	3.31	0.83	Very High Adherence
Grand Mean	3.30	0.60	Very High Adherence

Scale: 3.26–4.00 – Very High Adherence; 2.51–3.25 – High Adherence; 1.76–2.50 – Low Adherence; 1.00–1.75 – Very Low Adherence

Table 1.2 shows that the dialysis nurses had Very High Adherence to patient identification and verification with a grand mean of 3.30 (SD = 0.60). This means that a measure of precaution was regularly introduced into the provision of care for hemodialysis. The respondents showed a good compliance with the procedures designed to ensure that each patient received the right treatment, parameters and drugs. Such consistency is particularly important in hemodialysis, where treatment is individualized and inaccuracies in identifying patients or matching clinical information may compromise the safe delivery of care.

Notably, confirming the patient's identity before administering medications associated with treatment yielded the highest mean of 3.36 (SD = 0.82). This is perhaps because there was increased awareness when giving medicines, and that the identification of medicines is a main protection against medication errors that could have been prevented. In contrast, mean of 3.26 (SD = 0.87) was obtained when the dialysis parameters prescribed were verified before the beginning of hemodialysis. Although the lowest ranked, the practice was within the Very High Adherence. This indicates that verification was

conducted across all the practices assessed, but more intensive focus on treatment parameter review prior to initiation of dialysis may further enhance the accuracy of patient specific delivery of treatment.

This finding is supported by the specific study conducted by Iryawati et al. (2023) on patient identification in a hemodialysis unit, which revealed that the lack of knowledge among the staff members may affect the extent of compliance with the identification process. They highlighted the importance of regular education and simulation, standard operating procedures, and patient engagement in identification, incident reporting, and ongoing monitoring as strategies to enhance identification practices. In a related study, Lima et al. (2023) explored the perceptions of nursing staff about safety in the hemodialysis units and found that the problems related to international patient-safety objectives included errors in patient identification and medication delivery. The present study results indicate a high level of adherence of the respondents which shows a good safety practice, but ensuring systematic identification at various treatment points and verification is still crucial to ensure the absence of mismatches and the accuracy of the hemodialysis care.

Table 1.3 Level of Adherence to Hemodialysis Safety Protocols in Terms of Vascular Access Care

Indicators	Mean	SD	Interpretation
1. Assesses the condition of the patient's vascular access before initiating hemodialysis.	3.14	0.86	High Adherence
2. Inspects the vascular access site for signs of infection, bleeding, swelling, or other abnormalities.	3.30	0.82	Very High Adherence
3. Uses aseptic technique during procedures involving the patient's vascular access.	3.36	0.86	Very High Adherence
4. Monitors the vascular access throughout hemodialysis for possible complications.	3.31	0.90	Very High Adherence
5. Provides appropriate care to the vascular access site after completion of hemodialysis.	3.26	0.93	Very High Adherence
Grand Mean	3.27	0.64	Very High Adherence

Scale: 3.26–4.00 – Very High Adherence; 2.51–3.25 – High Adherence; 1.76–2.50 – Low Adherence; 1.00–1.75 – Very Low Adherence

As reflected in Table 1.3, the dialysis nurses attained a Very High Adherence in vascular access care, with an overall mean of 3.27 (SD = 0.64).

The outcome indicated that programmes aimed at maintaining the condition and function of vascular access were regularly performed in the care of hemodialysis. The level of observed protection of vascular access is the vital pathway for successful dialysis therapy and represents significant care for the protection of the access through assessment, aseptic handling, continuous monitoring and after treatment care.

A closer examination of the indicators shows that using aseptic technique during procedures involving the patient's vascular access ranked highest, with a mean of 3.36 (SD = 0.86), classified as Very High Adherence. This reflects careful attention to limiting contamination whenever the access is manipulated.

In comparison, assessing the condition of the vascular access before initiating hemodialysis obtained the lowest mean of 3.14 (SD = 0.86) and was the only indicator categorized as High Adherence.

This is significant because in pre-treatment assessment, nurses can recognize abnormalities, such as signs of infection, impaired access function or other

abnormalities before dialysis is started. Thus, while the overall result demonstrates favorable vascular access practices, more consistent pre-dialysis assessment could further strengthen early detection and prevention of access-related problems.

Recent literature reinforces these findings. The findings of Chen et al. (2022) indicated the necessity of enhancing the competence of nurses for assessing and maintaining vascular access and the importance of hemodialysis nurses' knowledge in vascular access.

