Majalah Kesehatan Indonesia

Volume 5, Issue 2, October 2024, p. 63–70
P-ISSN 2745-6498, E-ISSN 2745-8008

Management of urogenital hygiene health education to improve knowledge and prevent urinary tract infection in patient with chronic kidney disease

Dhea Firnanda Airin Allyarista[1], Nurfika Asmaningrum [2*)], Anisah Ardiana[3], I Kade Iman Darmawan[4]

[1] Faculty of Nursing, University of Jember
[2] Center of Fundamental Nursing Studies, Faculty of Nursing, University of Jember
[3] Center of Fundamental Nursing Studies, Faculty of Nursing, University of Jember
[4] Department of Nursing, Bali Mandara Hospital

ARTICLE INFO

Article history:

Received 21 July 2024
Accepted 8 October 2024
Published 17 October 2024

Keyword:

Health education
Urogenital hygiene
Urinary tract infection
Chronic kidney disease
Catheterization

ABSTRACT

Urinary Tract Infections (UTIs) are a prevalent form of Healthcare-Associated Infections (HAIs) in patients with chronic kidney disease (CKD), especially those undergoing urinary catheterization. It is estimated that UTIs affect up to 25% of catheterized patients, significantly impacting morbidity and healthcare costs (World Health Organization, 2021). This study aims to determine how health education regarding urogenital hygiene can increase knowledge and prevent infection for patients undergoing urinary catheterization. This research is quantitative descriptive using a case study approach. A one-group pre-test post-test design was employed to collect data through the administration of pre-test and post-test knowledge assessments before and after health education. The results demonstrated a significant increase in knowledge scores from 67 to 93, indicating the effectiveness of health education in enhancing knowledge about urogenital hygiene. Furthermore, observation of signs and symptoms of UTIs showed a decrease in symptoms during the patient's treatment, highlighting the positive impact of health education. Providing urogenital hygiene education effectively increases knowledge and mitigates the risk of UTIs during patient care.

Kata kunci:

Edukasi kesehatan
Kebersihan urogenital
Infeksi saluran kemih
Penyakit ginjal kronis
Kateterisasi

**) corresponding author*

Nurfika Asmaningrum
Center of Fundamental Nursing Studies, Faculty of Nursing, University of Jember
Jln. Kalimantan 37 Tegalboto No. 37, Krajan Timur, Sumbersari, Kec. Sumbersari Kabupaten Jember, Jawa Timur – Indonesia 6812

Email: nurfika_asmaningrum@unej.ac.id
DOI: 10.47679/makein.2024207

ABSTRAK

Infeksi Saluran Kemih (ISK) merupakan salah satu bentuk Infeksi Terkait Perawatan Kesehatan (Healthcare-Associated Infections/HAIs) yang umum terjadi pada pasien dengan penyakit ginjal kronis (PGK), terutama pada mereka yang menjalani kateterisasi urin. Diperkirakan bahwa ISK mempengaruhi hingga 25% pasien yang dipasang kateter, secara signifikan mempengaruhi morbiditas dan biaya perawatan kesehatan (World Health Organization, 2021). Penelitian ini bertujuan untuk mengetahui bagaimana edukasi kesehatan mengenai kebersihan urogenital dapat meningkatkan pengetahuan dan mencegah infeksi pada pasien yang menjalani kateterisasi urin. Penelitian ini menggunakan pendekatan deskriptif kuantitatif dengan pendekatan studi kasus. Desain penelitian one-group pre-test post-test digunakan untuk mengumpulkan data melalui penilaian pengetahuan sebelum dan sesudah edukasi kesehatan. Hasil penelitian menunjukkan peningkatan skor pengetahuan yang signifikan dari 67 menjadi 93, yang menunjukkan efektivitas edukasi kesehatan dalam meningkatkan pengetahuan tentang kebersihan urogenital. Selain itu, pengamatan terhadap tanda dan gejala ISK menunjukkan penurunan gejala selama perawatan pasien, yang menegaskan dampak positif dari edukasi kesehatan. Pemberian edukasi kebersihan urogenital secara efektif meningkatkan pengetahuan dan mengurangi risiko ISK selama perawatan pasien.

INTRODUCTION

Urinary Tract Infections (UTIs) are a significant concern for patients with Chronic Kidney Disease (CKD), particularly those with indwelling urinary catheters. Healthcare-Associated Infections (HAIs), such as UTIs, significantly impact patient morbidity and healthcare costs, leading to extended hospital stays and increased financial burden (World Health Organization, 2022; Pakpahan et al., 2024). According to Magill et al. (2022), UTIs remain one of the most frequent HAIs in hospitalized patients, with catheter-associated UTIs accounting for approximately 40% of all HAIs. Therefore, effective preventive measures, including health education, are crucial in reducing the prevalence of HAIs (Gould et al., 2021).

Patient safety is a system aimed at making healthcare safer, which includes risk assessment, identification, and management of risks, as well as reporting, analyzing incidents, and implementing solutions to minimize risks and prevent harm caused by errors in patient care (Zaskia et al., 2023). The high prevalence of HAIs, particularly UTIs among CKD patients with catheters, underscores the need for robust infection prevention measures (Pakpahan et al., 2024; Priskila et al., 2024). Infection prevention and control (IPC) strategies are essential in improving healthcare quality and ensuring patient safety (Supratiningsih et al., 2024).

