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Assessing Educational Requirements in Hemodialysis Treatment and Testing a Home-Care Self-Instruction Module

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Abstract : Patients who survive major illnesses often experience long-term impairments in their functional abilities. Educating them about their condition and responsibilities is essential for better health outcomes. Chronic Kidney Disease (CKD) is a major global health concern, particularly in developing countries like India, where 90% of patients cannot afford treatment. Over one million people worldwide depend on dialysis or a kidney transplant, and CKD incidence has doubled in the past 15 years.

To address this, a study was conducted to assess the learning needs of hemodialysis patients and to develop and evaluate a Self-Instructional Module (SIM) for home care. A descriptive evaluative research design was adopted, involving 60 conveniently selected patients from a hospital dialysis unit. A structured questionnaire was used, covering demographics, learning needs, and SIM effectiveness.

Findings showed that 73% of participants had average knowledge, and only 8% had good knowledge. A significant improvement in post-test scores ($P<0.0001$) confirmed the SIM's effectiveness, especially in areas like dialysis care, fistula management, diet, complications, and coping strategies. However, knowledge gains were not significantly influenced by demographic factors ($P>0.05$).

The study concludes that hemodialysis patients have varied but critical educational needs. The SIM effectively enhanced their knowledge, supporting the hypothesis that structured education improves patient understanding and home management capabilities.

Keywords **– Impairments, Hemodialysis, Fistula, Self Instructional Module**

INTRODUCTION

"Learning is the beginning of wealth. Learning is the beginning of health. Learning is the beginning of spirituality. Searching and learning is where the miracle process all begins." — Jim Rohn

The field of medicine has undergone significant transformation due to scientific advancements, technological innovations, and the development of modern pharmaceuticals. As a result, many patients are now able to survive serious illnesses. However, despite prolonged survival, many individuals continue to experience reduced functional abilities. This highlights the importance of equipping patients with proper knowledge and awareness of their health responsibilities, which can be achieved through education.

Patients with End Stage Renal Disease (ESRD) have several treatment options available, including maintenance hemodialysis, peritoneal dialysis, and kidney transplantation. In India, the cost of a single hemodialysis session ranges from ₹150 in government hospitals to ₹2,000 in private hospitals. Monthly expenses for dialysis in private healthcare settings can reach approximately ₹12,000, with an annual cost nearing ₹1,40,000 (around $3,000 USD)—a figure still much lower compared to $60,000 per year in countries like the United States and the United Kingdom. Despite the relatively lower costs, over 90% of Indian patients are unable to afford these treatments. Additional expenses such as the construction of an arteriovenous (AV) fistula, ranging from ₹6,000 to ₹20,000, and erythropoietin injections costing between ₹4,000 and ₹10,000 monthly, further burden patients financially.

Nurses play a crucial role in the long-term management and care of patients undergoing renal transplantation. They support patients in understanding and integrating their treatment plans into everyday life. For professional nurses, empowering patients with the knowledge and skills necessary for self-care is a key priority. Patient education has always been an essential component of nursing, and teaching individuals how to manage their own health has been a core principle of nursing practice throughout history.

STATEMENT OF THE PROBLEM:

"Assessing Educational Requirements in Hemodialysis Treatment and Testing a Home-Care Self-Instruction Module."

OBJECTIVES OF THE STUDY:

1. To explore and determine the educational requirements of patients receiving hemodialysis.
2. To develop a self-instructional module (SIM) focused on home-based care for individuals undergoing hemodialysis.
3. To evaluate the impact of the self-instructional module on patients' knowledge regarding their condition and home care.
4. To analyse the relationship between the study findings and selected demographic factors.

OPERATIONAL DEFINITIONS:

1. **Learning Needs:** In this study, *learning needs* refer to the essential knowledge and information that patients undergoing hemodialysis require in order to manage their condition effectively and maintain their health through appropriate self-care practices.
2. **Hemodialysis:** Hemodialysis is a medical procedure used to filter waste products and excess fluids from the blood when the kidneys are no longer able to function adequately. In the context of this study, it refers to a life-sustaining treatment performed using a dialysis machine and dialyzer for patients with end-stage renal disease.
3. **Self-Instructional Module (SIM):** A self-instructional module in this study refers to a structured, written educational resource designed to provide patients with clear and accessible guidance on topics such as dietary adjustments, arteriovenous (AV) fistula care, physical activity limitations, and the overall home management of their condition.

SCOPE OF THE STUDY:

1. **Community Health Nursing:** Community health nurses can apply the study's findings to enhance the quality of care provided to individuals undergoing hemodialysis. The results can guide nurses in offering tailored health education on home management and encouraging greater personal involvement in patient care.
2. **Clinical Nursing:** Clinical nurses may utilize the outcomes of this study to recognize the importance of lifestyle changes required for hemodialysis patients. This includes providing guidance on dietary habits, physical activity limitations, and adherence to treatment protocols to improve patient outcomes.
3. **Nursing Research:** The study paves the way for future research focused on exploring the challenges and burden faced by caregivers of patients receiving hemodialysis, thereby contributing to evidence-based improvements in support services.

