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CASE STUDY

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TELENURSING AND HEALTH EDUCATION TO IMPROVE FLUID RESTRICTION COMPLIANCE IN CHRONIC KIDNEY DISEASE PATIENTS WITH HYPERVOLEMIA UNDERGOING HEMODIALYSIS: CASE STUDY

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ABSTRACT

Background: Patients with chronic kidney disease (CKD) who are undergoing hemodialysis therapy are important to limit fluids to prevent fluid buildup that can trigger complications. Increased fluid volume, both intravascular and interstitial, can cause hypervolemia. Telenursing is the use of technological resources and communication systems to promote nursing development. This study is to determine the application of telenursing and health education to improve adherence to fluid restriction in CKD patients undergoing hemodialysis.
Methods: This research is a case study on three patients with hypervolemia. The interventions provided were health education twice and telenursing via short messages for six days. The instrument used in this study used an adaptation of the ESRD-AQ questionnaire to measure adherence to fluid restriction and was supported by clinical data on blood pressure, IDWG, UF goal, and degree of edema.
Results: The results of this study are that the level of adherence before the intervention was given was 100% non-adherent. After being given the intervention, 66.7% (Mrs. N. and Mrs. S.) were compliant, and 33.3% of Mr. T. did not comply with fluid restrictions.
Conclusion: Health education and telenursing in the form of short message reminders can improve compliance with fluid restriction in CKD patients with hypervolemia. Recommendations from research can determine effective health education methods and media as well as telenursing media for patients and families.

Keywords: *Telenursing, health education, adherence, fluid restriction, hypervolemia, chronic kidney disease, hemodialysis.*

INTRODUCTION

Patients with CKD require comprehensive management. Providing comprehensive CKD patient care in terms of dialysis plans, medication, and dietary restrictions is very important in slowing down the development and complications of CKD (Ricci et al., 2016). Renal replacement therapy consists of hemodialysis, transplant, and CAPD (Continuous Ambulatory Peritoneal Dialysis). The purpose of hemodialysis is to help improve the composition of body fluids to achieve fluid balance. Even so, patients must continue to limit fluid intake (fluid restriction) and diet. The problem of excess fluid experienced by patients is not only obtained from excessive drinking intake but also from foods that contain high water content (Beerappa & Chandrababu, 2019).

Fluid restriction is often difficult for patients to maintain, especially if they are taking drugs that dry out the mucous membranes such as diuretics. Because the drug will cause thirst which results in a response to drinking(Brunner, 2013). Based on previous research by Melianna (2013), stated that 76% of patients undergoing HD at Fatmawati General Hospital did not comply with fluid restrictions and 53.6% of respondents experienced an overload. The study results of the Beerappa (2019) stated that the level of compliance with the respondent's fluid restrictions was 51.6%.

In addition to the level of adherence to fluid restriction, another problem that is most often faced by CKD patients is the status of increased fluid volume (fluid overload) (Hung et al., 2014).

Hypervolemia is an increase in intravascular and interstitial fluid volume, and increased fluid intake and/or retention (Dewan, 2016). The rapid development of the times has led to advances in the application of information and communication technology in all fields, especially in the health sector. Telenursing is a strategy that enhances nursing activities, enabling professionals to use them to guide and monitor patients and populations according to patient needs.

This facilitates access, saves time, and resources, and promotes greater self-care possibilities (Fronczek et al., 2017). Several studies have shown that patient knowledge about the disease and treatment is associated with increased adherence. With limited knowledge, patients tend to have little control over the disease and its complications. However, not always patients with good knowledge will behave obediently (Parvan et al., 2015). Therefore health education is an important aspect of increasing patient knowledge which is part of nursing duties (Miyata et al., 2018). Several previous studies explained that health education led by nurses can affect increasing adherence to medication management (Arad et al., 2021). The researcher is interested in further research in the form of a case study on "The Application of Telenursing and Health Education to Improve Fluid Restriction Compliance in Chronic Kidney Disease Patients with Hypervolemia Undergoing Hemodialysis at “RSUP Dr. Karidi, Semarang”.

METHOD

This research is a case study with a pre-post study on three patients Mrs.N, Mr.T and Mrs.S. This research has obtained informed consent from the respondents. Respondents' inclusion criteria included patients aged > 18 years, diagnosed with CKD with symptoms of hypervolemia, willing to participate as respondents, undergoing hemodialysis therapy at least twice a week, and being able to communicate, read and write. The research was conducted at Dr. Kariadi, Semarang in October - November 2022. Data collection used the method of interviews, observations, studies of nursing care documentation, and research questionnaires. The interventions provided were health education twice and telenursing via short messages and WhatsApp calls for six days. Educational material in the form of leaflets with material covering the importance of limiting fluids, how to control fluids, how to reduce thirst, symptoms of excess fluids and their dangers to the body, sodium (salt) diet tips and determining daily fluid intake. Nursing care is enforced from assessment, data analysis, determining diagnosis, planning interventions, and implementation to evaluation, while nursing interventions are carried out for 7 days.