The Health Belief Model (HBM) provides a useful framework for understanding how health education can influence individual behavior (Green et al., 2020). According to the HBM, individuals are more likely to engage in preventive behaviors if they perceive themselves as susceptible to a disease, believe the disease has serious consequences, and see the benefits of taking preventive actions (Rosenstock et al., 1988; Jones et al., 2021). In the context of preventing UTIs, educating patients and their families on urogenital hygiene can improve their perception of risks and the importance of appropriate catheter care, thus enhancing compliance with recommended practices (Hanifah et al., 2023).

Effective health education should involve the use of appropriate teaching materials tailored to the patient's needs. Informative materials, such as brochures and visual aids, play a crucial role in enhancing the family's knowledge and enabling them to actively participate in infection prevention practices (Ponika et al., 2023). Studies indicate that the combination of verbal education with visual aids significantly improves information retention and comprehension among patients and their caregivers (Smith & Jones, 2022). Moreover, previous research has demonstrated that using interactive and visual-based learning tools can effectively increase the knowledge and motivation of participants in healthcare settings (Thompson et al., 2021).

The duration of health education sessions and the regularity of follow-ups are critical to ensuring effective knowledge transfer and behavior change (Maitsa, 2021; Priskila et al., 2024). In this study, health education was provided using a structured approach that included multiple sessions and demonstrations of proper catheter care techniques, which were evaluated for their impact on reducing UTI symptoms. Demonstrations and hands-on practice have been shown to be more effective in promoting knowledge retention and skill acquisition compared to verbal explanations alone (Maduakolam et al., 2022; White et al., 2022).

A lack of knowledge about catheter and urogenital hygiene among caregivers has been linked to an increased risk of UTIs, emphasizing the importance of structured health education interventions (Yunita et al., 2022; Wahyuni et al., 2023). Proper education on catheter care includes instructions on maintaining hygiene in the genital area, avoiding contamination, and recognizing early signs of infection (Sari et al., 2023). This study aims to evaluate the effectiveness of structured health education, provided through demonstrations and visual materials, in improving the knowledge of caregivers and preventing UTIs in CKD patients with urinary catheters.

The current study aims to contribute to the existing body of knowledge by addressing the gap in effective educational interventions targeted at preventing urinary tract infections (UTIs) in patients with chronic kidney disease (CKD) undergoing catheterization. While previous studies have highlighted the high prevalence of healthcare-associated infections (HAIs), particularly UTIs, among catheterized patients (Magill et al., 2022; Zimlichman et al., 2013), there is limited evidence on structured, culturally tailored health education approaches that specifically involve caregivers to improve urogenital hygiene practices (Priskila et al., 2024; Gould et al., 2021). Educational interventions that include caregivers have been shown to significantly enhance adherence to preventive practices by creating a supportive environment for the patient (Green et al., 2020; Shrestha et al., 2022). This study fills this gap by evaluating the effectiveness of comprehensive health education using both verbal instructions and visual aids to increase knowledge and adherence to preventive behaviors among families of CKD patients (Smith & Jones, 2022; Thompson et al., 2021). Previous research has indicated the importance of visual learning tools in improving the retention of health information, particularly in managing chronic conditions (Thompson et al., 2021; White et al., 2022). By involving caregivers in the intervention and providing a well-structured educational framework, this research seeks to mitigate the risks of UTIs and offer a scalable preventive strategy that can be implemented across various healthcare settings (Ponika et al., 2023; Rosenstock et al., 1988). The study's findings contribute to the growing need for patient-centered, preventive healthcare solutions that empower families to play an active role in the management of chronic conditions, ultimately enhancing patient outcomes and reducing the incidence of HAIs (Yunita et al., 2022; Wahyuni et al., 2023).

METHODS

Participant (Subject) Characteristics

This study was conducted at a hospital in Bali from March 16 to March 21, 2024. Participants included family members of Mrs. S, who was a patient undergoing treatment for chronic kidney disease (CKD). The inclusion criteria for participants were: (1) family members aged 18 years or older who were actively involved in the patient's care, and (2) those willing to provide informed consent to participate in the study. The exclusion criteria were: (1) family members with significant health issues preventing active participation, and (2) individuals who were not available for the full duration of the educational intervention. Clearly defining the inclusion and exclusion criteria is critical to ensure the internal validity and generalizability of the study (Zhou et al., 2023).

Measures and covariates, and Quality of Measurements

The instrument used for data collection was a questionnaire designed to assess the knowledge of urogenital hygiene by (Faran, 2023), whose validity had been tested with an r table value of 0.361 and a calculated r of 0.377 – 0.566. The results of the validity test show that r count > r table so it can be concluded that the instrument is valid. In reliability testing, the questionnaire had a Cronbach's alpha value > 0.762, which means it is reliable because the r value is > 0.70. Meanwhile, assess the evaluation of the signs of UTI using a questionnaire Adawiya (2017) whose validity has been tested (r table > r count) with an r table value of 0.444 and r count of 0.505 – 0.781. The questionnaire's content validity was established through consultation with subject matter experts, ensuring the relevance and appropriateness of the items. Reliability testing was performed with a sample of 30 participants from a similar population prior to the main study. With a Cronbach's alpha value, the reliability test is 0.913 (r > 0.70). The patient is declared to have an Urinary Tract Infection (UTI) if the patient experiences >6 symptoms mentioned in the questionnaire.

