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Hygiene with wipes in bedridden patients with catheter-associates urinary infection in cardiac surgery. Randomized controlled trial.

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Abstract:	The study aimed to assess hygiene with wet wipes in bedridden patients with urinary catheters for catheter-associated urinary tract infection (CAUTI) prevention. CAUTI occurred in 16.5% of the control group compared to 5.9% of the intervention group (p= 0.031). Hygiene with wet wipes can substitute conventional hygiene for preventing CAUTI.

Hygiene with wet wipes in bedridden patients to prevent catheter-associated urinary tract infection in cardiac surgery. A randomized controlled trial.

Running title: Hygiene for catheter-associated urinary infection

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ABSTRACT:

The study aimed to assess hygiene with wet wipes in bedridden patients with urinary catheters for catheter-associated urinary tract infection (CAUTI) prevention. CAUTI occurred in 16.5% of the control group compared to 5.9% of the intervention group (p= 0.035). Hygiene with wet wipes can substitute for conventional hygiene for preventing CAUTI.

INTRODUCTION

Urinary tract infections (UTI) represent about 15%-20% of all healthcare-associated infections, and approximately 60% of these are associated with urinary catheters, which are used in up to 16% of inpatients (1). Up to 70% of UTIs are avoidable with the use of evidence-based prevention practices. (2)

Personal hygiene, including bathing, is a nursing activity related to quality of life and of medical care. The most widespread, well-described technique is conventional hygiene, which consists of washing the patient with a sponge or cloth, soap, and water from a basin. Over the last decade, waterless hygiene with the use of pre-saturated clothes has emerged as an alternative to conventional regimens (3).

Some authors sustain that hygiene with water can increase the risk of nosocomial infection, as the mechanical friction causes the shedding of cells containing microorganisms, which leads to contamination of the water. Similarly, tap water, toilets, sinks and basins can act as a reservoir for microorganisms and cause nosocomial infections (4, 5).

Given the importance of preventing UTIs and the scarcity of studies related to patient hygiene, this study aimed to assess hygiene with pre-saturated wipes versus conventional

hygiene in cardiac surgery bedridden patients for reducing catheter-associated urinary tract infections (CAUTI).

METHODS

This open label randomized controlled trial took place in the Germans Trias i Pujol University Hospital between January 2019 and February 2020. This paper follows the CONSORT reporting guidelines for studies of non-pharmacological interventions(6).

Participants

Patients undergoing cardiac surgery who were bedridden, had an indwelling urinary catheter, and provided signed informed consent were eligible to participate in the study. Exclusion criteria were: missing records, patients admitted from other units with urinary catheters, patients with previous UTI in last 3 months, and language barrier. Patients were consecutively recruited until the sample size was reached. Upon enrollment, subjects were randomized to parallel groups (1:1) using a random numbers table. Patients were withdrawn from the study if they demonstrated hypersensitivity to any component of the hygiene protocol, transferred to other services, voluntarily dropped out, or died before completing the follow-up.

Intervention

The control group received conventional patient hygiene with water and soap, while the experimental group received dry hygiene with wipes impregnated with soap and moisturizing lotion containing polyhexanide (Prontoderm wipes, B. Braun). Nursing professionals in the participating services received training on the hygiene protocol designed for the study. Urine samples were collected following hospital protocol and only in patients with clinically suspected infection.

Ethical considerations

The hospital's clinical ethics committee approved the study (code PI-18-173) and participants were asked to sign informed consent. Infection control nursing staff collected the data using a questionnaire with the study variables.

Study variables

The primary outcome was the occurrence of a CAUTI as defined by the Centers for Disease Control and Prevention (7)

Other variables were age, sex, comorbidity according to the Charlson Index, days of catheterization, skin integrity, microorganism in urine culture, antibiotic administration, treatment duration, and discharge outcome.