Pre and post-intervention were given the End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ) (Kim et al., 2010)questionnaire sub-section of fluid restriction to measure the level of adherence to fluid restriction which consisted of 10 questions with an assessment of the answers to category 1 scored 200, 2 scored 150, 3 scored 100, 4 scored 50, and 5 scored 0. Compliance uses the cut-off point (median) value, namely adherence if ≥ 150 and non-adherence <150. Supported by clinical data on blood pressure, IDWG, UF goal, and degree of edema.

This research uses a univariate data analysis method which is presented in the form of a frequency distribution table and is presented descriptively. The ethical considerations from the case studies used are autonomy, confidentiality, justice, beneficence, and non-maleficence.

RESULT

The results of the research were obtained after carrying out health education interventions and monitoring through telenursing by collecting pre-post intervention data using the ESRD-AQ questionnaire and clinical supporting data from three respondents at RSUP Dr. Kariadi, Semarang obtained the following results:

Tabel 1 Pre–post Intervention

Patient	IDWG (kg)		Degree of Edema		Blood Pressure		UF Goal		Fluid Restriction Compliance	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mrs.N	4	3,5	3	2	161/94	184/108	3000	2500	50 (Non-adherence)	150 (Adherence)
Mr. T	4	3	4	4	145/75	133/93	4000	3500	50 (Non-adherence)	100 (Non-Adherence)
Mrs.S	4	3	3	2	152/96	154/93	3000	2500	50 (Non-adherence)	150 (Adherence)

Table 1 shows the pre-intervention and post-intervention results between HD 1 and HD 2. Clinical data on changes in IDWG, degree of edema, and pre-post intervention blood pressure.

Case 1.

Mrs. N, a woman aged (31 years) with a high school education has not worked as a housewife diagnosed with CKD stage 5 since 2019 with a schedule of hemodialysis twice a week on Mondays and Thursdays in the afternoon, and a history of uncontrolled hypertension. The patient said that the right leg was swollen two months ago (grade 3 edema), and even though routine HD was done, it still had not been reduced. The patient complains that he gets tired quickly when doing activities, sometimes feeling short of breath just before HD. The patient admits that it is difficult to limit fluids, rarely measures fluid intake in a day with a measuring cup, usually drinks 4-5 glasses a day (±1200 cc), and can still urinate 2-3 times (±300 cc). BP: 185/102 mmHg, HR: 88 x/minute, RR: 20 x/minute, BW before HD 62.5 kg, double lumen HD access.

Patients and families are given health education interventions about the importance of limiting fluids, how to control fluids, how to reduce thirst, symptoms of excess fluids and their dangers to the body, dietary tips on sodium (salt), and determining daily fluid intake, explained directly using leaflets. Education was carried out for 30 minutes 2 times, namely after the assessment and at the 2nd HD. The patient agreed to be monitored using telenursing via WhatsApp in the form of a short message containing an appeal to control fluids, limit fluid intake for one day and evaluate fluid intake. The pre-intervention results of the assessment of adherence to fluid restriction were 50, which means the patient was not compliant. Post-intervention evaluation on the seventh day, the patient's fluid restriction adherence value was 150, which means the patient was compliant. Supported by clinical examination, the degree of edema decreased to 2, BP increased, UF goal decreased to 2500 and IDWG decreased to 3.5 kg.

Case 2.

Mr. T, a man aged (42 years) with a bachelor's degree working as a contractor foreman diagnosed with CKD stage 5 in 2020 with a schedule of hemodialysis twice a week on Tuesday and Friday morning sessions, a history of hypertension, controlled diabetes mellitus, and a family history of Mr. Tn. T suffers from CKD and diabetes mellitus. The patient said the swelling in both legs and abdomen (grade 4 edema of the lower extremities and ascites in the abdomen), even though routine HD had been done, the swelling had not reduced. The patient complained that since his leg was swollen it was difficult for him to walk, so he used a cane to walk. Patients say they get tired quickly when doing activities, sometimes they feel short of breath just before HD. The patient has performed 3 punctures, the last puncture was in September. The patient had done a trial of a strict liquid and salt diet for one month, but there was no significant change so he got bored. The patient admits that it is difficult to limit fluids, rarely measures fluid intake in a day with a measuring cup, usually drinks 3 - 4 glasses a day (± 1100 cc), can still urinate 2-3 times but a little (± 200 cc), BP: 122/63 mmHg, HR: 80 x/minute, RR: 20 x/minute, BW before HD 101 kg, double lumen HD access.

