

Perception and attitudes of critical care nurses on external urinary catheter securement and the prevalence of securement devices in critically ill patients

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ABSTRACT

Introduction: the literature describes the limited use of urinary catheter securement devices (UC). Critical care nurses (CCNs) consider UC security an important activity for nursing care. Our objective was to determine CCN perceptions and attitudes to external UC security and the prevalence of securement devices in seriously ill patients.

Materials and Methods: a cross-sectional observation study was carried out between the CCNs of southern Italy between May and July 2023. All CCNs with a probationary period of less than six months were excluded. Chi-square tests assessed the correlation between variables. The significance level was set to $p > 0.05$.

Results: a total of 77.6% (n=76) know UC securement devices, but only 43.9% (n=43) have these devices available in operational units. CCNs with security devices reported reduced urinary tract infections [(89.5% n=42) compared to (10.6% n=5), $p=0.007$] and patient comfort [(83%, n=60) versus (16.7%, n=12), $p=0.02$] and dislocation [(84.9%, n=62) versus (15.1%, n=11)]. Changes can be reduced according to CCNs with safety devices [56.2% (n=41) versus 43.8% (n=32), $p=0.0001$].

Conclusions: the results of this study will significantly contribute to incorporating this activity into standard nursing care and improving the quality of care. Future research should consider the potential effects of nursing care.

Key words: Urinary catheters, attitude, perception, critical care nurses, securement device.

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Introduction

The Urinary Catheter (UC) is the most used indwelling invasive device in hospitalized patients, with 17.5% of patients in 66 European hospitals¹ and 23.6% in 183 U.S. hospitals². Despite widespread use, these devices are not free from adverse events.^{1,2} Several studies showed that urinary catheterization can cause severe mechanical trauma (perforation, partial urethral damage, and urinary leakage), symptomatic bacterial infection, anaphylaxis, catheter toxicity, hypersensitivity,³ dislocation, and pressure ulcers.⁴⁻⁷

The literature describes the effectiveness of adhesive securement devices for vascular catheters, reporting interesting and innovative results,⁸ but their effectiveness on urinary catheterization is often overlooked.⁹ Recently, a literature review has shown encouraging results regarding external UC securement.¹⁰ The studies included in the review reported a reduction in adverse events such as i) infection, ii) device dislocation, and iii) urethral meatus erosion while highlighting an improvement in iv) patient comfort,¹⁰ thanks to the use of appropriate external securement systems such as containment straps and StatLock® and GripLock® adhesive systems.^{11,12} In research by Tracy and colleagues in 2000, the effectiveness of adhesive securement systems compared to traditional methods such as safety pins and adhesive tape was evaluated.¹³ The UCs of patients secured with adhesive securement systems did not remain in place for less time compared to urinary catheters of patients with UCs secured with adhesive tape or safety pin. The authors conclude that the sample is too small to be generalized, but the initial results show a significant area of interest for urinary catheter securement. A similar study was conducted by Macneil and colleagues, which, comparing the data of the force exerted by the UC on the bladder neck,¹⁴ highlighted the apparent reduction of such force using external securement devices. Even UC-related infection can be reduced thanks to using such devices, as demonstrated by Darouiche,¹⁵ with a 45% reduced infection rate on a sample having the UC secured with a StatLock® device. Appah and colleagues have shown that only 18% of catheterized patients in the hospital structure under study have the correct UC securement device,¹⁶ demonstrating how this nursing practice is not widely implemented. The study by Orme and colleagues in 2008¹⁷ analyzes three clinical cases intending to evaluate the effectiveness of the adhesive securement device for indwelling urinary catheters. The results show that standard tape did not ensure the necessary securement; the adhesive system with plastic housing proved cumbersome, difficult to remove, and uncomfortable for the patient. Securement straps ensure proper fixation but often slip and rub, leaving marks on the thigh. On the other hand, the hydrocolloid-based system proved easy to apply and ensured excellent device stability. Although external securement devices are designed to promote device stability, accidental catheter dislocation was, and still is today, a problem encountered by many patients.¹⁸⁻²¹ The existing literature suggests that UCs should be adequately secured to increase device stability and reduce adverse events.²²⁻²⁵ Critical care nurses consider external UC securement an essential aspect of care, but this perception does not align with current practice.⁹ Moreover, the available literature on the subject is still insufficient, mainly due to the limited number of studies conducted in the international field.¹⁰ Future research should also be oriented toward UC securement systems to make this invasive but essential device safer.⁸⁻¹⁰ Currently, critical care nurses are still not highly inclined to promote the use of UC securement devices, even though their implementation would undoubtedly improve the standards of care for critically ill patients admitted to the Intensive Care Unit (ICU). The results of this study aim to understand the barriers that hinder

the correct use of external UC securement in critically ill patients to include this practice as a standard of care. We hypothesize that external UC securement systems are rarely used, and critical care nurses do not consider this practice essential in the care process of critically ill patients. Therefore, this study aims to investigate the perception and attitudes of critical care nurses on external UC securement and the prevalence of securement devices in critically ill patients admitted to ICU.