Statistical analysis

Assuming an alpha risk of 5%, allowing a 5% dropout rate, to provide 80% power, 100 individuals were required in each group,

The accumulated incidence of CAUTI was calculated with 95% confidence intervals (CI), and groups were compared in univariable analyses using the chi-squared test or Fisher's exact test or the student‘s t test or Mann-Whitney U test . The study arm (experimental or control) was introduced into a multivariable logistic regression model adjusted for sex and days of catheterization. All analyses were performed using the SPSS statistical package (version 24). Two-tailed p values of less than 0.05 were considered significant.

RESULTS

A total of 212 patients were included in the study, of which 170 (85 per arm) were included in the analysis (Fig. 1). The only significant difference between groups was comorbidity: the Charlson index was higher in the control group (p=0.008).

The duration of catheterization ranged from 1-35 days. CAUTI was significantly more frequent in the control group (n=14 (16.5%), 95% CI 9.7% to 25.5% versus n=5 (5.9%, 95% CI 2.2% to 12.5%) (p = 0.035). The incidence of CAUTI was higher among female participants (25.0%, 95% CI 13.9 % to 39.3 %) than male participants (6.4%, 95% CI 3.1% to 11.8%; p = 0.002).

In the multivariable analysis (Table 1), CAUTI was independently associated with conventional hygiene (odds ratio [OR] 4.1 95% CI 1.3 to 12.7). In the 19 patients with CAUTI, 12 (60%) had infections caused by Enterobacterial (n = 9 controls versus n = 3 experimental). *Pseudomonas* spp. were isolated in three cases, all in the control group. Four patients (20%) presented with polymicrobial cultures (75% in the control group). Nineteen patients (95%) received antibiotics during their hospital stay, with 58% of these continuing this treatment after discharge.

Most (94.1%) maintained skin integrity. More patients receiving conventional (7.1%) versus dry hygiene (3.5%), developed moisture-induced skin lesions, but the difference was not significant.

Regarding the discharge outcome, 89.1% of participants were discharged home, while 4.1% died from non-infectious causes.

DISCUSSION

Our study provides evidence from an open label randomized controlled trial that water-based hygiene in bedridden patients with a urinary catheter is associated with a higher risk of CAUTI than hygiene with pre-saturated wipes.

A systematic review showed that waterless hygiene reduces the incidence of urinary infection(8) and recommended that healthcare centers consider eliminating patient bathing with basins. Other authors(9) found a reduction in UTIs when dry bathing practices were implemented, although most evidence is from pre-post studies comparing wet wipes impregnated with chlorhexidine to traditional soap, so the reduction could be due to the incorporation of the antiseptic.

In contrast, other authors (10) found insufficient evidence for the clinical efficacy of wet wipes with chlorhexidine and suggested the need for randomized clinical trials

In our study, CAUTI was independently associated with conventional water-based hygiene.

Most of the patients with CAUTI (60%) had an enterobacterial infection. The polymicrobial cultures, which were more frequent in the water-based hygiene arm, could reflect an excess of periurethral ascending contamination during washing with soap and water.

Groven et al (3) found that dry washing is associated with fewer skin lesions than conventional hygiene. We also observed that more patients receiving conventional versus dry hygiene developed skin lesions, although we failed to detect a statistically significant difference. One of the strengths of the current study is the inclusion of a randomly assigned control group and the incorporation of the change in hygiene technique with wet wipes as an isolated measure, rather than part of a multicomponent intervention. On the other hand, one limitation is that it was not double-blinded due to the type of intervention. Another possible limitation is that there were patients lost to follow-up in both study arms, possibly leading to bias due to the lack of information on these patients. Also, the study was limited to cardiac surgery patients and may not be generalizable to other populations.

In conclusion, in bedridden patients with a urinary catheter the use of pre-saturated wipes significantly reduced the incidence of CAUTI compared to conventional soap-and-water hygiene. Despite not containing an antiseptic, the wipes used in our study reduced the incidence of CAUTI, without disruption of skin integrity. Thus, performing skin hygiene pre-saturated wipes is a safe alternative to soap and water.

