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Research Article

EFFECTIVENESS OF CONTINUOUS AUTOMATIC BLADDER IRRIGATION BASED ON INTERNET OF THINGS IN TRANS URETHRAL RESECTION OF PROSTATE: ANALYSIS OF NURSES' KNOWLEDGE AND READINESS

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ABSTRACT

Transurethral Resection of the Prostate (TURP) is a minimally invasive surgical procedure commonly performed to treat benign prostatic hyperplasia. However, complications such as TURP Syndrome can occur if the procedure is not performed correctly. Continuous Automatic Bladder Irrigation (CABI) based on the Internet of Things (IoT) is a technology developed to minimize the risk of these complications. This study aims to analyze the relationship between the knowledge and readiness of nurses in implementing IoT-based CABI on TURP complications at the Jombang Regional General Hospital. Quantitative methods were used in this study, including data collection techniques through observation and questionnaires. The results showed that nurse readiness significantly affected the effectiveness of CABI implementation and decreased TURP complications. The implications of this study indicate the importance of training and education for nurses in using IoT-based technology.

KEYWORDS

CABI, Complications, IoT, Nurse Readiness, TURP.

INTRODUCTION

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Transurethral Resection of the Prostate (TURP) is a minimally invasive surgical procedure commonly performed to treat an enlarged prostate that causes urinary problems in men. During Transurethral resection of the prostate (TURP), the doctor uses a unique instrument inserted through the urethra to remove a small piece of enlarged prostate tissue, helping to improve urine flow (Franco et al., 2022; Madersbacher et al., 2020; Novelty et al., 2019).

This procedure is often recommended to treat symptoms of prostatitis or benign prostatic hyperplasia (BPH). Transurethral resection of the prostate (TURP) can relieve symptoms such as difficulty urinating, frequent urination, and urinary retention. The main advantages of Transurethral Resection of the Prostate (TURP) are the absence of large incisions, reduced risk of infection and faster recovery time compared to open surgery (Putri, 2017).

Transurethral resection of prostate (TURP) syndrome is one of the most common and feared complications. The incidence of Transurethral resection of prostate (TURP) syndrome increases by 20% with a significant mortality rate. The mortality rate of Transurethral resection of prostate (TURP) syndrome is 0.99% (Chauhan et al., 2023). Several studies over the past 20 years have shown that the incidence of mild to moderate Transurethral Resection Of Prostate (TURP) syndrome is between 0.5% and 8%, with a reported mortality of 0.2% to 0.8%. Meanwhile, severe Transurethral resection of prostate (TURP) syndrome has a mortality of 25%, although it is rare (Faisal, 2023).

Practical nursing care in Transurethral Resection Of Prostate (TURP)) is critical to ensure safety and optimal outcomes for patient care. Transurethral Resection Of Prostate (TURP) is a surgical procedure commonly used to treat prostate enlargement problems that can cause disturbing urinary tract symptoms (Putri Agustin, 2020). Transurethral resection of the prostate (TURP) is a surgical procedure commonly performed to treat prostate enlargement problems. The effectiveness of Transurethral resection of the prostate (TURP) is influenced by various factors, including the implementation method, knowledge and readiness of nurses involved in the process (Rasyid et al., 2020).

The Continuous Automatic Bladder Irrigation (CABI) method based on the Internet of Things (IoT) is a breakthrough in the Transurethral Resection Of Prostate (TURP) procedure. By integrating Internet of Things (IoT) technology, Continuous Automatic Bladder Irrigation (CABI) improves the efficiency of resource use and provides accurate monitoring during the procedure. In Transurethral resection of the prostate (TURP), Continuous Automatic Bladder Irrigation (CABI) Internet of Things (IoT) automatically regulates and controls the flow of irrigation fluid to the bladder continuously.

Nurse readiness also includes a thorough understanding of the medical equipment used in transurethral resection of the prostate (TURP). They must be skilled in handling and maintaining these tools and ensuring that they function properly before the procedure begins. These skills are vital in preventing potential complications and ensuring patient safety (Purwanza et al., 2022).

Readiness in managing risks and complications is also an essential aspect of the role of nurses in Transurethral Resection of the Prostate (TURP). They must be ready to identify warning signs and respond quickly in an emergency. Expertise in handling potential complications such as bleeding or infection is critical to maintaining patient health (Siburian, 2021). This study aims to analyze the relationship between the knowledge and readiness of nurses in

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implementing the Continuous Automatic Bladder Irrigation (CABI) method based on the Internet of Things (IoT) on complications of transurethral resection of the prostate (TURP).

METHOD

This type of research is quantitative research with a Cross-sectional approach. Cross-sectional is one of the research approaches in social science, and statistics are carried out at a particular time or in a certain period to collect data from various subjects or observation units. The study was conducted at the Jombang Regional General Hospital, Indonesia, from April 2024 to July 2024.

