A Study to Assess the Effectiveness of Self-Instructional Module on Knowledge Regarding Management of Electrolyte Imbalances in Patients with Renal Insufficiency among Staff Nurses in Selected Hospitals at Tumkur

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Abstract

Aim: This study aims to knowledge regarding the management of electrolyte imbalances in patients with renal insufficiency among staff nurses in selected hospitals.

Methodology: The research approach used for the study was one-group pretest-posttest design. With a sample of 10 staff nurses, pilot study was conducted, sample for the major study included 100 staff nurses on the basis of non-probability convenient sampling technique method. A structured questionnaire was used.

Results: The study findings revealed that 24% of the respondents belong to the age group of 21–30 years and 37% of the respondents belong to the age group of 31–40 years and 19% of respondents belong to the age group of above 41–50 years and 20% belong to 51–60 years of age. About 33% of staff nurses having 1–5 years of experience, 36% of nurses were 6–10 years experienced, 20% of staff nurses were having 11–15 years of experience, and 11% of them were having experience of above 15 years. About 65% of staff nurses were working in government set up and remaining 35% were working under private sector. Standard deviation of pre-test is 3.34 and of post-test is 1.43 which indicates that the subscriber identification module was effective in increasing knowledge of staff nurses regarding the management of electrolyte imbalances in renal failure.

Conclusion: The results of the study indicated that staff nurses do not have adequate knowledge regarding the management of electrolyte imbalances in renal failure. The results have also shown that various demographic variables such as gender, professional experience, and working hospital have a significant association with respect to the knowledge of staff nurses regarding the management of electrolyte imbalances in renal failure.

Keywords: Effectiveness, electrolyte, knowledge, renal insufficiency

Introduction

Health is the general condition of a person in all aspects. It is also a level of functional or metabolic efficiency of an organism, often implicitly human. Diseases are "expression of discomfort" due to structural and functional abnormalities. Human diseases disturb or damage the functioning of cells, tissues, organs, or systems. They are usually characterized by specific signs and symptoms and can be mild and short lasting such as the common cold or severe enough to kill millions such as renal failure. These abnormalities can be caused by various agents. The factors causing diseases may be internal or external in nature.[1]

Renal insufficiency is the state in which kidneys unable to perform function at its optimum level, it includes mainly two

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types, acute renal failure (ARF) and chronic renal failure. Chronic renal insufficiency is a disease that slowly and gradually destroys the filtering capacity of the kidneys. It is sometimes referred to as progressive renal insufficiency which is irreversible, ARF is a rapid loss (breakdown or decrease) of renal function due to damage to the kidneys, resulting in retention of nitrogenous (urea and creatinine) and non-nitrogenous waste products that are normally excreted by the kidney.[2]

Body fluid is composed primarily of water and electrolytes. Electrolytes are defined as inorganic substances that form ions in an aqueous solution. The body is equipped with homeostatic mechanisms to keep the composition and volume of body fluids within narrow limits.[2]

Our body needs electrolytes; when these substances are present in sufficient quantities, body functions normally. During electrolyte imbalance, normal cellular functions are impaired. The degree of impairment, the symptoms, and the severity of this depends on the degree that body has exceeded the normal limits. Electrolytes have several functions. They are used to conduct electricity, the central nervous system sends electrical impulses throughout the body, they can act as secondary messengers, skeletal muscle fibers will respond to a larger than normal electrical stimulus and electrolytes can serve also as catalysts for enzymatic reactions.[2]

Depletion of sodium (Na^+) or potassium (K^+) or calcium (Ca^{++}) through excessive urinary excretion may cause renal failure or renal failure may lead to the depletion of these ions or electrolytes in the blood plasma, normal Na^+ concentration ranges from 135 to 145 meq/L. Hyponatremia refers to a serum sodium level <135 meq/L; similarly, hypernatremia is higher than normal serum sodium level, i.e. exceeding 145 meq/L. The normal serum potassium concentration ranges from 3.5 to 5.5 meq/L, if it is below, normal serum k^+ concentration indicates hypokalemia and if it is greater than normal called as hyperkalemia. A high intake of potassium can cause severe hyperkalemia in patients with impaired renal function. The normal total serum Ca^+ level is 8.6–10.2 mg/dl. Its deficiency is termed as hypocalcemia and excess of Ca^+ in the plasma is known as hypercalcemia, these imbalances may significantly affect renal function and result in renal failure.[3]

Fluid and electrolyte disturbances commonly occur in ARF. The type of fluid derangement is often a function of urine output or volume. With oliguria, urine output is usually defined as being <400–500 mL/day (or <30 mL/h if being measured by a bladder catheter). Without appropriate declines in fluid intake or institution of dialysis, fluid overload may occur. The excessive fluid in the body may initially be linked to cosmetic changes such as peripheral edema, but uncorrected, may result in more detrimental problems such as pulmonary edema. While decreased or absent (anuria is usually defined as a urine output <50–100 mL/day), urine output is often considered to be a hallmark of ARF, in the initial stages of most forms of ARF, urine volume remains unchanged or may even increase.[3]

Objectives of the study

The objectives of the study were as follows:
1. To assess the pre-test knowledge of nurses regarding the management of electrolyte imbalances in patients with renal insufficiency
2. To assess the post-test knowledge score regarding the management of electrolyte imbalance in patients with renal insufficiency
3. To find out a significant difference between pre- and post-test knowledge scores
4. To determine the association between post-test knowledge score with selected demographic variables.