Materials and Methods

Study design and research question

A cross-sectional observational study was conducted among critical care nurses. The question that guided our study is: What is the prevalence of external urinary catheter securement systems? Moreover, what are the perceptions and attitudes of critical care nurses on the effectiveness of these devices?

Data collection and participants

Data were collected between May 25, 2023, and July 31, 2023, through a free platform for creating surveys, "Google Forms". Through the local representatives of Southern Italy of the National Association of Critical Care Nurses (ANIARTI), an ad hoc constructed questionnaire was distributed. The study's first phase included identifying representatives who were available to participate. Participation was voluntary. Once the available representatives were identified, they were asked to disseminate the questionnaire link among their work colleagues. All critical care nurses who expressed consent to participate in the study were enrolled after adhering to the information notice of both sexes. All critical care nurses with less than 6 months of service in the probationary period were excluded. Subsequently, the data obtained were imported into the Excel worksheet for data analysis.

Instrument

An ad hoc tool was created for data collection. The first part of the instrument includes the information notice and the nature of the study. Subsequently, the participant was asked to adhere to the study. Once study adherence was obtained, each critical care nurse completed the sociodemographic questionnaire with personal information as follows: *gender* (male, female); *age* (numeric); *educational qualification* (Regional school diploma, bachelor, Nursing degree, Master's degree in Nursing and Midwifery Sciences, 1st Level Master's, 2nd Level Master's, PhD); *years of service and particularly those in Critical Care departments* (numeric); finally the *type of Intensive Care Unit in which they were working during the study period* (General Intensive Care, Post-operative Intensive Care, Trauma Center Intensive Care).

The second section of the questionnaire is aimed at investigating the prevalence of securement systems within the ICUs of the interviewees as follows: *knowledge of external securement systems for indwelling urinary catheters* (yes, no, do not know); *availability of devices in their operational units* (yes, no, do not know); *device type* (ordinary tape, elastic bands, stat-lock, adhesive tape with tab, hydrocolloid-based adhesive); *securement site* (leg, abdomen, other).

The last part instead deals with the training of the interviewed nursing staff: *training courses* (yes, no, do not know); *most effective device* (ordinary tape, elastic bands, stat-lock, adhesive tape with tab, hydrocolloid-based adhesive); *outcome that can be improved* (device dislocation, infection, urethral meatus erosion, patient comfort); *degree of agreement on the highlighted outcomes*

(strongly disagree, partially agree, agree, strongly agree). The questionnaire was constructed based on information obtained from a recent literature review on external UC securement device.¹⁰ An evaluation panel composed of critical care nurses assessed the questionnaire for clarity and neutrality on a 4-point Likert scale [0=not clear - 3=very clear; not neutral - very neutral]. Furthermore, a first administration of the questionnaire was conducted to determine the measure of test reliability through Cronbach's alpha on the degree of agreement, which is acceptable²⁶ ($\alpha=0.67$), clarity [Mean=2.1; Standard deviation=0.87] and neutrality [Mean=2.2; Standard deviation=0.63].

Outcomes

The outcomes were considered from a recent literature review that identified i) Infection, ii) Device dislocation, iii) Urethral meatus erosion, and iv) Patient comfort.¹⁰

Ethical considerations

Ethical review and approval by an ethics committee for this study were waived due to its observational, online nature. All critical care nurses who voluntarily agreed to participate in the study were enrolled. Ethical considerations were indicated in the first part of the questionnaire, based on the principles established by the Data Protection Authority (DPA) in Italy. The study complied with the guidelines contained in the Declaration of Helsinki.

Statistical analysis

Numerical variables were considered mean and standard deviation, while categorical variables were considered absolute frequency and percentage. The chi-square test was applied to verify associations between variables. The association between variables was verified in the groups of critical care nurses who used/knew or did not use the securement systems against outcomes such as i) Infection, ii) Device dislocation, iii) Urethral meatus erosion, and iv) Patient comfort. Agreement values were considered (Agree=3; Strongly agree=4), while disagreement (Strongly disagree=1; Partially agree=2). The significance level was set for p-values <0.05. Analyses were conducted using the Statistical Package for Social Science (SPSS) software. 24.