The population in this study were all nurses in the operating room, patients who underwent transurethral resection of the prostate (TURP) using the continuous automatic irrigation method (CABI) based on the Internet of Things (IoT) and patients who underwent transurethral resection of the prostate (TURP) using the non-continuous automatic irrigation method (CABI) based on the Internet of Things (IoT). The sample in this study was a Total Sampling of 98 nurses.

The research instrument used a questionnaire consisting of two main parts: the assessment of knowledge about CABI and readiness to use IoT technology. The validity and reliability of the instrument were tested before being used in data collection. Data were collected for two months through direct observation and filling out questionnaires by respondents. Data were analyzed using statistical regression tests to identify the relationship between knowledge, nurse readiness, and TURP complications.

RESULTS

The following research data describes the distribution and characteristics of respondents, including age, gender, length of service, marital status, and last education, presented in the following table.

Table 1. Respondent characteristics

Characteristics	n	%
Age		
20-25	29	29,59184
26-30	45	45,91837
>30	24	24,4898
Gender		
Man	34	34,69388
Woman	64	65,30612
Years of service		
1 – 10 Years	46	46,93878
11 – 20 Years	32	32,65306
>20 Years	20	20,40816
Marital status		
Married	79	80,61224
Not married yet	19	19,38776

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Last education		
Diploma III	63	64,28571
Bachelor + Nursing Profession	35	35,71429

Respondents aged 26-30 years were 45 people (45.91837%), female gender was 64 people (65.30612%), work period of 1 - 10 years was 46 people (46.93878%), marital status was married was 79 people (80.61224%), last education was DIII was 63 people (35.71429%) (**Table 1**).

Table 2. Nurses' knowledge and readiness for complications of Transurethral Resection of Prostate (TURP)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.190[a]	.036	.016	1.65541

Table 3. Relationship between nurses' knowledge and nurses' readiness for complications of Transurethral Resection of Prostate (TURP)

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	15.259	2.633		5.794	.000
	Pengetahuan Perawat (X1)	-.106	.123	-.091	-.861	.391
	Kesiapan Perawat (x2)	.163	.088	.196	1.862	.046

Regression Test

Table 4. Nurses' knowledge and readiness of nurses for complications of Transurethral Resection of Prostate (TURP) procedures towards Continuous Automatic Blader Irrigation (CABI)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.622[a]	.387	.368	1.34249

Table 5. Relationship between nurses' knowledge and nurses' readiness, complications of Transurethral Resection of Prostate (TURP) and the variable Continuous Automatic Blader Irrigation (CABI)

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	8.151	2.484		3.281	.001

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	Pengetahuan Perawat	-.051	.100	-.044	-.513	.609
	Kesiapan Perawat	.458	.072	.544	6.326	.000
	Komplikasi TURP	.244	.083	.241	2.932	.004

Table 6. Nurses' knowledge and readiness for complications of Transurethral Resection of Prostate (TURP)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15.259	2.633		5.794	.000
	Pengetahuan Perawat	-.106	.123	-.091	-.861	.391
	Kesiapan Perawat	.163	.088	.196	1.862	.046

Table 7. Relationship between nurses' knowledge and nurses' readiness, complications of Transurethral Resection of Prostate (TURP) and the variable Continuous Automatic Blader Irrigation (CABI)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.151	2.484		3.281	.001
	Pengetahuan Perawat	-.051	.100	-.044	-.513	.609
	Kesiapan Perawat	.458	.072	.544	6.326	.000
	Komplikasi TURP	.244	.083	.241	2.932	.004

The R Square value of 0.036 means that the influence of the nurse's knowledge variable and the nurse's readiness on Transurethral Resection of Prostate (TURP) complications is 3.6%. In contrast, the remaining 96.4% is influenced by other variables (Table 2). Nurse's knowledge does not have a significant influence on complications of Tranurethral Resection of the Prostate (TURP) (P = 0.391) (Table 3). The influence of nurses' knowledge, nurse readiness, and complications of transurethral resection of the prostate (TURP) on continuous automatic bladder irrigation (CABI) is 38.7%. In comparison, the remaining 61.3% is influenced by other variables not included (R Square value = 0.387) (Table 4). Two variables influence continuous automatic bladder irrigation (CABI), namely, the nurses' readiness and complications of transurethral resection of the prostate (TURP) (Table 5).