Data Collection

This research uses primary and secondary data. Primary data was obtained directly from respondents through interviews, observations, and filling out knowledge questionnaires regarding urogenital hygiene in the patient's family. Meanwhile, secondary data was obtained from reviewing the medical records. Interviews were conducted with the patient's family, Mrs. S, to explore knowledge about HAIs and their prevention through urogenital hygiene in patients who have urinary catheterization. In addition, observations are carried out to document signs and symptoms of risk of urinary tract infections that occur in patients. This includes signs and symptoms of UTI risk that appear in patients. The family was then asked to fill out an informed consent sheet and a pre-test sheet to find out the initial knowledge score, which was measured using the knowledge instrument of urogenital hygiene.

Health education regarding urogenital hygiene is carried out after the family has filled out the pre-test sheet, and a demonstration is carried out on how to carry out proper urogenital hygiene. Next, the post-test sheet was filled in by Mrs. S with a predetermined time interval after providing health education and demonstrations. Evaluation was carried out on the signs and symptoms of UTI in patients using a questionnair which was carried out for six consecutive days until the patient was discharged. A urinary tract infection is considered positive if >6 symptoms appear on the questionnaire.

Data were collected using structured interviews, direct observations, and a pre-test and post-test knowledge assessment. The structured interviews consisted of pre-determined questions and were conducted by trained healthcare professionals to minimize bias and maintain consistency (Dewi et al., 2022). The observations were also structured, with observers using standardized checklists to evaluate participants' adherence to urogenital hygiene practices. The use of structured data collection methods ensures that the gathered information is reliable and comparable across participants (Flick, 2018).

Research Design

This research uses a case study with one group pre test - post test design approach to investigate how health education regarding urogenital hygiene can increase knowledge and prevent UTIs in patients with urinary catheterization. The pre-test and post-test were carried out to measure the value of knowledge before and after being given health education.

Intervention Duration and Follow-Up

The educational intervention was delivered in three sessions over a three-week period. Each session lasted approximately 60 minutes, during which verbal instruction, demonstrations, and visual aids were used. A pre-test was administered immediately before the first session, and a post-test was conducted one week after the final session to assess knowledge retention and the impact of the educational intervention. Providing ample time between sessions allowed participants to apply the knowledge they had gained (Gordon et al., 2021). The timing between pre-test and post-test measurements was critical in assessing the short-term effectiveness of the intervention (Maduakolam et al., 2022).

Data analysis

The data collected is subjected to comprehensive analysis to identify nursing problems that arise in patients, namely the risk of infection. This analysis includes an increase in knowledge scores before and after health education, along with an evaluation of the occurrence of signs and symptoms of urinary tract infections that appear in patients who have been observed after the family received urogenital hygiene health education.

Ethical Considerations

Although no formal ethics approval was obtained, this study adhered to the ethical guidelines outlined in the Declaration of Helsinki (World Medical Association, 2013). Written informed consent was obtained from all participants, who were given detailed information about the study's objectives, procedures, and potential risks and benefits. Participant confidentiality was ensured, and participation was voluntary, with individuals having the right to withdraw at any time (Silverman, 2021).

RESULTS OF STUDY

Case Overview

The managed patient is an older adult with the initials Mrs. S, who is 64 years old and female and has the highest education status: primary school. The patient came to the emergency room on March 14 2024 with a primary medical diagnosis of CKD stage V and secondary diagnoses of hyperkalemia & anemia. The patient is a referral patient from another hospital who complained of feeling weak and short of breath. When the assessment was carried out on March 16th 2024, the patient complained that his body felt weak and short of breath. Based on the physical examination results, the patient had a urinary catheter installed on day 2. During the genital examination, whitish spots were found on

Table 1. Questionare Pre Test - Post Test

No	Statement	Correct Answer		Incorrect Answer	
		Pre-Test	*Post-Test*	*Pre-Test*	*Post-test*
1	Genitourinary personal hygiene is an effort to care for and maintain the cleanliness of the urinary system and reproductive systems to avoid various diseases	√	√		
2	Preventing the entry of microorganisms (bacteria, viruses and fungi) into the genital area is the goal of implementing urogenital hygiene	√	√		
3	The urogenital system is the urinary system and reproductive system		√	X	
4	Using loose powder on the genital area is the right way to maintain cleanliness in the female genital area	√	√		
5	Wearing underwear must be dry and absorb sweat	√	√		
6	Using a cleanser or antiseptic fluid every day helps keep the genital area clean			X	X
7	Wash the genital area properly, namely from back to front using clean water		√	X	
8	It is recommended that sanitary napkins be changed at least 3-5 times a day	√	√		
9	Using panty liners every day is better than changing underwear	√	√		
10	The pubic area should not be too moist because this can cause microorganisms (bacteria, viruses and fungi) to grow and reproduce easily	√	√		
11	After washing the genital area when urinating or defecating, it is best to dry the genital area first using a clean tissue/cloth	√	√		
12	Urinary tract infection (UTI) is one of the impacts of a lack of urogenital personal hygiene	√	√		
13	Cleaning the genital area is enough to do when showering		√	X	
14	When washing the genital area, there is no need to wash your hands first		√	X	
15	Wearing underwear that is too tight can change the pH in the pubic area so it needs to be avoided	√	√		
SCORE = (Number of correct questions: number of questions) x 100					

