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SURVEY ON NURSING CARE OUTCOMES FOR PATIENTS WITH INDWELLING URINARY CATHETERS AT THE INTENSIVE CARE CENTER, BACH MAI HOSPITAL, 2025

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ABSTRACT

Objective: To describe the outcomes of nursing care for patients with indwelling urinary catheters at the Intensive Care Center, Bach Mai Hospital, in 2025.

Methods: A cross-sectional descriptive study was conducted on 138 critically ill patients undergoing intensive treatment at Bach Mai Hospital. The study employed a two-part instrument: Part 1 collected clinical and subclinical characteristics from medical records, and Part 2 consisted of a questionnaire assessing nurses' urinary catheter care practices. Care outcomes were evaluated based on patients' conditions at discharge and the occurrence of urinary tract infections. Data were analyzed using SPSS 25.0 with frequency and percentage tables, and Chi-square tests were applied to assess changes in patients' conditions over the observation periods.

Results: Regarding nursing practice, 79.0% of nurses fully implemented urinary catheter care procedures. There were significant changes in patients' Glasgow Coma Scale scores at 24 hours, 48 hours, and day 5 of observation. Similarly, changes were observed in body temperature and urinary tract infection status across the same time points, with statistically significant differences ($p < 0.05$). The incidence of UTIs on day 5 was 17.4%, and the proportion of patients with good nursing care outcomes was relatively high (71.7%).

Conclusion: The incidence of urinary tract infection among critically ill patients with indwelling urinary catheters remains relatively high (17.4%). Nursing care quality for these patients should be further improved to reduce infection rates and enhance patient outcomes.

Keywords: Intensive care patients, indwelling urinary catheter, urinary tract infection, Bach Mai Hospital.

1. INTRODUCTION

Indwelling urinary catheterization is a standard clinical procedure performed to drain urine. It is estimated that over 100 million urinary catheters are sold each year globally, with approximately 30 million used in the United States alone [1].

Nurses are involved in the entire process of catheter insertion, care, and monitoring of patients with indwelling urinary catheters. Therefore, nurses play a critical role in preventing errors and complications associated with urinary catheterization. Several studies have shown that good adherence to urinary catheter insertion techniques and indwelling catheter care protocols helps reduce the rate of urinary tract infections [2]. In most cases, catheter insertion performed by nurses is smooth and successful; however, difficulties or complications during the procedure are not uncommon [3]. Additionally, prior use of instruments, trauma, or sexually transmitted infections can cause anatomical changes that make urinary catheterization difficult [1],[4]. A 2025 study by Nguyen Thi Bao Lien on hospital-acquired infections conducted at the Intensive Care Unit of St. Paul Hospital reported an infection rate of 4.9 per 1,000 patient-days [5]. Regarding urinary catheter care, Nguyen Thi Thu Ha (2021) indicated that preventive counseling for urinary tract infections, pressure ulcer prevention counseling,

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and patient satisfaction were associated with nursing care outcomes [6].

The Intensive Care Center - Bach Mai Hospital receives many critically ill patients requiring multiple invasive procedures, among which urinary catheterization is common due to the frequent use of sedation and the strict requirement for hourly urine output monitoring. To date, there have been few reports on the role of nurses in caring for patients with indwelling urinary catheters, particularly at the Intensive Care Center - Bach Mai Hospital. For the above reasons, we conducted this study with the objective: "To describe nursing care outcomes for patients with indwelling urinary catheters at the Intensive Care Center, Bach Mai Hospital, in 2025."

2. METHODOLOGY

2.1. Study subjects: Patients with indwelling urinary catheters undergoing treatment at the Intensive Care Center, Bach Mai Hospital.