Meng et al. (2024) also found that dialysis nurses' knowledge, practice, and self-efficacy regarding vascular access are also significant factors in ensuring proper care of the access, and that there is a need for in-depth education and practice.

Additionally, Lok and Rajan (2022) called for individualized management of vascular access, noting the need to constantly assess and keep vascular access in place over the course of a patient's dialysis treatment.

Given these studies, the present results suggest that the respondents were generally practicing good vascular access, but the relatively lower rating on pre-treatment evaluation is an area that deserves more clinical attention.

Table 1.4 Level of Adherence to Hemodialysis Safety Protocols in Terms of Medication Administration and Safety

Indicators	Mean	SD	Interpretation
1. Verifies the correct patient, medication, dose, route, and time before administering medications.	3.29	0.94	Very High Adherence
2. Compares the medication to the current medication order before administration.	3.25	0.85	High Adherence
3. Assesses relevant patient information that may affect safe medication administration.	3.25	0.85	High Adherence
4. Monitors and documents the patient's response to medications administered during hemodialysis.	3.33	0.82	Very High Adherence
5. Follows established procedures when a medication error or unexpected medication-related reaction occurs.	3.18	0.88	High Adherence
Grand Mean	3.26	0.60	Very High Adherence

Scale: 3.26–4.00 – Very High Adherence; 2.51–3.25 – High Adherence; 1.76–2.50 – Low Adherence; 1.00–1.75 – Very Low Adherence

The level of adherence of dialysis nurses for dialysis safety in medication administration and safety is presented in Table 1.4. The grand mean of 3.26 (SD = 0.60) corresponds to Very High Adherence, indicating that medication-safety measures were generally carried out consistently during hemodialysis care. Although the overall mean is positioned at the lower threshold of the Very High Adherence category, it reflects substantial observance of practices involving medication verification, assessment of pertinent patient information, monitoring and documentation of medication responses, and management of medication-related concerns. The outcome, therefore, represents good medication-safety habits and suggests opportunities for increased uniformity in specific aspects of medication management.

Examining the individual indicators, monitoring and documenting the patient's response to medications administered during hemodialysis recorded the highest mean of 3.33 (SD = 0.82) and was interpreted as Very High Adherence. This indicates that nurses were very focused on surveillance after the medication was administered, so that any potential adverse responses and effects of the medication can be noted and documented. In comparison, following established procedures when a medication error or unexpected medication-related reaction occurs registered the lowest mean of 3.18 (SD = 0.88) and was classified as High Adherence. In addition, medication-order

comparison and assessment of pertinent patient information also achieved a mean of 3.25, in the High Adherence category. These findings indicate that while medication administration overall was safe, areas for further strengthening include pre-administration verification and assessment of the patient, as well as medication incident management to ensure very high adherence levels are achieved across all practices.

The observations are supported by the recent literature. Frament et al. (2020) identified medication reconciliation as a fundamental component of medication safety among patients requiring dialysis, particularly because complex medication regimens and involvement of multiple healthcare providers may increase the likelihood of medication discrepancies. The authors highlighted the need to systematically detect and address medication-related inconsistencies in order to optimize patient safety.

In a related discussion, Cardone and Parker (2020) pointed out the challenges with medication management in dialysis, and emphasized the importance of coordinated strategies to overcome medication related problems in dialysis.

These results can be considered in the context of these studies and indicate that the nurses had a solid base to ensure medication safety, but improving verification

procedures and the response to medication errors or unexpected reactions may help to strengthen

adherence throughout the entire medication-management process.

Table 1.5 *Level of Adherence to Hemodialysis Safety Protocols in Terms of Monitoring and Management of Hemodialysis-Related Complications*

Indicators	Mean	SD	Interpretation
1. Monitors the patient's vital signs at appropriate intervals throughout hemodialysis.	3.13	0.90	High Adherence
2. Observes the patient for signs and symptoms of possible complications.	3.26	0.87	Very High Adherence
3. Promptly recognizes signs and symptoms of common hemodialysis-related complications.	3.20	0.89	High Adherence
4. Implements appropriate nursing interventions when hemodialysis-related complications occur.	3.15	0.97	High Adherence
5. Promptly reports significant changes in the patient's condition.	3.14	0.95	High Adherence
Grand Mean	3.17	0.64	High Adherence

Scale: 3.26–4.00 – Very High Adherence; 2.51–3.25 – High Adherence; 1.76–2.50 – Low Adherence; 1.00–1.75 – Very Low Adherence

Table 1.5 depicts the level of adherence of dialysis nurses to hemodialysis safety protocols in terms of monitoring and management of hemodialysis-related complications. The dimension yielded a grand mean score of 3.17 (SD = 0.64) suggesting High Adherence. This suggests that the general opinion of the respondents was that they were doing the necessary patient monitoring, alerting to potential complications, implementing nursing measures and reporting any major changes in patient condition. But, in contrast with the previous safety dimensions, monitoring and management of complications continued to be at High Adherence. This separation shows that the regular clinical surveillance and complication management were carried out but not as regularly, and this aspect of hemodialysis nursing is still in need of reinforcement.