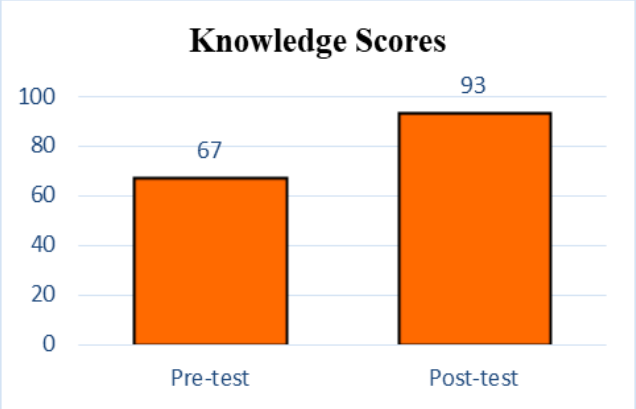

Figure 1. Graph of Changes in Knowledge Scores Before and After Education

the patient's catheter tube, and the patient had dirty diapers on.

The laboratory results, including leukocyte levels of 12.3 × 10^3/μL and a urine bacteria value of 1+, highlight a heightened risk of infection. Elevated leukocyte levels are indicative of an ongoing inflammatory response, commonly associated with infection, particularly in patients with indwelling urinary catheters. The presence of bacteria in the urine (bacteriuria) further supports the increased susceptibility to urinary tract infection (UTI). In patients with urinary catheters, the combination of bacteriuria and leukocytosis suggests the development of catheter-associated UTIs (CAUTIs), a well-known complication in catheterized patients. Thus, these findings underscore the critical need for proactive infection control measures, including rigorous urogenital hygiene practices. The nursing problem that is the focus of this research is the risk of infection, characterized by whitish spots on the patient's catheter tube, dirty diapers, urine bacteria 1+, and leukocyte levels: 12.3 103/μL.

Implementation of Health Education

Based on the results of the figure 1, it shows that the pre-test knowledge score before being given health education was 67 with the number of correct answers on 10 questions and incorrect answers on 5 questions. Health education is then provided using hanging paper media where, after an explanation is given, the media is hung on the patient's IV pole to serve as a reminder of how to carry out urogenital hygiene, which the family can carry out. Furthermore, the results show that after health education was carried out, the score obtained was 93, with 14 questions correct and 1 question incorrect (Figure 1). This change in score indicates that there has been an increase in the patient's family's knowledge regarding urogenital hygiene in patients who have catheters installed as an effort to prevent infection, especially urinary tract infections. The increase demonstrates the effectiveness of the health education intervention provided to Mrs. S's family, which included verbal instruction, demonstrations, and the use of visual aids. The 26-point increase in knowledge is statistically significant and clinically relevant, as it reflects the family's increased ability to manage urogenital hygiene, thereby potentially reducing the patient's risk of infection.

Table 2. Evaluate Signs of Urinary Tract Infection (UTI)

No	Signs And Symptoms	Before Health Education	After Health Education					
			Day-1	Day-2	Day-3	Day-4	Day-5	Day-6
1	Experiencing pain or burning during urination (dysuria)	X	X	X	X	X	X	X
2	Fever more than 38°C	X	X	X	X	X	X	X
3	Shivering	X	X	X	X	X	X	X
4	Nauseous	X	X	X	X	X	X	X
5	Vomit	X	X	X	X	X	X	X
6	Itching feeling around the area where the catheter is inserted	√	√	√	X	X	X	X
7	Redness around the genetalia area	X	X	X	X	X	X	X
8	Hip/lower pain	X	X	X	X	X	X	X
9	Pain in the bladder/suprapubic area	X	X	X	X	X	X	X
10	Tenderness in the bladder area	X	X	X	X	X	X	X
11	Malaise	√	√	√	√	√	X	X
12	Increased urinary frequency (a sensation of needing to urinate urgently and frequently)	X	X	X	X	X	X	X
13	Urine appears thick and cloudy	√	√	√	√	√	X	X
	Total Score	**3**	**3**	**3**	**2**	**2**	**0**	**0**

Notes:
√ = Yes
X = No

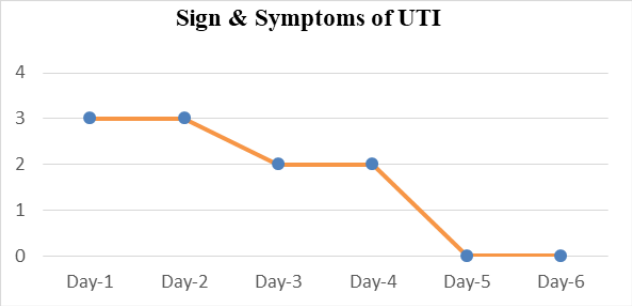

Figure 2. Evaluation Chart for Signs and Symptoms of Urinary Tract Infection

Evaluation of Health Education

Assessing that the patient's family was able to implement urogenital hygiene, the researchers then evaluated the implementation of urogenital hygiene on the incidence of urinary tract infections (UTIs) in patients who had catheters installed. Evaluation of the family's implementation of urogenital hygiene as an effort to prevent the risk of infection is carried out by assessing the signs and symptoms of urinary tract infections (UTI). A urinary tract infection is considered positive if > 6 symptoms appear based on the questionnaire results. Evaluations carried out on patients every day are presented in tabel 2.