Results

Sample description

The response rate to our survey is 81.7% of critical care nurses who meet the inclusion criteria. Our sample comprised 98 critical care nurses, 40.8% male (n=40) and 59.2% female (n=58). The age groups between 20-30 and 31-40 years were the most prevalent, with the same percentage of 33.7% (n=33). Most critical care nurses have a Bachelor's Degree in Nursing (48% n=47) and have 1-5 years of service (37.8% n=37), and 57.1% (n=56) worked in ICU. Regarding the type of ICU, the most prevalent is the General Intensive Care Unit, with a response rate of 51% (n=50); more details in Table 1.

Knowledge and attitude of critical care nurses

The association between variables in the groups of critical care nurses who used/knew or did not use the securement device gave the following results about the previously described outcomes (Table 2). Among critical care nurses familiar with the device, 89.4% (n=42) agree that its use can reduce catheter-associated urinary tract infections, compared to 10.6% (n=5) who disagree

(p<0.007). A similar association was found for device dislocation, with 84.9% (n=62) agreeing and 15.1% (n=11) disagreeing (p<0.003). Regarding patient comfort, 83.3% (n=60) agree, while 16.7% (n=12) disagree (p<0.022). These results indicate that critical care nurses familiar with the device have a higher perception of its benefits. However, the data related to urinary meatus erosion cannot be considered as they are not significant (p<0.60).

Regarding the group of critical care nurses who have securement systems available in their operational unit, they reported an excellent association with device dislocation [Agreement= 56.2% (n=41) vs Disagreement=43.8% (n=32), p<0.0001], as well as in urinary meatus erosion [Agreement= 50.7% (n=37) vs Disagreement=49.3% (n=36), p<0.20] and patient comfort [Agreement= 58.2% (n=38) vs Disagreement=41.8% (n=34), p<0.003]. Unlike the previous data, the same group did not report a good association with infection since the data obtained is not significant (p<0.575).

Prevalence

From the results obtained, we can assess the level of knowledge on the subject, particularly the prevalence of these devices, highlighting that they are not consistently present across all the operational units considered. Out of 98 critical care nurses, 77.6%

Table 1. Sociodemographic Characteristics (n=98).

Variable	n	(%)
Gender		
Male	40	(40.8)
Female	58	(59.2)
Age		
20-30	33	(33.7)
31-40	33	(33.7)
41-50	21	(21.4)
51-65	11	(11.2)
Years of service		
1-5	37	(37.8)
6-10	17	(17.3)
11-15	14	(14.3)
16-20	9	(9.2)
21-25	10	(10.2)
26-30	5	(5.1)
31-35	6	(6.1)
Years of service in critical care area		
1-5	56	(57.1)
6-10	16	(16.3)
11-15	10	(10.2)
16-20	5	(5.1)
21-25	5	(5.1)
26-30	1	(1.0)
31-35	5	(5.1)
Education Level		
Regional school diploma	7	(7.1)
University Nursing diploma	4	(4.1)
Bachelor's degree in Nursing	47	(48.0)
Master's degree in nursing and Midwifery Sciences	14	(14.3)
1 st Level master's degree	25	(25.5)
2 nd Level master's Degree	1	(1.0)
Type of intensive care unit		
General intensive care unit	50	(51.0)
Post operative intensive care	8	(8.2)
Trauma center intensive care	40	(40.8)

(n=76) know external UC securement devices, but only 43.9% (n=43) have such devices available in their operational units. The critical care nurses who have these devices [43.9% (n=43)] indicated the StatLock system as the most prevalent device in their operational units, with 28.6% (n=28) and the one they consider most effective [54.1% (n=53)]. A major problem is related to staff training since 85.7% (n=84) of the participants have never attended a course on external UC protection systems. The outcomes they indicated as “improvable” if an adequate external securement device is used are: device dislocation for 75.5% (n=74); Infection for 32.7% (n=32), urinary meatus erosion for 65.3% (n=64), patient comfort for 69.4% (n=68), and skin lesion (due to pressure on the leg from the connecting tube) for 1% (n=1) (Figure 1). Critical care nurses could express their degree of agreement on the effectiveness of securement systems in improving the previously listed outcomes; the highest degree of agreement was found in urethral meatus erosion and device dislocation (Figure 2).