DISCUSSION

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Nurses' knowledge covers various areas required for effective and safe nursing practice (Harigustian, 2021). This includes understanding human anatomy and physiology, disease pathophysiology, and pharmacology. Understanding of Disease and Patient Counseling Skills in Medical and Clinical Procedures, Understanding of Pharmacology and Drug Administration. Involvement in Nursing Management and Care Planning. The various knowledge of nurses does not have a significant effect on complications of transurethral resection of prostate (TURP) (Sayed et al., 2021).

The study results showed that the level of professional expertise, understanding of protocols and procedures, responsibility for patients using health technology, and patient satisfaction carried out by each nurse could significantly influence complications of transurethral resection of the prostate (TURP).

Nurse readiness involves a holistic combination of knowledge, skills, and attitudes. By improving nurse readiness in all these aspects, the healthcare system can ensure that nurses can provide optimal and sustainable care, responding to the complex demands of the contemporary healthcare world (Harrison et al., 2020).

Based on the analysis results, the t-value for knowledge was -0.513 with a sig value of 0.603; the sig value is more significant than 0.05. The Continuous Automatic Bladder Irrigation method plays a vital role in certain conditions, such as after surgery on the urinary tract or in treating patients with a history of significant hematuria (blood in the urine). This procedure uses a special catheter connected to an automatic irrigation system. This system allows continuous delivery of irrigation solution into the patient's bladder, while urine produced by the patient can be excreted simultaneously (Malyala et al., 2022).

Based on the analysis results, the t-value for nurse readiness was 6.326 with a sig value of 0.000, and the sig value was less than 0.05. The Continuous Automatic Bladder Irrigation (CABI) procedure usually involves using unique irrigation solutions, such as NaCl (sodium chloride) or heparin. This solution helps dissolve blood or coagulation clots that may form in the patient's bladder. The choice of irrigation solution type depends on hospital policy, patient condition, and other medical considerations (Chan et al., 2020).

The application of the Continuous Automatic Bladder Irrigation (CABI) method is not only aimed at overcoming acute problems but also to prevent long-term complications such as urinary tract infections or the formation of blood clots, which can cause more severe obstruction (Elsbernd et al., 2022).

Based on the analysis results, the t-value for complications of transurethral resection of the prostate (TURP) was 2.932, with a sig value of 0.004, less than 0.05. Continuous Automatic Bladder Irrigation (CABI) is a method that has been applied in the medical world to overcome certain conditions, such as hematuria, after urinary tract surgery. Using Internet of Things (IoT) technology in Continuous Automatic Bladder Irrigation (CABI) provides a new dimension to efficiency and patient monitoring. The primary function of the Continuous Automatic Bladder Irrigation (CABI) method based on the Internet of Things (IoT) can be described in several vital aspects (Yamashita et al., 2023).

Integrating the Internet of Things (IoT) in Continuous Automatic Bladder Irrigation (CABI) provides real-time monitoring capabilities for patient conditions. Advanced sensors connected to the Continuous Automatic Bladder Irrigation (CABI) system can measure and transmit data directly to an online platform. This allows the medical team to observe the

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patient's progress without being physically near him. Thus, this method increases the efficiency of monitoring and allows for a quick response to possible changes in conditions (Safitri et al., 2020).

Transurethral Resection of the Prostate (TURP) is a standard surgical procedure performed to treat an enlarged prostate that is obstructing urine flow in men. While not all cases of BPH require surgery, Transurethral Resection of the Prostate (TURP) is an effective option when symptoms are severe or do not respond to conservative treatments (Wang et al., 2020).

This procedure involves removing a small piece of prostate tissue through the urethra using a resectoscope to improve urine flow and reduce bothersome symptoms. Despite its risks and side effects, Transurethral Resection of the Prostate (TURP) remains one of the most common and successful procedures used to manage BPH (Srinivasan & Wang, 2020).

CONCLUSION

1. Nurses' knowledge does not significantly affect the complications of transurethral resection of the prostate (TURP). Based on the results of the analysis, the t-value for knowledge is -0.851

2. Nurses' readiness significantly affects the complications of transurethral resection of the prostate (TURP). Based on the table above, the t-value for knowledge is 1.862

3. Nurses' knowledge only significantly affects the implementing of the Continuous Automatic Bladder Irrigation (CABI) method. Based on the results of the analysis, the t-value for knowledge is -0.513

4. Nurses' readiness significantly affects the implementing of the Continuous Automatic Bladder Irrigation (CABI) method. Based on the results of the analysis, the t-value for nurses' readiness is 6.326

5. Complications of transurethral resection of the prostate (TURP) significantly affect the implementation of the Continuous Automatic Bladder Irrigation (CABI) method. Based on the analysis results, the t-value for complications of transurethral resection of the prostate (TURP) was 2.932.

6. Nurses' knowledge of complications of transurethral resection of the prostate (TURP) affects the implementation of the Continuous Automatic Bladder Irrigation (CABI) method.

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