An examination of the individual results reveals that observing the patient for signs and symptoms of possible complications obtained the highest mean of 3.26 (SD = 0.87) and was the only practice classified as Very High Adherence. This indicates that nurses were more vigilant in observing changes that may signal the onset of complications. In contrast, monitoring the patient's vital signs at appropriate intervals throughout hemodialysis posted the lowest

mean of 3.13 (SD = 0.90) and was categorized as High Adherence. Complications were also quickly identified, nursing interventions were appropriate and important changes were reported promptly, all of which were within the High Adherence range.

The pattern indicates that nurses were concerned with the signs of patient deterioration but that increasing the frequency of systematic physiologic monitoring and subsequent nursing interventions may help to identify complications early and manage them appropriately.

The results can be compared with Thomas-Hawkins et al. (2020) who showed that registered nurse (RN) staffing and workload in hemodialysis units are related to nursing care not performed and patient safety, indicating that adequate nursing capacity is important to consistently provide essential nursing surveillance and care activities.

Similarly, Mendes et al. (2020) found that patient monitoring, avoiding adverse events, appropriate clinical practices, and clinician readiness are strategies that could be pertinent to promotion of patient safety during hemodialysis. All these studies confirm the need for continuous clinical monitoring, as complications can arise during dialysis and must be

identified and cared for appropriately. As such, the High Adherence ratings reflected in the present table reflect generally favorable practice; however, the relatively lower ratings across several indicators

suggest the need for increased adherence to physiologic monitoring, complication recognition, intervention, and reporting.

Table 2. Summary of the Level of Adherence to Hemodialysis Safety Protocols

Dimensions	Mean	SD	Interpretation
Infection Prevention and Control	3.41	0.60	Very High Adherence
Patient Identification and Verification	3.30	0.60	Very High Adherence
Vascular Access Care	3.27	0.64	Very High Adherence
Medication Administration and Safety	3.26	0.60	Very High Adherence
Monitoring and Management of Hemodialysis-Related Complications	3.17	0.64	High Adherence
Grand Mean	3.28	0.55	Very High Adherence

Scale: 3.26–4.00 – Very High Adherence; 2.51–3.25 – High Adherence; 1.76–2.50 – Low Adherence; 1.00–1.75 – Very Low Adherence

The consolidated results on hemodialysis safety protocol adherence by the dialysis nurses on the 5 dimensions in the current study are shown in Table 2. The overall grand mean of 3.28 (SD = 0.55) corresponds to Very High Adherence, signifying that safety measures were firmly incorporated into the respondents' hemodialysis nursing practices. Four dimensions— infection prevention and control, patient identification and verification, vascular access care, and medication administration and safety—reached the Very High Adherence level. Monitoring and management of hemodialysis-related complications, meanwhile, was classified as High Adherence. Taken as a whole, the findings demonstrate a strong safety orientation among the respondents, although the level of consistency was not identical across all areas of practice.

Across the five dimensions, infection prevention and control emerged as the strongest area, obtaining the highest mean of 3.41 (SD = 0.60). This means that the respondents were most consistent in practicing the preventive measures in order to limit infection risks. Conversely, monitoring and management of hemodialysis-related complications yielded the lowest mean of 3.17 (SD = 0.64) and was the only dimension

that did not attain Very High Adherence. The pattern indicates that the nurses' preventive and procedural safeguards were more consistent, which is consistent with those that necessitate less constant attention, whereas practices that require rapid recognition of change in the patient, prompt action and reporting of findings were not as consistently implemented. The latter remained at a positive level however, given its relatively lower performance, it points to complication monitoring and management as the key space for the system to be improved further.