The reduction in specific symptoms, such as itching and malaise, was quicker compared to other symptoms. This can be attributed to immediate improvements in hygiene practices following education, which directly impacted local symptoms such as irritation around the catheter. Malaise, which is often a systemic response, decreased more gradually, likely reflecting the time needed for the body's immune response to stabilize as the bacterial load decreased. Cloudy urine, which indicates crystallization or the presence of bacteria, also showed improvement by day 5, suggesting that sustained urogenital hygiene helped prevent the build-up of pathogenic organisms in the urinary tract.

The evaluation results over six days show a gradual reduction in UTI symptoms. On days 1 and 2, three symptoms were recorded, including itching around the catheter insertion site, malaise, and cloudy urine. By day 6, these symptoms had subsided entirely (Figure 2). The reduction in symptoms over time suggests that adherence to proper urogenital hygiene, facilitated by educational intervention, effectively mitigated the risk of UTI. The evaluation results obtained from education on the implementation of urogenital hygiene from the beginning of the assessment to the provision of intervention for 6 consecutive days showed a decrease in signs and symptoms of UTI. On days 1 and 2, there were 3 signs and symptoms of UTI risk. The 3rd and 4th days showed that the risk of UTI decreased with only 2 symptoms appearing, until on the 5th and 6th day, the risk of UTI decreased to no symptoms. This decrease indicates that the patient did not experience HAIs in the form of urinary tract infections (UTIs) from the first 3x24 hours of treatment until the day the patient was discharged.

DISCUSSION

Urinary catheterization in CKD patients serves to calculate fluid intake and output, yet it increases the risk of infection if not managed properly. The assessment results regarding infection risk showed that the patient's urine had bacteria (1+) and an elevated white blood cell count (12.3 103/µL), which indicates a heightened risk of infection. Research by Sinaga et al. (2023) supports that leukocyte values above 10.0 103/µL are considered high, often signifying an inflammatory response, which could lead to infections such as UTIs. Moreover, the patient's ability to perform activities of daily living (ADL) was significantly impaired, necessitating assistance for eating, dressing, and toileting. In this scenario, family involvement becomes critical to help monitor dietary intake, manage stress, and maintain hygiene, as emphasized by Wahyuni et al. (2023).

Patients with urinary catheters face a substantial risk of developing healthcare-associated infections (HAIs), particularly urinary tract infections (UTIs). This occurs when bacteria from the skin or perineal area enter the urinary tract via the catheter. Research shows that urinary catheters increase the bacterial load by 5% each day (Sukarwan & Wardani, 2022). Without proper risk management, such infections can prolong hospital stays, increase healthcare costs, and diminish quality of life (Indrayadi et al., 2022). Therefore, infection control practices are crucial, with family members playing an essential role in implementing hygiene routines, especially in cultures like Indonesia, where family members often act as caregivers (Situmorang, 2020).

Family knowledge regarding urogenital hygiene is different before and after being given health education. This change in score shows that there has been an increase in knowledge in the patient's family. Health education is provided using hanging paper media, which has the advantage that information can be accessed at any time and is easily recovered when the patient or patient's family needs information. The researcher then also demonstrated how to properly clean urogenital hygiene so that families have an idea of how to carry out these activities.

Hanging paper is a medium for conveying visual health information through writing, and pictures are formed vertically accompanied by a rope that is used as a hook to hang them in a particular place (Hanifah et al., 2023). Carrying out a demonstration will also help convey the message to someone more clearly (Maduakolam et al., 2022). in line with research conducted by Hanifah et al., (2023) which shows that there is a significant difference in knowledge scores before and after being given health education using hanging paper media. The target can understand and learn practically because there is no need to record other important information, as it has been written practically on hanging paper. This shows that health education media provided in conventional ways or creative media can attract readers so that they can increase their knowledge for readers.

Evaluation results obtained from educational results from the beginning of the assessment to the provision of intervention showed a decrease in signs and symptoms of UTI until the 6th day. Some signs and symptoms of risk of urinary tract infection experienced by clients include itching around the area where the urinary catheter is installed, malaise, and urine that appears thick and cloudy. The appearance of itching in the genital area due to the installation of a urinary catheter causes discomfort. Itching can be caused by the growth of staphylococcus bacteria which can cause itching because the bacteria interact directly with the nerves (Djuang et al., 2021). In line with research by Andriani et al., (2023) which states that several bacteria that cause UTI include *E.coli, Proteus mirabilis, Pseudomonas sp., Klebsiella penumoniae, Enterococcus faecalis, and Staphylococcus sp.* And the results of this research revealed that the bacteria *Staphylococcus sp.* plays a significant role in the occurrence of UTI as much as 65%.