Patients and families are given the same intervention as case 1 in the form of health education and monitoring through telenursing. The pre-intervention results of the assessment of adherence to fluid restriction were 50, which means the patient was not compliant. Post-intervention evaluation on the seventh day, the patient's fluid restriction adherence value was 100, which means that the patient is still not compliant even though the score has increased. Supported by clinical examination, the degree of edema decreased to 3, BP decreased, UF goal decreased to 350 and IDWG decreased to 3 kg.

Case 3.

Mrs. S, a woman aged (56 years) with an elementary school education has not worked as a housewife diagnosed with ESRD since 2019 with a schedule of hemodialysis twice a week on Wednesdays and Saturdays in the morning sessions, and a history of uncontrolled hypertension. The patient said the swelling in both legs and abdomen (grade 3 edema of the lower extremities and ascites in the abdomen), even though routine HD had been done, the swelling had not reduced. Patients complain of getting tired quickly when doing activities, sometimes feeling short of breath just before HD. The patient admits that it is difficult to limit fluids, rarely measures daily fluid intake with a measuring cup, usually drinks 3 - 4 glasses (± 1000 cc) a day, can still urinate 2 - 3 times but a little (± 200 cc), BP: 185/102 mmHg, HR: 88 x/minute, RR: 20 x/minute, BW before HD 62.5 kg, double lumen HD access.

Patients and families have been given health education interventions and monitoring through telenursing the same as in cases 1 and 2. The pre-intervention results of the assessment of compliance with fluid restriction had a value of 50, which means the patient was not compliant. Post-intervention evaluation on the seventh day, the patient's fluid restriction adherence value was 150, which means the patient was still compliant.

Supported by clinical examination, the degree of edema decreased to 2, BP increased, UF goal decreased to 2500 and IDWG decreased to 3 kg.

DISCUSSION

1. Health Education uses Telenursing

Providing education or health education to individuals, namely planning, implementing, and evaluating educational programs designed for the special needs of patients (Kurniawati et al., 2018). In this case study, the three respondents admitted that it was difficult to limit fluids, patients did not understand the limits of fluid intake in a day, and there were aspects of knowledge that were lacking related to fluid restriction management. So that health education materials have been adapted to the needs of patients with material provided including the importance of limiting fluids, how to control fluids, how to reduce thirst, symptoms of excess fluids and their dangers to the body, sodium (salt) dietary tips, and determining daily fluid intake explained directly using media leaflets. Educational media is also an important point, one of which is face-to-face health education which has a more effective effect on motivating patients to comply with therapeutic recommendations (Parvan et al., 2015).

Previous research explains that implementing regular health education interventions can help improve self-management skills (Yuliastuti & Suhartini, 2018) and motivate patients to participate in kidney care independently for optimal health and outcomes, such as preventing emergency room visits and improving quality patient life (Alikari et al., 2019). Hemodialysis nurses have an important role as educators to help chronic kidney disease patients to be able to control fluid intake so that they can be obedient in limiting fluid intake (Miyata et al., 2018). The success of health education was observed from the increase in interdialytic weight (IDWG) before and after dialysis, ultrafiltration volume (UF), and the patient's blood pressure values after training (Nadri et al., 2020). In this case study, the results showed changes in IDWG, UF volume, blood pressure, and degree of edema in the three respondents. IDWG in the three respondents decreased in Mrs. N decreased from 4 kg to 3.5 kg, Mr. T from 4 kg to 3 kg, and Mrs. S from 4 kg to 3 kg. The degree of edema in Mrs. N and Mrs. S decreased from degrees three to two. Meanwhile, Mr. N still with a degree of edema 4. Blood pressure on Mrs. N and Mrs. S has increased, while Mr. T has decreased. UF Goal in the three patients decreased.

In addition to conducting patient health education, monitoring is also carried out through telenursing via WhatsApp messages and telephones in the form of short messages containing an appeal to control fluid intake, limit fluid intake for one day, and evaluate fluid intake and output while at home. Telenursing itself is a strategy that enhances nursing activities, enabling professionals to use it to guide and monitor patients and populations according to patient needs through communication technology (Souza-Junior et al., 2016). This case study is in line with previous research that nurse-led telephone follow-up and patient education programs can improve HD adherence and modify health behavior in ESRD patients by increasing knowledge about patients' chronic conditions (Arad et al., 2021).