In accord with the overall pattern illustrated in Table 2, Mendes et al. (2020) found several strategies for promoting patient safety in hemodialysis, indicating that the safe care of patients requires coordinated preventive measures, patient monitoring, clinical competence, and appropriate practices. It was also found by Hong et al. (2020) that the nursing work environment and patient-safety culture were correlated with patient-safety nursing activities in hemodialysis clinics, where patient-safety also manifests through the interconnectedness of nursing activities rather than isolated procedures. In addition, Chen et al., (2023) created hemodialysis nursing-sensitive quality indicators including both structural and process

indicators as well as outcome indicators, which further stress the multidimensionality of safe and quality dialysis nursing. Taken together, these studies support the finding of the present study of the need for consistent practice across a number of areas of nursing in promoting effective hemodialysis safety. The Very

High Adherence reported in Table 2, therefore, indicates a positive general safety attitude, but the relatively lower adherence with complication monitoring and management is an area of clinical reinforcement.

Table 3.1 Perceived Quality of Nursing Care in Terms of Responsiveness to Patients' Needs

Indicators	Mean	SD	Interpretation
1. Promptness in responding to patients' requests for nursing assistance.	3.23	0.83	High
2. Timeliness in attending to changes in patients' conditions during hemodialysis.	3.14	0.89	High
3. Attention given to the individual needs and concerns of patients.	3.09	0.98	High
4. Timeliness of nursing interventions when patients experience problems during treatment.	3.13	0.89	High
5. Availability of nursing assistance when patients need help or clarification regarding their care.	3.11	0.95	High
Grand Mean	3.14	0.67	High

Scale: 3.26–4.00 – Very High; 2.51–3.25 – High; 1.76–2.50 – Low; 1.00–1.75 – Very Low

Table 3.1 illustrates the perceived quality of nursing care in terms of responsiveness to patients' needs. The dimension registered a grand mean of 3.14 (SD = 0.67), which corresponds to a High level. This means that the dialysis nurses generally considered their care to be on time and attentive when the patient needed help, when they had changed, when they were concerned or when they needed clarification during the dialysis treatment.

While the overall assessment reflects favorable responsiveness, its placement below the Very High category suggests that there remains room to enhance the consistency with which patients' individual needs are recognized and addressed throughout hemodialysis.

Among the indicators, promptness in responding to patients' requests for nursing assistance obtained the highest mean of 3.23 (SD = 0.83), showing that immediate response to requests for help was the most evident aspect of responsiveness. Conversely, attention given to the individual needs and concerns of patients recorded the lowest mean of 3.09 (SD = 0.98). The larger standard deviation associated with this indicator also reflects greater variation in how respondents assessed this aspect of their care. This

pattern implies that the nurses were generally accessible when patients directly sought assistance, but opportunities remain to strengthen proactive and individualized attention, particularly in recognizing concerns that patients may not readily express.

Jui-Chin et al. (2024) find that grasping patients' unique needs and offering care that goes beyond technicalities is crucial for hemodialysis nurses' care experiences. Their results highlight the importance of sensitivity and personalised interaction to address patients undergoing long-term dialysis in an appropriate manner.

Likewise, Koon (2020), studied the patients' perception of caring behaviors and satisfaction among the hemodialysis patients, revealing the importance of caring interactions in the dialysis setting. The results of these studies support the current finding that responsiveness is not just a matter of completing tasks quickly on request but also a matter of acknowledging patients' concerns, being available and responding to patients personally. Thus, the High rating documented in Table 3.1 reflects favorable responsiveness while indicating that more consistent individualized attention could further elevate the perceived quality of nursing care.

Table 3.2 Perceived Quality of Nursing Care in Terms of Accuracy and Consistency of Nursing Care

Indicators	Mean	SD	Interpretation
1. Accuracy in carrying out prescribed nursing procedures for hemodialysis patients.	3.11	0.85	High
2. Consistency in following established nursing procedures when providing patient care.	3.19	0.90	High
3. Accuracy and completeness of documentation of patient assessments, interventions, and responses.	3.27	0.85	Very High
4. Accuracy in verifying relevant information before carrying out prescribed nursing interventions.	3.20	0.90	High
5. Consistency in maintaining appropriate nursing care throughout the patient's treatment.	3.17	0.84	High
Grand Mean	3.19	0.60	High

Scale: 3.26–4.00 – Very High; 2.51–3.25 – High; 1.76–2.50 – Low; 1.00–1.75 – Very Low

Table 3.2 presents the data of nursing care in terms of its accuracy and consistency. With a grand mean of 3.19 (SD = 0.60), this dimension was assessed as High, indicating that the dialysis nurses generally regarded their nursing practices as accurate, dependable, and consistently carried out throughout hemodialysis treatment.