Apart from itching, clients also experience malaise. In line with research conducted by Maitsa (2021) that fever, chills and malaise are early symptoms of urinary tract infections. Malaise or fatigue is caused by bacteria attacking the body, causing the immune system to weaken. So, in other words, malaise is a form of the body's immune response in fighting microorganisms that cause infectious diseases. The following symptom that appears is cloudy urine. Normal urine is generally clear in color. Turbidity that occurs in urine is usually the result of the crystallization process or deposition of urates (in acidic urine) or phosphates (in alkaline urine). Turbidity can also be caused by protein in the urine. The normal neutral pH of urine is 7.0, where if it has a pH <5.0 it is acidic and a pH >8 is alkaline (Wahyu et al., 2024). Research conducted by Arivo & Annissatussholeh (2017) states that acidic urine pH can increase the growth of E.coli bacteria, where if this bacteria is outside the colon, it will be pathogenic and can cause the risk of UTI.

It is important for anyone who participates in helping the patient's healing process, especially the patient's family. In Indonesian culture, the family plays the role of the patient's guardian and medical personnel when interacting with the patient. Therefore, in healthcare settings, infection prevention and control programs are carried out by medical professionals and the patient's family or guardians (Situmorang, 2020). Family members' knowledge about HAIs can be increased through educational activities, especially if combined with demonstrations, which can ultimately influence individual attitudes and behaviour based on awareness and desire to avoid HAIs (Priskila et al., 2024). With health education, there will be a process of change according to the theory of Rogers (1962) in Rosidah (2022), which consists of the awareness stage (awareness and belief arise), interest (interest begins to arise which encourages feelings to change), evaluation (assessing/considering the action to be taken), trial (testing an exemplary action), and adoption (the process of accepting something that has been tried and feeling the benefits, thus maintaining the results of the change).

Health education significantly improved the family's knowledge of urogenital hygiene, as evidenced by the post-test scores. According to the Health Belief Model (HBM), individuals are more likely to engage in preventive behaviors if they perceive the risks and benefits of an action (Rosenstock et al., 1988). In this case, the family's increased understanding of the risk of UTIs and the effectiveness of hygiene practices reflects the perceived threat and benefits. Health education, therefore, acted as a catalyst for change by enhancing the family's belief in the efficacy of preventive measures (Green et al., 2020). Moreover, the use of hanging paper as an educational tool reinforced the family's engagement by providing accessible and practical guidance, as demonstrated in Hanifah et al. (2023).

The success of the educational intervention can also be viewed through the lens of Rogers' Diffusion of Innovation theory. The family's behavior change followed Rogers' stages, starting with awareness and interest in the importance of hygiene, followed by evaluation and trial of the hygiene practices taught (Rosidah, 2022). This gradual adoption of improved hygiene practices, culminating in consistent application by the family, demonstrates the utility of combining education with hands-on demonstration to promote lasting behavior change.

This study's findings align with earlier research showing that structured health education improves infection prevention knowledge among caregivers (Shrestha et al., 2022). The 26-point increase in knowledge scores mirrors similar studies where health education interventions led to marked improvements in UTI prevention practices (Ponika et al., 2023). Furthermore, the decrease in UTI symptoms–itching, malaise, and cloudy urine–by day 6 of the intervention aligns with research by Maitsa (2021), which shows that systematic education coupled with active participation in care can lead to a reduction in infection symptoms.

A notable limitation of this study is its use of a one-group pre-test post-test design, which lacks a control group and

may affect the generalizability of the findings. The absence of a comparison group makes it difficult to attribute the observed changes solely to the intervention, as other factors could have influenced the outcomes. Future studies should employ a more robust design, such as randomized controlled trials, to strengthen the validity of the conclusions drawn from educational interventions.

The gradual reduction of UTI symptoms, such as itching, malaise, and cloudy urine, suggests that the health education intervention effectively mitigated the risk of infection. This is consistent with the Health Belief Model's assertion that individuals are more likely to adhere to recommended behaviors when they perceive a significant threat and believe the intervention will mitigate that risk (Green et al., 2020). The decrease in infection signs from three symptoms on day 1 to none by day 6 highlights the effectiveness of consistent urogenital hygiene and caregiver involvement in infection prevention efforts.

CONCLUSIONS AND RECOMMENDATION

The health education provided to the patient's family played a pivotal role in reducing the risk of HAIs, particularly UTIs, by improving knowledge of urogenital hygiene. This study reinforces the importance of integrating structured educational interventions into nursing care to enhance infection prevention practices. However, future research should explore the use of digital tools for education to increase accessibility and retention of hygiene knowledge. Expanding on this study, further investigations could include more diverse patient populations and assess long-term impacts of health education on infection rates.

REFERENCES

Adawiya. (2017). *Pengaruh perawatan kateter terhadap penurunan tanda-tanda infeksi saluran kemih pada pasien wanita di RSUD Cengkareng Jakarta Barat tahun 2018* [Skripsi]. Universitas Esa Unggul.

Andriani, G., Harlita, T. D., & Lamri, L. (2023). Identifikasi bakteri yang dapat menyebabkan infeksi saluran kemih pada urine pengguna pantyliner. *Jambura Journal of Health Sciences and Research, 5*(3), 851–861. https://doi.org/10.35971/jjhsr.v5i3.20579

Arivo, D., & Annissatussholeh, N. (2017). Pengaruh tekanan osmotik pH, dan suhu terhadap pertumbuhan bakteri *Escherichia coli*. *Jurnal Ilmu Kedokteran Dan Kesehatan, 4*(3), 153–160.