Another study using telenursing with SMS communication media (Short Message Service) to monitor CKD patients showed an increase in the knowledge and quality of life of patients undergoing hemodialysis (Tarverdizade Asl et al., 2018). A study conducted by Modanloo, et al (2015) used health education interventions and telenursing via text messages (Short Message Service) SMS to control weight in hemodialysis patients to increase self-efficacy in weight management in patients undergoing hemodialysis (Modanloo et al., 2015).

2. Compliance with fluid restrictions in CKD patients with hypervolemia

The results of this case study the results of measuring adherence to fluid restrictions using the ESRD-AQ questionnaire at the pre-intervention showed 100% disobedience in the three clients with a score of 50. Meanwhile, the results of the post-intervention measurement of fluid restrictions showed 2 respondents had complied (66.7%), namely Mrs.N and Mrs.S with a score of 150, and 1 respondent was still disobedient, namely Mr.T with a score of 100. This is supported in the other question components of the questionnaire given, indicating that the majority of respondents were 2 people (66.7%) who discussed fluid restrictions with health workers in the previous week, stated that health workers conveyed the importance of limiting fluids every month, realized that limiting fluid intake was very important, realized the importance of limiting fluids because health workers advised them to limit fluids, stated taking measurements body weight twice a week when carrying out hemodialysis treatment, and states that it is important to measure body weight.

This research is also in line with previous research on the effect of educational programs on

Improving diet adherence and fluid control in hemodialysis patients (Başer & Mollaoğlu, 2019). In addition, this research is also in line with previous research which states that health education can increase adherence to fluid restrictions (Parker, 2019). In this case study report, the three respondents had the same risk factors for CKD, namely having a history of hypertension. The two patients did not treat hypertension properly, did not routinely control blood pressure, and did not take hypertension medication regularly. Improper handling of hypertension can cause various complications such as CKD (Iman Muhamad Firmansyah et al., 2016). Whereas on the client 3 factors that cause CKD are due to diabetes mellitus since 5 years ago. There are changes in renal hemodynamics, ischemia, and abnormalities of glucose metabolism associated with increased oxidative stress, inflammatory processes, and overactive renin-angiotensin-aldosterone (RAAS) processes that also contribute to kidney damage (Rocco et al., 2015).

CKD patients undergoing hemodialysis are advised to limit their intake of fluids that enter the body every day. Compliance is defined as the level of individual behavior that receives medication, adheres to a diet, or makes lifestyle changes by therapy recommendations and health care providers (Santos et al., 2015)). Compliance with fluid restrictions means patient behavior follows recommendations in regulating body fluid intake. Especially in CKD patients, the rule used to determine fluid intake is 500 ml plus the amount of urine excreted in the last 24 hours (Rocco et al., 2015). Based on the results of the nursing assessment of patients in the three respondents experiencing signs of hypervolemia, including patients experiencing swelling, edema anasarca orthopnea (shortness of breath when lying down), and increased body weight in a short time. After the third intervention, the patient still experienced signs of hypervolemia but with reduced degrees of symptoms, from the degree of edema, IDWG, blood pressure, and UF Goal (Nadri et al., 2020).

The high level of compliance with fluid restriction can be influenced by several factors, namely gender, education level, level of knowledge, length of time undergoing hemodialysis, involvement of health workers, support, and IDWG (Al Husna et al., 2019). According to several studies, other factors that affect adherence are divided into several aspects, namely patient-related factors (age, gender, education level, knowledge, interpersonal communication), and socio-economic factors (income level, employment status, social and family support, and friend support peer), psychological factors, factors related to health care, factors related to therapy, and factors related to disease (Mukakarangwa et al., 2020). According to the researchers, it is the factors that affect adherence that can make this research in line with previous research, while others are not in line with previous research.

CONCLUSION

This case study research resulted that health education and monitoring of fluid intake through telenursing showed a change in patient behavior to regulate fluid intake in the three respondents so that patients were more obedient in limiting and controlling fluid intake. The success of health education was observed in the increase in pre-post intervention results using the ESRD-AQ questionnaire and from a decrease in IDWG, ultrafiltration volume (UF), the patient's blood pressure value, and degree of edema. This research has weaknesses, including the relatively short time for implementing the intervention and the provision of daily monitoring through telenursing, sometimes respondents do not respond quickly.

SUGGESTION

CKD patients are expected to be able to maintain and improve adherence to fluid restrictions. The family provides support for the patient in controlling fluid restrictions. For nursing services, especially hemodialysis nurses, can regularly educate patients according to the patient's needs and continue to monitor the patient's fluid intake while at home by utilizing telenursing. It is hoped that telenursing can be applied in the health care system of the hemodialysis unit. For future researchers, it is hoped that they can develop effective methods and media for health education and telenursing media for patients and families.

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