- Selection criteria:

+ Patients aged 18 years and older

+ Indicating indwelling urinary catheter placement

+ Patient/ family member agrees to participate in the study

- Exclusion criteria:

+ Pre-existing urinary tract infection

2.2. Time and location

- Location: Intensive Care Center, Bach Mai Hospital

- Time: From February 2025 to the end of June 2025

2.3. Study design

- Study design: Prospective cross-sectional descriptive study with analytical components (follow-up at specified time points: after catheter insertion, 48 hours, daily catheter care, and catheter removal)

- Sample size and sampling method: Convenience sampling; all 138 patients meeting the inclusion criteria were enrolled during the data collection period (February to June 2025)

- Study instruments:

+ The study record form was developed based on the Ministry of Health Regulation "Decision 3916/QĐ-BYT dated 28/08/2017 on hospital-acquired infection surveillance" [7] and Bach Mai Hospital's intensive care nursing protocols. Reliability testing yielded Cronbach's alpha = 0.782. The form consisted of three parts:

+ Part A: General patient information

+ Part B: Clinical and laboratory findings

+ Part C: Nursing care activities

+ Data collection procedures:

Parts A and B were collected from medical records and observations from patients' daily care.

Nursing care activities were recorded through direct observation of nursing techniques, urinary catheter care practices, and urine test results.

- Catheter monitoring time points:

+ T0: Immediately after transurethral urinary catheter insertion

+ T48h: Reassessment at 48 hours post-insertion

+ Tkt (endpoint): Study conclusion upon successful catheter removal, development of hospital-acquired urinary tract infection, or patient discharge/transfer from the Intensive Care Center

+ Tx: Routine daily catheter care days

- Repeat urinalysis and urine culture were performed when suggestive symptoms appeared.

+ Supporting equipment:

++ Foley catheters (2-way or 3-way) and urine collection bags

++ Gloves, drapes, and antiseptic solutions for catheter care

++ Bach Mai Hospital laboratory analyzers for biochemical tests and urinalysis

++ Standard patient care and treatment equipment

++ Ministry of Health-approved urinary catheter care checklist

+ Evaluation criteria:

++ Nursing care outcome was classified as achieved when both criteria were met: 1) Patient recovered with early catheter removal (or significant improvement and discharge); 2) No hospital-acquired infection

++ Nursing care outcome was classified as not achieved when failure to meet one or both criteria

2.4. Data processing: SPSS 25.0 software; results presented as frequencies, percentages, and means.

2.5. Research ethics: The study was approved by the Ethics Committee of Thang Long University and authorized by the Directorate of Bach Mai Hospital.

3. RESULTS

Table 1. General characteristics of study participants (n=138)

General characteristics	Number (n)	Percentage (%)
Gender		
Male	78	56,5
Female	60	43,5
Reason for ICU admission		
Septic shock	47	34,1
Major cerebrovascular accident	37	26,8
Neurological disease	22	15,9
Acute Myocardial Infarction	15	10,9
Autoimmune disease	9	6,5
Others	8	5,8

General characteristics	Number (n)	Percentage (%)
ICU Interventions		
Mechanical ventilation	123	89,1
Vasopressors	77	55,8
Hemofiltration/ Blood transfusion	70	50,7
Catheter placement	100	72,5
Others	14	10,1
Indication for urinary catheter		
Sedation	110	79,7
Urinary incontinence	24	17,4
Urine output monitoring	4	2,9
Catheter size		
18F	100	72,5
Others	38	27,5

Comments: The distribution was uneven across groups. Male participants outnumbered females, with a male-to-female ratio of 1.3:1. The primary reasons for admission to the Intensive Care Center were septic shock and cerebrovascular accidents. The majority of participants required mechanical ventilation (89.1%). Indwelling urinary catheters were primarily indicated for sedation, with the most common catheter size being 18F.

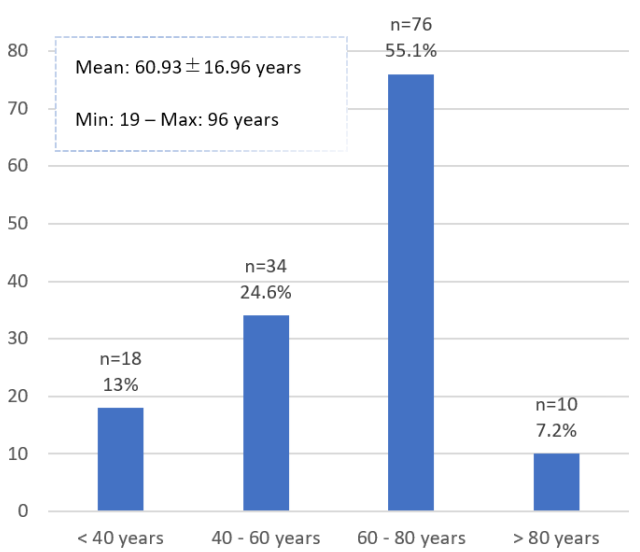

Figure 1. Age distribution of participants (n = 138)

Comments: The mean age of participants was 60.93 ± 16.96 years; among them, 60-80 years accounted for 55.1%, 40-60 years for 24.6%, and under 40 years for 13.0%.