Dewi, R., Sari, P., & Lestari, W. (2022). Structured Health Education for Improved Hygiene Practices: A Quasi-Experimental Study. *Journal of Nursing Practice*, 9(3), 251-260.

Djuang, M. L. F. (2021). Hubungan Tindakan Vulva Hygiene dengan Kejadian Infeksi Saluran Kemih (ISK) pada Pasien Rawat Inap di RSU Mamami Kupang. *CHMK Midwifery Scientific Journal*, *4*(2), 268–277. Retrieved from https://cyber-chmk.net/ojs/index.php/bidan/article/view/1053

Faran, N. A. (2023). Hubungan pengetahuan personal hygiene urogenetal dengan terjadinya gejala infeksi saluran kemih pada remaja putri di SMA Negeri 4 Kota Jambi [Skripsi]. Universitas Jambi.

Flick, U. (2018). *An Introduction to Qualitative Research* (6th ed.). SAGE Publications.

Gordon, C., Fahey, M., & Thompson, R. (2021). Evaluating the Impact of Health Education Interventions: A Systematic Approach. *Journal of Health Education Research & Development*, 38(2), 123-136.

Gould, C. V., Umscheid, C. A., Agarwal, R. K., Kuntz, G., & Pegues, D. A. (2021). Guideline for Prevention of Catheter-associated Urinary Tract Infections. *Infection Control & Hospital Epidemiology, 42*(4), 1-36.

Green, E. M., Murphy, E., & Gryboski, K. (2020). The Health Belief Model. *The Wiley Encyclopedia of Health Psychology*, 211–214.

Hanifah, H., Sutresna, I., & Lindasari, S. W. (2023). Pengaruh Pendidikan Kesehatan Melalui Media Kertas Gantung Terhadap Pengetahuan Anak Sekolah Dasar Tentang Jajanan Sehat. *Jurnal Ners, 7*(1), 501–505. https://doi.org/10.31004/jn.v7i1.13800

Indrayadi, I., Oktavia, N. A., & Agustini, M. (2022). Perawat dan keselamatan pasien: Studi tinjauan literatur. *Jurnal Kepemimpinan Dan Manajemen Keperawatan, 5*(1), 62–75. https://doi.org/10.32584/jkmk.v5i1.1465

Jones, C., Smith, M., & Roberts, L. (2021). Health Belief Model and Infection Prevention Behaviors: A Systematic Review. *Journal of Health Psychology*, 26(9), 1274–1288.

Maduakolam, I. O., Ogbonnaya, N. P., Ndubuisi, I. F., Ekechukwu, E. N. D., Okoronkwo, I. L., & Onwujekwe, O. (2022). Effects of a Structured Health Education on Prevention of HIV Risky Behaviors among Adolescents in Nigeria–a Pragmatic Randomized Controlled Trial. *Libyan Journal of Medicine*, *17*(1), 1–9. https://doi.org/10.1080/19932820.2022.2128414

Magill, S. S., Edwards, J. R., Bamberg, W., Beldavs, Z. G., Dumyati, G., Kainer, M. A., ... & Fridkin, S. K. (2022). Multistate Point-Prevalence Survey of Health Care–Associated Infections. *The New England Journal of Medicine, 370*(13), 1198-1208.

Maitsa, N. (2021). Infeksi Saluran Kemih Karena Kateter: Manajemen Dan Pencegahan. *Jurnal Penelitian Perawat Profesional*, *3*(4), 791-798. https://doi.org/10.37287/jppp.v3i4.585

Maitsa, N. A. D. (2021). Infeksi Saluran Kemih Karena Kateter: Manajemen dan Pencegahan. Jurnal Penelitian Perawat Profesional, 3(4), 791–798.

Pakpahan, E., Daeli, W., & Suryadi, B. (2024). Hubungan Monitoring dengan Kepatuhan Perawat Dalam Pencegahan Infeksi Nosokomial. *Jurnal Anestesi: Jurnal Ilmu Kesehatan Dan Kedokteran*, 2(1), 265–274. https://doi.org/10.59680/anestesi.v2i1.798

Ponika, Y., Yasin, D. D. F., & Widyaastuti, E. E. (2023). Penerapan perawatan kateter dengan chlorhexidine disinfektan untuk mencegah risiko infeksi saluran kemih pada pasien cerebro vasculer accident (CVA) di ruang ICU RSUD Dr. (H.C.) Ir. Soekarno Provinsi Bangka Belitung. *Nursing Care & Biomolecular, 8*(1), 119–125.

Priskila, E. ., Carolina, M. ., & Anggraini, F. (2024). Pengaruh Pendidikan Kesehatan terhadap Pengetahuan dan Sikap Keluarga Pasien tentang Pencegahan Healthcare Associated Infections (HAIs). *Jurnal Keperawatan*, *17*(1), 79–88. https://doi.org/10.32583/keperawatan.v17i1.2198

Rogers, E. M. (1962). Diffusion of Innovations. Free Press.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social Learning Theory and the Health Belief Model. *Health Education Quarterly, 15*(2), 175-183.