OPERATIONAL DEFINITIONS (O.T)

1. Assessment: It refers to gather information regarding the management of electrolyte imbalances in patients with renal insufficiency
2. Effectiveness: It refers to the extent to which the self-instructional module on the management of selected electrolyte imbalances achieves desired effect in improving the knowledge of staff nurses as evidence from gain in knowledge score
3. Self-instructional module: It refers to the written material designed for staff nurses to provide information regarding the management of selected electrolyte imbalances
4. Knowledge: It refers to response of the staff nurses to the questions stated in the questionnaire regarding the management of selected electrolyte imbalances in renal failure patients
5. Electrolyte imbalances: It is a state of health where there is an imbalance in the homeostasis of electrolyte distribution in the body fluids
6. Renal insufficiency: It is a medical state of health where kidneys are unable to excrete nitrogenous waste and maintain homeostasis.

DELIMITATION OF THE STUDY

- The sample size is limited to 100 staff nurses who are working at selected hospitals at Tumkur
- Staff nurses who are willing to participate.

Hypothesis

H_1: Subscriber identification module (SIM) is effective in increasing nurse's knowledge regarding the management of electrolyte imbalances in renal failure patients

H_2: There will be a significant association between the post-test score and selected demographic variables.

Assumptions

1. Staff nurses may have minimal knowledge regarding the management of selected electrolyte imbalances in renal insufficiency

2. SIM provides an opportunity for learning and better understanding regarding the management of selected electrolyte imbalance in patients with renal insufficiency
3. Nurses could positively utilize the knowledge regarding the management of electrolyte imbalances, to provide comprehensive nursing care to the renal failure patients in future.

Research approach

The approach adopted for this study is evaluative research.

Research design

In the present study, "one-group pre-test, post-test design" was selected which is a pre-experimental design to measure the effectiveness of self-instructional module on the management of electrolyte imbalances in RF.

Variables

1. Dependent variable: In this study, knowledge of staff nurses regarding the management of selected electrolyte imbalances in renal failure is the dependent variable
2. Independent variable: In this study, the independent variable was self-instructional module regarding the management of selected electrolyte imbalances in renal failure.

Research settings

This study was conducted at Shridevi, Doddamane, and Government District Hospitals, Tumkur.

Population

In the present study, population includes staff nurses who are qualified with either diploma or bachelor in nursing and working at the time of data collection in selected settings at Government District, Doddamane, and Shridevi Hospitals, Tumkur.

Sample

The sample comprised 100 staff nurses working in medical wards, surgical, intensive care unit (ICU), and O.T at Government District, Doddamane, and Shridevi Hospitals, Tumkur.

Sample size

The study includes a sample of 100 staff nurses working at Shridevi, Doddamane, and Government District Hospitals, Tumkur.

Sampling technique

Non-probability convenient sampling technique was considered appropriate for this study.

SAMPLING CRITERIA

Inclusion criteria

The following criteria were included in the study:
1. Staff nurses who are qualified with either diploma or bachelor nursing and are working in selected hospital at Tumkur

2. Staff nurses who are willing to participate in this study
3. Staff nurses who are present during data collection
4. Staff nurses working in medical wards, surgical ward, dialysis, ICU, and O.T at selected hospitals.

Exclusion criteria

The following criteria were excluded from the study:
1. Staff nurses who are not available during the data collection period
2. Staff nurses with ANM and M. Sc nursing qualification
3. Staff nurses who are working in pediatric wards and labor room.

METHOD OF DATA COLLECTION

Data collection tool

The purpose of the study was to assess the level of knowledge of staff nurses regarding the management of electrolyte imbalances in renal failure, a structured knowledge questionnaire was found appropriate for the collection of the data.

Development of tool

In this study, the researcher used structured knowledge questionnaire. Data collection tools are the procedure or instruments used by the researcher to observe or measure the key variable in the research problem. The tool was written in English.

Description of the tool

The structured interview schedule consists of two parts.

Part I: Demographic pro forma

The characteristics included age, gender, professional qualification, professional experience, working hospital, present working area, and residence. The respondents were asked to give relevant information in the space provided.

Part II: Structured knowledge questionnaire on the management of electrolyte imbalances in renal failure

It consists of 44 items and it is again divided into four sections.

They were as follows:
• Section A: Anatomy and physiology of renal system and normal electrolyte balance
• Section B: Renal failure or renal insufficiency
• Section C: Selected electrolyte imbalances
• Section D: Management of selected electrolyte imbalances.

All the items were multiple-choice questions, which have four alternative responses. A score value of 1 was allotted to each correct response. The total knowledge score was 44.