Table 2. Vital sign distribution of participants (n = 138)

Vital sign							
Category	24h		After 48h		After 5 days		p
	n	%	n	%	n	%	
Glassgow							
Con-scious	61	44,2	97	70,3	112	81,2	0,000
Uncon-scious	77	55,8	41	29,7	26	18,8	
Temperature (°C)							
< 37,5	91	65,9	73	52,9	65	47,1	0,009
37,5 - 38,5	41	29,7	57	41,3	59	42,8	
> 38,5	6	4,3	8	5,8	14	10,1	
Pulse (bpm)							
< 60	1	0,7	1	0,7	2	1,4	0,621
60 - 100	87	63,0	83	60,1	87	63,0	
> 100	50	36,3	54	39,2	49	35,6	
Systolic BP (mmHg)							
< 90	12	8,7	4	2,9	4	2,9	0,097
90 - 140	109	79,0	116	84,1	125	90,6	
> 140	17	12,3	18	13,0	9	6,5	
Ddiastolic BP (mmHg)							
< 60	7	5,1	6	4,3	6	4,3	0,451
60 - 90	124	89,9	123	89,1	128	92,8	
> 90	7	5,1	9	6,5	4	2,9	
Respiratory rate (breathe/ min)							
< 16	0	0,0	0	0,0	1	0,7	0,682
16 - 20	75	54,3	77	55,8	70	50,7	
> 20	22	15,9	22	15,9	28	20,3	
Me-chanical ventila-tion	41	29,7	39	28,3	39	28,3	
SpO_2 (%)							
95 - 100	113	81,9	124	89,9	123	89,1	0,102
< 95	25	18,1	14	10,1	15	10,9	

** p-value: chi-square test*

Comments: Statistically significant differences were observed in Glasgow Coma Scale scores and body temperature across monitoring time points ($p < 0.05$).

Table 3. Distribution of laboratory parameters of participants (n = 138)

Laboratory parameters							
Category	< 24h		After 48h		After 5 days		p
	n	%	n	%	n	%	
RBC (T/l)							
< 3,9	90	65,2	94	68,1	97	70,3	0,573
3,9 - 5,4	46	33,3	41	29,7	37	26,8	
> 5,4	2	1,5	2	1,4	1	0,7	
Not performance	0	0,0	1	0,7	3	2,2	
Hb (G/l)							
< 125	108	78,3	113	81,9	110	79,7	0,526
125 - 145	23	16,7	19	13,8	21	15,2	
> 125	7	5,1	5	3,6	4	2,9	
Not performance	0	0,0	1	0,7	3	2,2	
Hct (%)							
< 0.35	83	60,1	94	68,1	95	68,8	0,217
0,35 - 0,47	51	37,0	41	29,7	39	28,3	
> 0.47	4	2,9	2	1,4	1	0,7	
Not performance	0	0,0	1	0,7	3	2,2	
WBC (G/l)							
< 4	1	0,7	1	0,7	3	2,2	0,274
4 - 10	36	26,1	48	34,8	47	34,1	
> 10	101	73,2	88	63,8	85	61,6	
Not performance	0	0,0	1	0,7	3	2,2	

** p-value: chi-square test*

Comments: No statistically significant differences were found in laboratory parameters across the three time points (p > 0.05).

Table 4. Urinary tract infection status in participants with indwelling urinary catheters (n = 138)

Urinary tract infection status						
< 24h		After 48h		5 days		p
n	%	n	%	n	%	
Erythema						0,000
0	0,0	16	11,6	21	15,2	
Purulent						
0	0,0	0	0,0	3	2,2	
No Erythema/Purulent						
138	100	122	88,4	114	82,6	
Total						
138	100	138	100	138	100	

** p-value: chi-square test*

Comments: Statistically significant differences were observed in urinary tract infection status across the three time points (p < 0.05).