This includes the accurate implementation of routine procedures, checks of the relevant data, sufficiency of the paperwork and continuity of providing appropriate nursing interventions. Although the result denotes a favorable level of care, its classification as High rather than Very High indicates that further refinement of practice may help achieve greater uniformity and precision.

A notable strength emerged in the accuracy and completeness of documentation of patient assessments, interventions, and responses, which attained the highest mean of 3.27 (SD = 0.85) and was the only indicator rated Very High. This indicates that it was notable among the respondents that they kept detailed and up-to-date patient records.

On the other hand, accuracy in carrying out prescribed nursing procedures for hemodialysis patients registered the lowest mean of 3.11 (SD = 0.85), although it remained within the High category. The difference between these indicators suggests that documentation was perceived more favorably than actual procedural execution. Therefore, the

reinforcement of competency-based practice, procedural standardization, and careful implementation of prescribed interventions may be helpful in bringing clinical performance closer to what has been documented.

The findings are supported by Chen et al. (2023), who developed nursing-sensitive quality indicators for hemodialysis and identified nursing processes as essential components in systematically evaluating the quality and safety of dialysis care.

Their work highlights the significance of measurable and consistently applied nursing practices to ensure quality. From another standpoint, Thomas-Hawkins et al. (2020) showed that a correlation exists between the workload and unfulfilled roles of nurses and patient safety in hemodialysis units, highlighting the relationship between conditions that affect the consistent completion of nursing responsibilities and the reliability of care.

The studies provide support to the present findings and demonstrate that accuracy and consistency rely on correct documentation and dependable nursing process implementation during treatment.

Hence, the High rating reflects generally reliable nursing care, while the comparatively lower procedural-accuracy score points to an area where greater consistency could further strengthen the quality of hemodialysis services.

Table 3.3 Perceived Quality of Nursing Care in Terms of Patient Education and Communication

Indicators	Mean	SD	Interpretation
1. Clarity of explanations provided regarding hemodialysis procedures.	3.06	0.95	High
2. Adequacy of information provided regarding care of vascular access.	3.16	0.95	High
3. Adequacy of instructions regarding precautions and self-care practices.	3.26	0.75	Very High
4. Encouragement provided to patients to ask questions and express concerns.	3.03	0.93	High
5. Attentiveness and clarity when responding to patients' questions and concerns.	3.12	0.92	High
Grand Mean	3.12	0.61	High

Scale: 3.26–4.00 – Very High; 2.51–3.25 – High; 1.76–2.50 – Low; 1.00–1.75 – Very Low

Table 3.3 outlines the perceived quality of nursing care in terms of patient education and communication. The dimension had a grand mean of 3.12 (SD = 0.61), or High level.

This finding denotes that dialysis nurses generally regarded the educational and communicative aspects of their care favorably, particularly in explaining treatment-related information, providing guidance on vascular access and self-care, and addressing patients' questions and concerns.

Nevertheless, the overall rating did not reach the Very High level, indicating that opportunities remain to make patient education more consistently clear, interactive, and responsive to individual information needs.

Among the practices assessed, adequacy of instructions regarding precautions and self-care practices attained the highest mean of 3.26 (SD = 0.75) and was the only indicator classified as Very High. This demonstrates the nurses' empowerment in providing realistic advice that patients need to follow their treatment and take preventive measures outside the dialysis center.

By comparison, encouragement provided to patients to ask questions and express concerns yielded the lowest mean of 3.03 (SD = 0.93), although it remained within the High category.

The contrast indicates that the respondents were more consistent in giving instructions necessary for the patient to understand than in actively asking them to engage in dialogue. Therefore, it is possible to enhance

two-way communication, so that patient education becomes a more participative process where patients feel free to pose questions or express concerns.

The findings align with the findings of Jung and Roh (2020) who studied factors that affect the performance of patient education for nurses who work in the hemodialysis unit, suggesting that educational competence is important in the performance of patient education by nurses.

In a similar manner, Arad et al. (2021) showed that a structured patient education program with nurse follow-up enhanced patient treatment adherence in patients undergoing hemodialysis, further highlighting the real-world impact of ongoing patient education and nurse interaction.

Also, systematic incorporation of patients reported concerns into the care provided to patients with hemodialysis may have the potential of supporting patient-clinician communication and generate opportunities for patient-reported concern discussions (Schick-Makaroff et al., 2022).