BIBLIOGRAPHY

1. Ministerio de Sanidad y consumo de España. Sonda uretral en los pacientes críticos ingresados en las unidades de cuidados intensivos " PROYECTO ITU-ZERO ." 2018;1–90. Available from: https://www.seguridaddelpaciente.es/resources/documentos/2018/04/itu-zero/definitivo/PROYECTO-ITU-ZERO-2018-2020.pdf

2. Umscheid CA, Mitchell MD, Doshi JA, Agarwal R, Williams K, Brennan PJ. Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs. Infect Control Hosp Epidemiol. 2011 Feb;32(2):101-14. doi: 10.1086/657912. PMID: 21460463

3. Groven FMV, Zwakhalen SMG, Odekerken-Schröder G, Joosten EJT, Hamers JPH. How does washing without water perform compared to the traditional bed bath: A systematic review. BMC Geriatr 2017;17(1):1–16

4. Anaissie EJ, Penzak SR, Dignani ; M Cecilia. The Hospital Water Supply as a Source of Nosocomial Infections A Plea for Action. Arch Intern Med. 2022;162:1483–92.

5. Shaw E, Gavaldà L, Càmara J, Gasull R, Gallego S, Tubau F, et al. Control of endemic multidrug-resistant Gram-negative bacteria after removal of sinks and implementing a new water-safe policy in an intensive care unit. J Hosp Infect. 2018;98(3):275–81.

6. Barbour V, Bhui K, Chescheir N, Clavien PA, Diener MK, Glasziou P, et al. CONSORT Statement for randomized Trials of nonpharmacologic treatments: A 2017 update and a CONSORT extension for nonpharmacologic Trial Abstracts.

Ann Intern Med. 2017;167(1):40–7.

7. Horan TC, Andrus M, Dudeck MA. CDC/NHSN surveillance definition of health care-associated infection and criteria for specific types of infections in the acute care setting. Am J Infect Control 2008; 36: 309-32.

8. Strouse AC. Appraising the Literature On Bathing Practices And Catheter-Associated Urinary Tract Infection Prevention. Urol Nurs. 2015;35(1):11–7.

9. Reagan KA, Chan DM, Vanhoozer G, Stevens MP, Doll M, Godbout EJ, et al. You get back what you give: Decreased hospital infections with improvement in CHG bathing, a mathematical modeling and cost analysis. Am J Infect Control. 2019; 47(12):1471–3.

10. Boonyasiri A, Thaisiam P, Permpikul C, Judaeng T, Suiwongsa B, Apiradeewajeset N, et al. Effectiveness of Chlorhexidine Wipes for the Prevention of Multidrug-Resistant Bacterial Colonization and Hospital-Acquired Infections in Intensive Care Unit Patients: A Randomized Trial in Thailand. Infect Control Hosp Epidemiol 2016 ;37(3):245–53.

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Table 1. Factors associated with catheter-associated urinary tract infection (CAUTI). Univariable and multivariate analysis

	UTI		No UTI		Univariable		Multivariable	
	n	**%**	**n**	**%**	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
Group								
Experimental	5	5.9	80	94.1	1		1	
Control	14	16.5	71	83.5	3.1 (1.1-9.1)	0.035	4.1 (1.3-12.7)	0.014
Gender								
Male	8	6.4	117	93.6	1		1	
Female	11	25.0	33	75.0	4.9 (1.8-13.1.)	0.002	5.8 (2.1-16.6)	0.001
Age, mean ± SD	69.2 ±12.7		67.3 ±10.4		1.01 (0.97-1.07)	0.43		
Charlson index								
0 to 1	10	10.3	87	89.7	1			
2 to 4	9	12.3	64	87.7	1.2 (0.4 – 3.1	0.6.8		
Days of catheterization, mean ± SD	5.7 ± 2.8		4.9 ± 4.3		1.0 (0.9-1.1)	0.45	1.0 (0.9-1.1)	0.71

CI: confidence interval, OR: odds ratio.

Figure

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Figure 1. Participant Flow