Discussion

This study explores critical care nurses’ perceptions and attitudes regarding external UC securement and the prevalence of

securement system use in critically ill patients admitted to the ICU. The key findings of this study are: i) 43.9% of the critical care nurses interviewed have access to urinary catheter securement systems; ii) the group of critical care nurses familiar with these devices believes their use can reduce catheter-associated infections, prevent dislocation, and improve patient comfort, compared to those unfamiliar with them; iii) the group of critical care nurses with access to these devices believes their use can reduce dislocation, prevent erosion of the urinary meatus, and improve patient comfort, compared to those who do not use them.

The literature describes that the prevalence of indwelling urinary catheters with fixation is significantly lower than those without securement, and these devices are more commonly found in surgical rather than medical units.¹⁶ It has been demonstrated that using the StatLock device reduced the incidence of catheter-associated infections by 45% compared to using other fixation devices such as tape, Velcro strap, CathSecure, or none.¹⁵ Another outcome that can be improved, as demonstrated by MacNeil and colleagues, is the dislocation of the device, as the fixation of the UC eliminated traction forces at the bladder neck on the distal, proximal, and mid-catheter segments.¹⁴

Our findings regarding the percentage of use and availability of these devices in hospitalizations are comparable to those of Appah and colleagues, as our study also highlighted the limited

Table 2. Association between nurses' knowledge and availability of securement devices in *ICU vs. outcomes (n=98).

Outcome	Knowledge				p	Availability of Device				**p
	Yes		No			Yes		No		
	N	(%)	N	(%)		N	(%)	N	(%)	
Infection										
Agreement	42	(89.4)	5	(10.6)	.007	22	(46.8)	25	(53.2)	.575
Disagreement	34	(66.7)	17	(33.3)		21	(41.2)	30	(58.8)	
Dislocation										
Agreement	62	(89.4)	11	(15.1)	.003	41	(56.2)	32	(43.8)	.0001
Disagreement	14	(56.0)	11	(44.0)		2	(8.0)	23	(92.0)	
Meatal erosion										
Agreement	60	(82.2)	13	(17.8)	.060	37	(50.7)	36	(49.3)	.020
Disagreement	16	(64.0)	9	(36.0)		6	(24.0)	19	(76.0)	
Comfort										
Agreement	60	(83.3)	12	(16.7)	.022	38	(52.8)	34	(47.2)	.003
Disagreement	16	(61.5)	10	(38.5)		5	(19.2)	21	(80.8)	

*ICU, intensive care unit; **P-value <0.05; Outcomes (Infection, Dislocation, Meatal Erosion, Comfort).

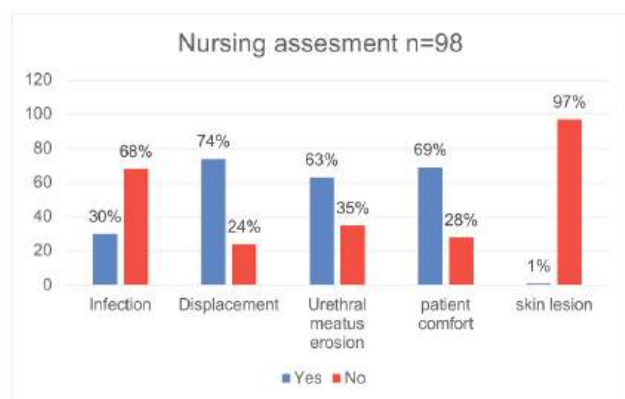


Figura 1. Nursing assessment.

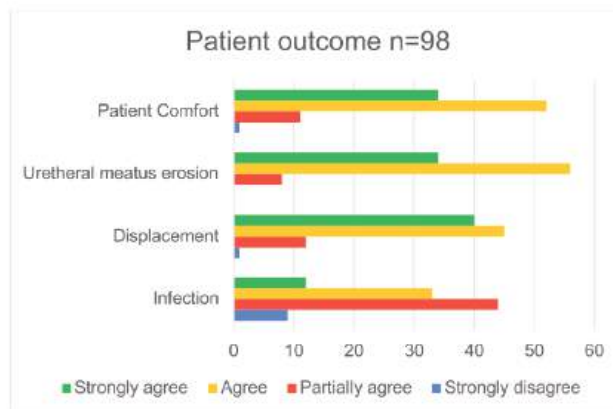


Figura 2. Patient outcome.

availability of securement devices in most of the hospitals analyzed, as demonstrated by Appah.¹⁶ The results obtained from the group of critical care nurses familiar with securement devices are similar to those of Darouiche;¹⁵ this group believes, that using these devices reduces the incidence of catheter-associated infections. Contrary to the previous finding, the results of the group of critical care nurses who use external securement devices disagree with Darouiche's study, as they do not believe that external fixation reduces the risk of infection. The results of this group are instead consistent with the study conducted by McNeill and colleagues,²⁷ as this group of critical care nurses agrees on the improved outcomes such as device dislocation and erosion of the urinary meatus.