These results are consistent with the current findings, which show that in addition to providing appropriate information, effective patient education requires the ability to engage in dialogue and to promote active patient participation.

The result showed an acceptable amount of patient education and communication, but there is room to strengthen the invitation to ask questions and concerns to encourage collaborative and patient-centered hemodialysis care.

Table 3.4 Perceived Quality of Nursing Care in Terms of Safety and Comfort of Patients

Indicators	Mean	SD	Interpretation
1. Maintenance of a safe environment throughout the patient's hemodialysis treatment.	3.15	0.86	High
2. Attention given to pain, discomfort, and other patient concerns during treatment.	3.21	0.90	High
3. Adequacy of nursing measures provided to promote physical comfort during hemodialysis.	3.11	0.96	High
4. Promptness in addressing conditions that may compromise patient safety.	3.19	0.91	High
5. Protection of patients' privacy and dignity while nursing care is being provided.	3.03	0.87	High
Grand Mean	3.14	0.61	High

Scale: 3.26–4.00 – Very High; 2.51–3.25 – High; 1.76–2.50 – Low; 1.00–1.75 – Very Low

As reflected in Table 3.4, the perceived quality of nursing care in terms of patients' safety and comfort attained a grand mean of 3.14 (SD = 0.61), corresponding to a High level. This rating indicates that the dialysis nurses typically considered their care to be helpful in maintaining a safe treatment environment, in making patients more comfortable, in addressing circumstances that could have a negative impact on patient safety, and in ensuring patients' privacy and dignity. Although all indicators received favorable assessments, none reached the Very High category. The pattern indicates that safety and comfort were also consistently considered in the provision of nursing care, but more could be done to ensure that the whole person was cared for and that patients' personal dignity was respected while receiving medical treatment.

Looking at the individual indicators, attention given to pain, discomfort, and other patient concerns during treatment achieved the highest mean of 3.21 (SD = 0.90). This means that the most salient aspect of perceived safety and comfort was the immediate physical response the nurses made to patients' physical issues. In contrast, protection of patients' privacy and dignity while nursing care is being provided registered the lowest mean of 3.03 (SD = 0.87). While still categorized as High, its comparatively lower standing draws attention to the less tangible aspects of care that may receive less emphasis than immediate clinical or physical needs. The findings therefore suggest that improving safety and comfort should encompass not

only protection from clinical risks and relief of discomfort but also deliberate efforts to safeguard privacy, respect personal boundaries, and preserve dignity throughout repeated dialysis treatments.

The pattern parallels that of Jui-Chin et al. (2024) who said that hemodialysis nursing requires to focus on the patients' physical, psychological, and individual needs, which necessitates sensitivity towards the care of persons undergoing repeated treatment. Similarly, Koon (2020) illustrated the significance of the caring behaviors of nurses on patients' experiences and satisfaction in the hemodialysis environment, proving that quality nursing is not only technical skills but also interpersonal caring.

Patient experience and safety was one of the critical domains of nursing quality as emphasized by Patrician et al., (2024), which highlights the need to attend to patient experience in addition to clinical safety outcomes.

The present results have been substantiated by the results of these studies, which have shown that the ideal nursing of a person on hemodialysis demands simultaneous measures for physical safety, comfort, respectful interaction, and dignity.

Thus, the High rating of this indicator in Table 3.4 indicates good practice, and the Lower grade of the indicator assessed for privacy and dignity indicates that this is an area that should be addressed more to support patient-centered dialysis care.

Table 3.5 Perceived Quality of Nursing Care in Terms of Continuity and Coordination of Care

Indicators	Mean	SD	Interpretation
1. Communication of relevant changes in the patient's condition to appropriate healthcare team members.	3.12	0.95	High
2. Completeness and accuracy of information provided during endorsement or handover.	3.28	0.80	Very High
3. Coordination with other healthcare professionals when additional assessment or intervention is required.	3.09	0.95	High
4. Documentation and communication of nursing concerns requiring continued attention.	3.19	0.82	High
5. Follow-through on nursing interventions and patient-care concerns requiring continued management.	3.15	0.97	High
Grand Mean	3.17	0.66	High

Scale: 3.26–4.00 – Very High; 2.51–3.25 – High; 1.76–2.50 – Low; 1.00–1.75 – Very Low

Table 3.5 presents the perceived quality of nursing care in terms of continuity and coordination of care. The dimension obtained a grand mean of 3.17 (SD = 0.66), interpreted as High. This result indicates that the dialysis nurses generally perceived continuity and coordination to be evident in their practice through the communication of changes in patients' conditions, accurate transfer of information, documentation of concerns, coordination of needed interventions, and follow-through of care. The High rating reflects favorable continuity of nursing services; however, its position below the Very High category suggests that coordination across healthcare providers and successive phases of patient management could still be made more consistent.