Table 5. Urinary catheter care practices (n = 138)

Urinary catheter care activities	n	%
Frequency of checking catheter patency and documentation		
≤ 2 days/time	135	97,8
> 2 days/time	3	2,2
Replacement of the connector and the urine bag dressing		
Yes	138	100
No	0	0,0
24-hour urine output measurement		
Yes	134	97,1
No	4	2,9
Changing the adhesive tape securing the catheter to the patient		
Yes	135	97,8
No	3	2,2
Placement of the urine collection bag in the appropriate position		
Yes	86	62,3
No	52	37,7
Overall		
Complete urinary catheter care	109	79,0
Incomplete urinary catheter care	29	21,0

Comments: Full compliance with urinary catheter care was 79.0%; among procedures, replacement of connector and urine bag dressings reached 100%, replacement of catheter fixation tape was 97.8%, and

24-hour urine output measurement was 97.1%.

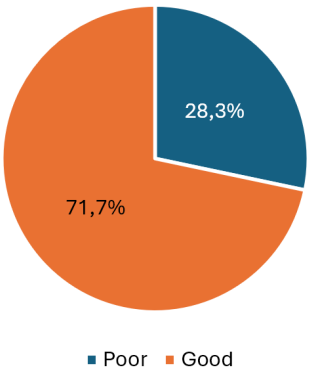

Figure 2. Nursing care outcomes of the participants (n = 138)

Comments: Good nursing care outcomes accounted for 71.7%, poor outcomes for 28.3%.

4. DISCUSSION

4.1. General characteristics of participants

Our study showed that male participants outnumbered females by nearly 1.3 times (56.5% vs. 43.5%), indicating a slight gender imbalance. The higher proportion of males reflects the reality in intensive care units, where male patients tend to have more comorbidities due to lifestyle factors such as alcohol and tobacco use, as well as engagement in physically demanding occupations. Notably, this study was conducted exclusively on patients with indwelling urinary catheters. Several studies have demonstrated that males are at higher risk of requiring urinary catheterization due to anatomical differences, which is consistent with our findings. Tang Xuan Hai reported similar results at the Intensive Care Center - Nghe An Obstetrics and Pediatrics Hospital (51.5% male vs. 38.5% female) [8], and by Nguyen Minh Luc at the Intensive Care and Toxicology Department - Viet Duc Hospital (60.9% male vs. 39.1% female) [9]. Another contributing factor, as noted by Nguyen Thi Thu Ha in 2022, is the higher overall male admission rate to ICUs (1.68:1 male-to-female ratio), with conditions more common in males, such as severe acute pancreatitis or acute exacerbations of COPD requiring mechanical ventilation and sedation—often necessitating urinary catheterization [6]. These reasons explain the higher proportion of male participants requiring indwelling urinary catheters.

Since all participants in this study had indwelling urinary catheters at the Intensive Care Center, age distribution mirrored that of the general ICU population. Mean age was relatively high at 60.93 ± 16.96 years; the most common age group was 60-80 years (55.1%, 76 participants), followed by 40-60 years (24.5%), under 40 years (13%), and 7.2% over 80 years. Thus, the majority were aged 60 years or older. Advanced age is a well-known risk factor for ICU admission, often associated with chronic comorbidities and impaired immunity, increasing susceptibility to critical illness. Older participants frequently experience psychological distress or delirium in the ICU, leading to sedation, which is a key indication for urinary catheterization. Comparable findings were reported by Nguyen Anh Tuan from August 2019 to July 2020 in 755 catheterized participants, with a mean age of 55.4 years; participants ≥46 years accounted for 68.6%, while those <20 years represented only 3.5% [10].

ICU patients typically present with severe conditions, high mortality, and significant sequelae or disability. They routinely undergo invasive procedures, including intravenous catheter placement, endotracheal intubation with mechanical ventilation, urinary catheterization, and nasogastric tube placement. In the acute phase, many are comatose or hemiplegic, entirely dependent on caregivers for activities of daily living and personal hygiene. These factors substantially increase the risk of infection in participants with indwelling urinary catheters. Comprehensive nursing care encompasses monitoring vital signs (especially blood pressure), maintaining respiratory and circulatory function, providing nutritional support, managing elimination, assisting with mobility, promoting personal hygiene, supporting sleep, providing psychological support to participants and families, and early detection of abnormal signs. Early rehabilitation measures are also implemented to prevent secondary complications such as muscle atrophy, joint contractures, pressure ulcers, pneumonia, urinary tract infections...