RESULTS

Analysis and interpretation of the information collected through structured knowledge questionnaire from 100 staff nurses working in Shridevi, Doddamane, and Government District Hospitals at Tumkur. The present study was designed to assess the effectiveness of self-instructional module knowledge of

staff nurses, collected data were coded, tabulated, organized, analyzed, and interpreted using descriptive and inferential statistics.

Table 1 shows the pre-test and post-test mean, standard deviation (SD), and mean percentage of knowledge among staff nurse regarding the management of electrolyte imbalances in renal failure.

Section I

The age distribution of staff nurses who had participated in the study: The maximum participants are from the age group of 31–40 years and the least number of participants are in the age group of 41–50 years. The gender of participants in the study: About 25 male nurses and 75 female nurses were participated in the research study. Professional qualification distribution of staff nurses: Fifty staff nurses are General Nursing and Midwifery holders, 30 staff nurses are post-B. Sc Nursing degree holders, and remaining 20 are basic B.Sc Nursing candidates. None of the staff nurses had any other certified courses. Working area distribution of staff nurses: Nineteen staff nurses who are working in medical wards, 24 staff nurses who are working in ICU, and remaining 7 staff nurses who are working in O.T were included in the study. The professional experience distribution of staff nurses: Nine staff nurses are having <2 years of experience, 19 staff nurses have 2–4 years of experience and remaining 22 staff nurses having more than 4 years of experience. Staff nurses residing in the urban area and rest of others, i.e., 30% residing in rural area. The working hospital distribution of staff nurses: Twenty-five staff nurses were included in the study from Government District Hospital, Tumkur, and remaining 25 staff nurses were selected from Shridevi Hospital, Tumkur.

Section II

The mean knowledge of MEI in RF was 20.86, with SD 3.34 and range from 13 to 27 before SIM. The mean score percentage was computed and it was found to be 47.4% (13–27). The mean knowledge of MEI in RF was 34.1 with SD 1.45 and range from 30 to 38 after SIM. The mean score percentage was computed and it was found to be 77.5% (30–38). The overall knowledge among staff nurses regarding the management of electrolyte imbalances before administering SIM. About 57.25% of staff nurses had inadequate knowledge, whereas 40% of staff nurses had moderate knowledge and 1% of them had adequate knowledge regarding the management of electrolyte imbalances in renal failure before SIM. The overall knowledge among staff nurses regarding the management of electrolyte imbalances in renal failure after SIM. About 56.75%

of staff nurses had adequate knowledge, whereas 36.5% of staff nurses had moderate knowledge and 1.75% of them had in adequate knowledge regarding the management of electrolyte imbalances in renal failure after SIM.

Section III

To evaluate the effectiveness of self-instructional module program by comparing pre- and post-test knowledge score – the paired mean difference on knowledge regarding MEI in RF before and after SIM was 14.54 and it was statistically significant at 0.05 (highly significant). The result undoubtedly confirms that the SIM is significantly effective in improving the knowledge regarding MEI in RF among the sampled staff nurses.

Discussion

Fluid and electrolyte management is challenging for clinicians, as electrolytes shift in a variety of settings and disease states and are dependent on osmotic changes and fluid balance. The development of a plan for managing fluid and electrolyte abnormalities should start with correcting the underlying condition. In most cases, this is followed by an assessment of fluid balance with the goal of achieving volemia. After fluid status is understood and/or corrected, electrolyte imbalances are simplified. Many equations are available to aid clinicians in providing safe recommendations or at least to give a starting point for correcting the abnormalities. However, these equations do not take into consideration the vast differences between clinical scenarios, thus acute kidney infecting electrolyte management more challenging. The supplementation plan, whether delivered intravenously or orally, must include an assessment of renal and gastrointestinal function, as most guidelines are established under the assumption of normal digestion, absorption, and excretion. After the plan is developed, frequent monitoring is vital to regain homeostasis. A fluid and electrolyte management plan developed by a multidisciplinary team is advantageous in promoting continuity of care and producing safe outcomes.[4-10]

The last objective of the study was to determine the association between post-test knowledge score with demographic variables

Association of post-test knowledge score with demographic variables was done using Chi-square test. The present study showed that gender, working hospital, and professional experience showed a significant association with post-test score, whereas age, qualification, area of work, and residential area are not significant. According to the hypothesis of the study, the investigator found that there is a significant association between post-test with selected demographic variable; hence, alternative hypothesis is accepted.

Conclusion

The data were analyzed by applying descriptive and inferential statistics. The results of the study indicated that staff nurses

Table 1: Mean, SD, and mean% of overall knowledge regarding MEI in random forest at selected hospitals

Domain	Mean	SD	Mean %
Pre-test	20.86	3.342472	47.4
Post-test	34.1	1.452966	77.5
Enhancement	13.24	1.89	30.1

SD: Standard deviation

do not have adequate knowledge regarding the management of electrolyte imbalances in renal failure. This assessment project has helped the investigator to develop a SIM to improve the knowledge of the management of electrolyte imbalances in renal failure. The results have also shown that various demographic variables such as gender, professional experience, and working hospital have a significant association with respect to the knowledge of staff nurses regarding the management of electrolyte imbalances in renal failure.

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