HYPOTHESIS:

H_1:

There will be a statistically significant improvement in the knowledge levels of patients following the administration of the Self-Instructional Module (SIM), compared to their knowledge levels prior to the intervention.

ASSUMPTIONS:

1. Patients undergoing hemodialysis possess some prior knowledge regarding home-based care, though it may be insufficient.
2. The introduction of a Self-Instructional Module (SIM) is expected to enhance their understanding of home management practices.

VARIABLES UNDER STUDY:

- Independent Variable: The Self-Instructional Module (SIM) designed to provide guidance on home care for patients undergoing hemodialysis.
- Dependent Variable: The level of knowledge related to home care needs among patients receiving hemodialysis.

LIMITATIONS OF THE STUDY:

1. A larger sample size could have provided more generalizable results.
2. Inclusion of a control group would have allowed better evaluation of the effectiveness of the SIM.
3. A more detailed, area-specific investigation could have enriched the findings.

ETHICAL CONSIDERATIONS:

1. The study received approval from the institutional ethics committee.
2. Permission to conduct the study was obtained from the relevant hospital authorities.
3. Participants were informed about the nature of the study and informed consent was obtained.
4. Confidentiality was maintained by using code numbers instead of names, and all raw data were securely stored.

CONCEPTUAL FRAMEWORK:

The conceptual basis for this study is grounded in Dorothea Orem's Self-Care Deficit Nursing Theory.

- Self-Care: Refers to the set of actions initiated and performed by individuals to maintain health and well-being. In this study, it encompasses patients' knowledge about dialysis fistula care, infection prevention, avoiding fistula rupture, and dietary adjustments.
- Self-Care Agency: Describes the patient's capacity to engage in self-care activities. In this study, factors such as age, gender, occupation, income, diet, and frequency of dialysis sessions are considered as influencing self-care agency.
- Therapeutic Self-Care Demand: Involves the behaviors required to maintain health, such as compliance with lifestyle changes and dietary guidelines. These requirements can also be supported by family members or caregivers.
- Assessment of Learning Needs: A structured questionnaire was used to evaluate the patient's current understanding of self-care practices. The results revealed multiple knowledge gaps among patients, indicating the presence of self-care deficits.
- Self-Care Deficit: In this study, the self-care deficits identified include: lack of knowledge about the dialysis procedure and its outcomes, increased risk of infection at the fistula site, risk of fistula rupture or compression, and insufficient awareness about necessary dietary modifications.
- Nursing Agency: Upon identifying these learning needs, the nurse investigator implemented a Self-Instructional Module to bridge the knowledge gap and enhance the patient's ability to manage their condition independently.

RESEARCH DESIGN

The study utilized a **descriptive and quasi-experimental research design**, incorporating a **one-group pre-test and post-test** format.

RESEARCH APPROACH

A **descriptive evaluative approach** was adopted to assess and measure the impact of the intervention.

SETTING OF THE STUDY

The study was conducted in the **dialysis unit of a selected hospital** within the city.

SAMPLING TECHNIQUE

A **non-probability convenience sampling method** was employed to recruit participants.

SAMPLE SIZE

The sample consisted of **60 patients** currently receiving hemodialysis treatment.

SAMPLING CRITERIA

Inclusion Criteria:

1. Patients undergoing hemodialysis on a day-care basis.
2. Individuals receiving hemodialysis for **less than three months**.
3. Literate patients able to understand **English or Tamil or Hindi**.
4. Patients **willing to participate** in the study.

Exclusion Criteria:

1. Individuals receiving **peritoneal dialysis**.
2. Patients undergoing **continuous hemodialysis in the ICU** setting.

TOOL DEVELOPMENT

A structured knowledge-based questionnaire was developed to assess both the learning needs and the effectiveness of the Self-Instructional Module (SIM). The development process included:

a) Comprehensive review of related literature
b) Blueprint formulation
c) Expert consultations
d) Validation through subject matter experts

VALIDITY AND RELIABILITY

Validity:
The tool and instructional module were validated by **19 experts** specializing in nephrology, medical-surgical nursing, community health nursing, and statistics. Recommendations from these experts were incorporated, and the validated tool was subsequently translated into **Tamil and Hindi**.

Reliability:
The reliability of the instrument was established using appropriate statistical methods, resulting in a reliability coefficient of **0.83**, indicating strong consistency.

PLAN FOR DATA ANALYSIS

Statistical methods such as **Mann-Whitney U test** and **ANOVA** were employed to determine associations between **demographic characteristics** and **pre-test knowledge scores**.