4.2. Nursing care outcomes for participants with indwelling urinary catheters

In our study, the catheter-associated urinary tract infection rate was relatively low at 17.4% (24 participants). This was higher than the 13.3% rate reported by Nguyen Thu Thu Ha at the National Hospital for Tropical Diseases [6]; and the 9.3% reported by Do Quoc Phong in 2024 at Hospital E, but lower than the 31.4% reported by Nguyen Duc Quynh at Bach Mai Hospital from August 2019 to July 2020. These findings indicate a marked improvement in catheter-associated urinary tract infection rates at Bach Mai Hospital's Intensive Care Center, contributing to better overall treatment outcomes and enhanced quality of care. A similar rate was reported in an Asian study conducted in Saudi Arabia by Mohd Saleem, with 20.2% [11]. In most studies, the primary indication for catheterization was coma due to altered consciousness. In our cohort, the majority received sedation, and many had severe or critical illness, making monitoring and care more challenging and often requiring prolonged catheter dwell time, thereby increasing catheter-associated urinary tract infection risk compared with less severe patient groups.

Several participants in this study received treatment for urinary tract infections, yet overall outcomes remained unchanged, underscoring the critical role of nursing care in preventing catheter-associated urinary tract infections. The occurrence of disease leads to

antibiotic or antifungal therapy, raising risks of hepatotoxicity, nephrotoxicity, unrecognized drug interactions, prolonged hospitalization, higher mortality, and increased treatment costs [5],[12].

According to U.S. reports submitted to the National Healthcare Safety Network in 2020, the rate of hospital-acquired urinary tract infections was 0.754 per 1,000 catheter-days in adult inpatient units. Hospital-acquired urinary tract infections are associated with increased mortality and length of stay, though the mortality link may partly reflect confounding by unmeasured clinical variables. Treatment costs for hospital-acquired urinary tract infections range from US$603-1,189 for general participants and up to US$1,764 for ICU participants [13],[14].

Regarding overall nursing care outcomes, the proportion of outcomes classified as achieved was relatively high (71.7%), while 28.3% were classified as not completed. This substantial proportion of suboptimal results warrants particular attention and further reinforces the need to strengthen urinary tract infection prevention through enhanced surveillance and strict adherence to urinary care protocols. The present study did not evaluate caregiver-related factors, such as knowledge, perceived importance, or level of compliance with urinary catheter care protocols. It was limited to documenting new-onset infection rates and mortality prognosis associated with urinary tract infections, thereby providing a stronger impetus for decisive actions to improve the quality of urinary catheter care.

4.3. Study limitations

In this study, all patients were severely or critically ill, introducing multiple confounding factors that may have prevented the results from fully reflecting real-world catheter care conditions. The study was conducted at a single intensive care unit, limiting generalizability to broader clinical practice, as patient characteristics may vary across ICUs of different scales and settings. The small sample size and lack of clear patient stratification represent additional limitations of the study.

5. CONCLUSION

Nurses achieved 100% compliance with comprehensive patient care and a relatively high rate of complete urinary catheter care (79.0%).

Significant changes were observed in Glasgow Coma Scale scores at 24 hours, 48 hours, and day 5. Similarly, body temperature showed substantial changes across the same time points ($p < 0.05$). Urinary tract infection status changed significantly across the three monitoring time points ($p < 0.05$), with a catheter-associated urinary tract infection rate of 17.4% on day 5.

The proportion of participants with good nursing care outcomes was relatively high (71.7%).

RECOMMENDATIONS

The Intensive Care Center should strengthen measures to improve nursing care for participants with indwelling urinary catheters and reduce the rate of urinary tract infections. Enhanced surveillance for urinary tract infection is recommended, particularly in high-risk participants with comorbidities, a history of cerebrovascular accident, or who are undergoing invasive procedures such as endotracheal intubation, central venous catheterization, or urinary catheterization.

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