Rosidah, B. (2022). Pengaruh pendidikan kesehatan metode demonstrasi terhadap hand hygiene 6 langkah 5 momen keluarga pasien. *Media Husada Journal of Nursing Science, 3*(1), 73–82. https://doi.org/10.33475/mhjns.v3i1.78

Sari, M., Masthura, S., & Fauziah. (2023). Compliance behavior of wearing masks in preventing nosocomial infections in the outpatient clinic of Pertamedika Ummi Rosnati Hospital, Banda Aceh City. *Journal of Healthcare Technology and Medicine, 9*(2), 2615–109.

Shrestha, S., Shrestha, R., & Maharjan, R. (2022). Impact of Caregiver Education on Adherence to Care Practices in Chronic Kidney Disease Patients. *Journal of Nursing & Care*, 11(5), 550-558.

Silverman, D. (2021). *Qualitative Research* (5th ed.). SAGE Publications.

Sinaga, H., Rampa, E., Romadhonni, T., Taroreh, J. E., Pare, Y. (2023). Kadar hemoglobin, leukosit, dan trombosit penderita malaria tropika +3 dan +4 di RSUD Kwaingga Kabupaten Keerom Papua. *Jurnal Wiyata: Penelitian Sains dan Kesehatan, 10*(1), 1–8. https://doi.org/10.56710/wiyata.v10i1.565

Situmorang, P. R. (2020). Hubungan pengetahuan bidan tentang infeksi nosokomial dengan tindakan pencegahannya pada pasien bedah seksio sesarea. *Jurnal Keperawatan Priority, 3*(1), 83–90. https://doi.org/10.34012/jukep.v3i1.811

Smith, J., & Jones, R. (2022). Enhancing Patient Education through Visual Aids: A Systematic Review. *Journal of Health Communication*, 27(5), 421-432.

Sukarwan, A., & Wardani, R. (2022). Peran perawat dalam pencegahan dan pengendalian infeksi pada pemasangan kateter urin. *Journal of Nursing Care and Biomolecular, 7*(1), 1–14. https://doi.org/10.32700/jnc.v7i1.252

Supratiningsih, T., Mintasih, S., & Kamilah, S. (2024). Hubungan pengetahuan perawat tentang penerapan sasaran keselamatan pasien dengan tingkat kepatuhan dalam pencegahan infeksi di Rumah Sakit Prikasih. *Open Access Jakarta Journal of Health Sciences, 3*(1), 1058–1064. https://doi.org/10.53801/oajjhs.v3i1.221

Thompson, A., Williams, M., & Rogers, P. (2021). Impact of Visual-Based Learning Tools on Healthcare Education. *Journal of Nursing Education, 60*(7), 364-371.

Wahyu, Z. S., Nadyah, Najamuddin, Fauziah, H., & Sabri, M. S. (2024). Karakteristik urine pada ibu hamil dengan bakteriuria asimptomatik. *Jurnal Midwifery, 6*(1), 94–100. https://doi.org/10.24252/jmw.v6i1.45366

Wahyuni, M. M. D., Syamruth, Y. K., Manurung, I. F. E., Weraman, P., & Pareira, M. I. R. (2023). Pemberdayaan keluarga dalam meningkatkan self-care pasien gagal ginjal kronik (GGK) di daerah lahan kering kepulauan. *Genitri Jurnal Pengabdian Masyarakat Bidang Kesehatan, 2*(2), 107–116. https://doi.org/10.36049/genitri.v2i2.127

Wahyuni, S., Ahmad, Y., & Latifah, M. (2023). Caregiver Knowledge and Practices in Preventing Urinary Tract Infections in Patients with Indwelling Catheters. *Journal of Health Sciences and Research*, 15(1), 45-52.

White, P., Brown, S., & Smith, T. (2022). Demonstration as an Effective Teaching Strategy in Clinical Practice: A Systematic Review. *Journal of Clinical Education, 15*(3), 112-120.

World Medical Association. (2013). World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects. *JAMA, 310*(20), 2191-2194.

Yunita, Yusuf, S., & Hengky, H. K. (2022). Prevention and controlling of healthcare associated infections (HAIs) in caretakers of inpatients in Rumah Sakit Umum ʻAisyiyah ST. Khadijah Kabupaten Pinrang. *Jurnal Ilmiah Manusia dan Kesehatan, 5*(1), 521–528.

Zaskia, F. D., Kamariyah, & Mawarti, I. (2023). Gambaran penerapan sasaran pasien safety oleh perawat di ruang rawat inap RSU Mayjen H.A Thaib Kota Sungai Penuh. *Jurnal Ners, 7*(2), 1776–1781.

Zhou, Y., Li, X., & Zhang, W. (2023). Participant Selection and Its Impact on Research Validity. *Journal of Clinical Research Design and Analysis*, 15(1), 45-58.

Zimlichman, E., Henderson, D., Tamir, O., Franz, C., Song, P., Yamin, C. K., ... & Bates, D. W. (2013). Health Care–Associated Infections: A Meta-analysis of Costs and Financial Impact on the US Health Care System. *JAMA Internal Medicine*, *173*(22), 2039-2046.