ORGANIZATION OF STUDY FINDINGS

Data collected were systematically **tabulated, analysed, and presented** under the following sections:

Section I: Analysis of Demographic Characteristics

- **Age**: 50% of participants were aged **41–60 years**, 30% were **≤40 years**, and 20% were aged **61–80 years**.
- **Gender**: 62% were **male** and 38% were **female**.
- **Education**: 43% had **secondary education**, 25% completed **primary**, 20% were **graduates**, 7% had **higher secondary**, and 5% were **postgraduates**.
- **Occupation**: 30% were **employed**, 25% were **housewives**, 20% were **business owners**, another 20% were **retired**, and 5% were **students**.
- **Family Type**: 62% lived in **joint families**, and 38% in **nuclear families**.
- **Monthly Income**: 42% earned between **₹10,001–15,000**, 33% earned **₹5,000–10,000**, 15% between **₹15,001–20,000**, and 10% earned **over ₹20,000**.
- **Dietary Pattern**: 57% followed a **mixed diet**, and 43% were **vegetarian**.
- **Frequency of Dialysis**: 65% underwent dialysis **twice a week**, 30% **thrice a month**, and 5% **twice a month**.

Section II: Assessment of Learning Needs Among Hemodialysis Patients

- **73%** of participants demonstrated **average knowledge** (scored between 6–10)
- **18%** had **poor knowledge** (scored between 0–5)
- **8%** displayed **good knowledge** (scored between 11–15)

Section III: Comparison of Pre- and Post-Test Knowledge Scores

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Table 1: Comparison of Pre and Post-Test Knowledge Gained by Cases in Study Group N=60=100%

Knowledge score on	Pre test	Post test	Wilcoxon Z	P Value
	Mean ± SD	Mean ± SD		
Dialysis	3.22 ± 1.04	4.77 ± 0.43	6.17	<0.0001
Fistula and care of fistula	4.37 ± 1.37	6.48 ± 0.68	6.25	<0.0001
Diet	2.45 ± 1.21	5.97 ± 0.99	6.77	<0.0001
Complication and coping mechanism	2.47 ± 1.23	5.22 ± 0.90	6.61	<0.0001
Total	12.50 ± 2.87	22.43 ± 1.61	6.74	<0.0001

Table II indicates a statistically significant improvement in knowledge scores after the administration of the Self-Instructional Module. The areas showing significant enhancement include understanding of the dialysis procedure, fistula care, dietary guidelines, awareness of possible complications, and coping strategies. The overall post-test knowledge scores were notably higher than the pre-test scores, with a **p-value < 0.0001**, indicating a highly significant difference.

Section IV: Association Between Demographic Variables and Pre-Test Knowledge Scores

The analysis revealed **no statistically significant relationship** between pre-test knowledge scores and the selected demographic characteristics, as **p-values were greater than 0.05**. This suggests that factors such as age, gender, education level, occupation, family structure, monthly income, dietary preferences, and frequency of dialysis sessions did not influence the patients' initial level of knowledge regarding home management of hemodialysis.

CONCLUSION:

The findings demonstrate a highly significant improvement in knowledge levels following the intervention, specifically in the areas of dialysis, fistula care, dietary practices, potential complications, and coping mechanisms, with a **p-value less than 0.0001**. The post-test scores were consistently higher than the pre-test scores across all domains, indicating that the **Self-Instructional Module (SIM) was effective** in enhancing patient knowledge related to home management of hemodialysis.

IMPLICATIONS:

Nursing Practice: The findings of this study can support nursing practice by guiding healthcare professionals in developing structured educational programs for patients undergoing hemodialysis in clinical or community settings. It emphasizes the role of nurses in providing essential information related to dietary management, infection prevention, fistula care, and strategies for managing complications—ultimately enhancing the quality of patient care and promoting better health outcomes.

NURSING EDUCATION*:*

This study can contribute to curriculum development by equipping nursing students with the knowledge and skills necessary to care for patients undergoing hemodialysis. Nursing educators may utilize the study's findings to design effective teaching plans that cover essential topics such as dialysis procedures, patient care, dietary management, and complication prevention.

NURSING ADMINISTRATION:

The outcomes of this research can assist nurse administrators in formulating policies and programs aimed at enhancing care for patients on hemodialysis. These strategies can ensure that patients receive comprehensive services during their hospital visits, with a focus on **preventive, promotive, and therapeutic** aspects of healthcare.

NURSING RESEARCH:

Research remains a vital tool for building evidence-based practices in nursing. This study contributes to the existing body of nursing knowledge and highlights the importance of continued investigation to support holistic and patient-centered care. The findings serve as a foundation for further studies in the area of renal care and patient education.

RECOMMENDATIONS:

Based on the findings of this study, the following suggestions are proposed:

1. A similar study should be conducted on a larger sample to increase generalizability.
2. Surveys can be carried out to evaluate the knowledge, practices, and coping mechanisms of patients receiving hemodialysis.
3. An experimental study can be conducted to determine the effectiveness of structured teaching programs on home care for hemodialysis patients.
4. Research can be undertaken to assess the knowledge and attitudes of dialysis unit nurses toward caring for patients undergoing hemodialysis.
5. A study may be conducted to evaluate the burden experienced by caregivers of individuals receiving hemodialysis.

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