Among the indicators, completeness and accuracy of information provided during endorsement or handover recorded the highest mean of 3.28 (SD = 0.80) and was the only indicator classified as Very High. A particular strength in the transfer of key patient information, during nursing endorsements, has been shown.

Conversely, coordination with other healthcare professionals when additional assessment or intervention is required registered the lowest mean of 3.09 (SD = 0.95), although it remained within the High category. This comparison shows that information sharing between nurses was more strongly felt than information sharing among the various disciplines. Timely consultation, referral, and communication with

other members of the healthcare team may therefore play a role in the better integration of patient care for patients who need extra professional input.

These findings align with Cheung et al. (2021), who found that the importance of communication skills in coordinated patient care was highlighted, and that interdisciplinary communication and collaborative practice between healthcare professionals caring for dialysis patients was valuable. Likewise, Schick-Makaroff et al. (2022) described how structured communication in hemodialysis care can help engage patients in the conversation and incorporate pertinent information into the care plan.

Furthermore, a comprehensive framework for assessing hemodialysis nursing was established by integrating nursing processes and care-quality indicators (CQIs), which further underscored the need for systematic and coordinated nursing interventions.

The present result is supported by these findings which indicate that continuity of care is not just about effective handover but about ongoing communication, collaboration and follow-through with the healthcare team.

For this reason, the High rating for continuity and coordination in Table 3.5 indicates generally good continuity and coordination, and the Lower rating for interdisciplinary coordination indicates one area in which collaborative practice may be improved.

Table 4. Summary of the Perceived Quality of Nursing Care

Dimensions	Mean	SD	Interpretation
Responsiveness to Patients' Needs	3.14	0.67	High
Accuracy and Consistency of Nursing Care	3.19	0.60	High
Patient Education and Communication	3.12	0.61	High
Safety and Comfort of Patients	3.14	0.61	High
Continuity and Coordination of Care	3.17	0.66	High
Grand Mean	3.15	0.56	High

Scale: 3.26–4.00 – Very High; 2.51–3.25 – High; 1.76–2.50 – Low; 1.00–1.75 – Very Low

Table 4 brings together information on the overall perceived quality of nursing care on the five dimensions measured in this study. The overall grand mean of 3.15 (SD = 0.56) represents a High-level overall rating; the overall rating is relatively high, showing that the dialysis nurses generally rated the care they provided as responsive, accurate and consistent, educational and communicative, attentive to patient safety and comfort, and supportive of continuity and coordination. Significantly, in all five dimensions, the perception was in High category, suggesting a fairly well-balanced view of the quality of the care provided in nursing homes. Nevertheless, none attained the Very High level, indicating that although nursing care was favorably assessed, opportunities remain to further elevate quality across its different components.

Comparatively, accuracy and consistency of nursing care emerged as the strongest dimension, with a mean of 3.19 (SD = 0.60), followed by continuity and coordination of care at 3.17 (SD = 0.66). Such findings reflect good measures of reliability, documentation, procedural consistency, and continuity as relatively better characteristics of the nursing care delivered. Patient education and communication had the lowest mean of 3.12 (SD = 0.61) compared to the other items. Although the differences among the dimension means were relatively small, the lower assessment of education and communication suggests that greater emphasis may be

placed on clear explanations, interactive discussions, encouragement of patient questions, and active involvement of patients in their care. Thus, improvement should not be limited to the lowest-rated dimension but should aim to advance all five areas toward a consistently higher standard of nursing quality.

The multidimensional pattern shown in this table is congruent with the systematic review by McCullough et al. (2023), which highlighted that the assessment of nursing service quality should not be based on a single indicator, but should take multiple factors into account, reflecting aspects of the care processes and outcomes. Likewise, communication, patient experience, safety culture, quality improvement, staffing and workload, leadership, and other interrelated factors were identified as relevant to nursing quality and safety by Patrician et al. (2024). In the field of hemodialysis, Chen et al. (2023) set up an evaluation system composed of the nursing quality indicators of hemodialysis, which includes multiple structural, process, and outcome indicators. Collectively, these studies reinforce the present finding that quality hemodialysis nursing is inherently multidimensional. Therefore, the High overall rating reflects generally favorable nursing care, while the absence of a Very High rating across the dimensions indicates the need for continued quality improvement, with particular attention to patient education and communication.