Limitations and strengths

Managing urinary catheters in intensive care units is a highly relevant issue for daily nursing practice, making this study particularly useful for improving the quality of care. Additionally, using a purpose-built questionnaire, validated by a panel of experts and with good reliability ($\alpha=0.67$), adds robustness to the collected data. Another positive aspect is the focus on clinical outcomes, such as infection, device dislocation, and erosion of the urethral meatus, which allows for a precise evaluation of the impact of using a securement device. Finally, comparing results with existing literature allows the study to be placed within the context of available evidence, providing a more comprehensive view of the situation.

However, the study also presents some limitations. The first limitation concerns the sample, which is geographically limited to critical care nurses in Southern Italy, potentially reducing the generalizability of the results compared to other regions or countries. Furthermore, a cross-sectional observational study does not allow for establishing causal relationships between using securement devices and clinical outcomes. Another potential limitation is related to the voluntary participation of nurses, which could create selection bias, as it may have attracted greater participation from critical care nurses who are more interested or informed on the subject. The absence of long-term follow-up further limits the ability to observe the evolution of critical care nurses' knowledge and practices and the real impact of securement devices on clinical outcomes. The limited availability of these devices in the examined units may have also influenced the critical care nurses' ability to apply acquired knowledge, with potential repercussions on the study's results.

Implications for clinical practice and future research

The results of this study have important implications for clinical practice and future research. The limited availability and use of external securement devices for UC in intensive care units highlight the need for targeted interventions to improve the quality of care. Critical care nurse education is a crucial factor: investing in specific training programs on external securement devices could increase awareness of the benefits of such devices and promote their broader and more consistent adoption. This approach could reduce the incidence of complications such as infections, device dislocation, and erosion of the urethral meatus, thereby improving patient comfort.

It is also essential to investigate the comparative effectiveness of different securement devices further, mainly through studies that can provide more robust data. Additionally, it is necessary to explore the economic impact of the widespread implementation of such devices, evaluating the cost-benefit ratio concerning complications. Finally, future research could explore implementing stan-

dardized guidelines for external securement devices, considering the specificities of different types of patients and units, to optimize care and ensure better clinical outcomes.

Conclusions

Almost all critical care nurses interviewed have an excellent basic knowledge of the subject, but less than half have the opportunity to implement and apply their knowledge, as these devices are not available in most of the units. A spontaneous question arises: "Why is the opportunity to apply this knowledge not provided?" These devices should be supplied in all units to improve patient care. In most of the units where securement devices are available, the most utilized devices are StatLock systems, indicating that, while there is still a small number of respondents using outdated methods (standard tape and elastic bands), it is important to note that the use of recent, study-supported devices that ensure better patient outcomes has also been recorded.¹⁵

Despite basic knowledge on the subject, most respondents stated that they had never attended training courses on the matter. Lack of training leads to a decreased awareness of the benefits of this practice and does not encourage the use or request for these devices by nursing staff in their units. If these devices are to be implemented, investment in training is necessary, explaining the importance and benefits they bring to patients, thus encouraging their use.

Regarding outcomes, a difference in knowledge was recorded between the groups of critical care nurses who use/are familiar with securement devices and those who do not use/are not familiar with them, demonstrating that if nursing staff had the opportunity to use these devices, they would also gain more excellent knowledge of the improvements they bring to patient outcomes. This study has partially demonstrated the need to invest both in training courses and in providing the best available devices to all hospital settings so that the skills of each critical care nurse can be put into practice with the ultimate goal of ensuring and providing the best possible care for patients.

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Conflict of interest: the authors declare no potential conflict of interest, and all authors confirm accuracy.

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Informed consent: all patients participating in this study signed a written informed consent form for participating in this study.

Patient consent for publication: all nurses involved in the study were provided with a detailed explanation of the nature of the research and voluntarily agreed to participate, giving their informed consent both for participation in the study and for the publication of anonymized information, in full compliance with ethical and legal standards.

Availability of data and materials: all data generated or analyzed during this study are included in this published article

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