Table 5. Relationship Between Dialysis Nurses' Adherence to Hemodialysis Safety Protocols and Their Perceived Quality of Nursing Care

Variables Correlated	r	p	Interpretation	Decision on H ₀
Adherence to Hemodialysis Safety Protocols and Perceived Quality of Nursing Care	.434	< .001	Moderate Positive Significant Relationship	Reject H ₀

Note. N = 103; α = .05.

Table 5 presents the relationship between dialysis nurses' adherence to hemodialysis safety protocols and their perceived quality of nursing care. The analysis yielded a correlation coefficient of $r = .434$ with $p < .001$ among 103 respondents, indicating a moderate positive and statistically significant relationship between the two variables. Since the probability value is below the .05 level of significance, the null hypothesis is rejected. The positive coefficient signifies that higher adherence to hemodialysis safety protocols tends to be associated with higher perceived quality of nursing care. However, the moderate magnitude of the relationship also indicates that adherence is meaningfully related to nursing-care quality without suggesting that it alone accounts for the overall quality of care.

The significant association further demonstrates that adherence to practices involving infection prevention and control, patient identification and verification, vascular access care, medication administration and safety, and complication monitoring tends to correspond with more favorable perceptions of responsiveness, accuracy and consistency, patient education and communication, safety and comfort, and continuity and coordination of care. This pattern is consistent with the Donabedian Structure–Process–Outcome Model, wherein the processes through which healthcare is delivered are linked to the quality of care achieved. In the context of the present study, adherence to safety protocols represents essential nursing-care processes; therefore, greater consistency in carrying out these processes is logically associated with better perceived nursing quality. Nevertheless, the moderate correlation suggests that other clinical, interpersonal, organizational, and patient-related factors may also contribute to variations in nursing-care quality.

The relationship established in Table 5 is supported by Hong et al. (2020), who found significant relationships among the nursing work environment, patient-safety culture, and patient-safety nursing activities in hemodialysis clinics, demonstrating the interconnection between conditions supporting nursing practice and the performance of safety-related care. Similarly, Chen et al. (2023) emphasized through

their hemodialysis nursing-sensitive quality indicators that nursing processes constitute an essential component of evaluating the quality and safety of dialysis care. Patrician et al. (2024) further identified multiple interconnected areas of nursing quality and safety, including communication, patient experience, safety culture, quality improvement, staffing, and workload, supporting the view that nursing quality emerges from several related dimensions of professional practice. Taken together, these findings reinforce the present result that stronger adherence to established safety processes is associated with better perceived nursing-care quality, while the moderate strength of the relationship appropriately indicates that quality hemodialysis nursing remains influenced by factors beyond protocol adherence alone.

IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The study concludes that dialysis nurses consistently integrate essential hemodialysis safety protocols into their nursing practice, providing a strong foundation for safe patient care; however, their perceived quality of nursing care, while generally high, has not reached the highest level across its major dimensions. The comparatively lower adherence in monitoring and managing hemodialysis-related complications indicates a need for greater consistency in clinical vigilance and response, while the relatively lower perceived quality in patient education and communication shows that the interpersonal and participatory aspects of care require further strengthening. More importantly, adherence to hemodialysis safety protocols is significantly and positively associated with perceived quality of nursing care, establishing that nurses who more consistently observe safety practices also tend to perceive themselves as providing better nursing care. Nevertheless, the moderate strength of this relationship indicates that protocol adherence alone does not determine the overall quality of nursing care, as other clinical, interpersonal, organizational, and patient-related factors may also contribute. Therefore, quality hemodialysis nursing requires not only sustained compliance with safety protocols but also strengthened complication management,

communication, responsiveness, coordination, and patient-centered care

Recommendations

Based on the findings and conclusions of the study, dialysis nurses are encouraged to sustain adherence to hemodialysis safety protocols while strengthening complication monitoring and management, patient education, and therapeutic communication; patients may actively participate in their care by reporting concerns and seeking clarification about treatment and self-care; healthcare administrators and nursing supervisors may provide continuing training and regularly evaluate safety and nursing care practices; nursing educators may reinforce hemodialysis safety and patient-centered care through appropriate clinical and competency-based learning activities; and future researchers may investigate other factors influencing nursing care quality and use multiple data sources to provide a more comprehensive assessment of hemodialysis safety and care.

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