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Rehabilitation Nurses' Knowledge, Attitudes, and Behaviors for Preventing Urinary Tract Infections From Intermittent Catheterization

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Abstract

Purpose: The aim of this study was to develop and examine the reliability of a survey to assess knowledge, attitudes, and behaviors (KAB) of rehabilitation nurses for preventing urinary tract infections in persons requiring intermittent catheterization.

Design: Cross-sectional survey with principal component analysis.

Methods: Survey development and administration based on national guidelines.

Findings: Principal component analysis produced three reliable components of KAB explaining 54.5% of response variance. Results indicate that nurses report adequate knowledge and training. Although the facility had an evidence-based online catheterization procedure, staff reported that the procedure was not helpful nor useable. Twenty-eight percent incorrectly identified the root cause of urinary tract infection, and 45% reported that other nurses always washed their hands. Barriers to using standard intermittent catheterization technique were staff, time, and patient variables.

Conclusion: The modified survey is a reliable measure of KAB.

Clinical Relevance: The survey assists with identifying knowledge gaps, customizing education, and changing practice.

Keywords: Attitude; Behavior; Intermittent catheterization; Knowledge; UTI.

Introduction

Neurogenic bladder dysfunction develops from damage to the central, autonomic, or peripheral nervous systems. Intermittent catheterization (IC) is a primary management option for patients experiencing bladder dysfunction resulting from these neurological disorders (Dorsher & McIntosh, 2012; Ginsberg, 2013; Stewart, 2011). Intermittent catheterization is used when elimination of urine does not occur naturally and where there is an issue with residual volume that includes symptoms or complications (Vahr et al., 2013). Because IC involves passing a catheter into the bladder intermittently to drain urine, patients gain control over the timing and place for bladder emptying. The use of IC and the prevention of urinary tract infections (UTIs) are important care issues for rehabilitation nurses. This study developed and tested a survey to describe rehabilitation nurses' knowledge, attitudes, and behaviors (KAB) for preventing UTI for patients with neurogenic bladders using IC; determined nursing characteristics associated with the survey results; and examined barriers nurses identified for preventing UTI in this population.

Bladder dysfunction occurs in patients with spinal cord injuries (70%–84%), multiple sclerosis (40%–90%), Parkinson's disease (37%–72%), and stroke (15%; Dorsher & McIntosh, 2012). Ongoing IC poses a significant risk of injury to the urinary structures, formation of bladder stones, development of encrustation, a tendency toward certain types of cancer, and development of UTI (Biardeau & Corcos, 2016; Krebs, Wollner, & Pannek, 2015). A UTI is a microbial infection involving the urethra, bladder, ureters, or kidneys (Kumar, Dave, Wolf, & Lerma, 2015). The Centers for Disease Control and Prevention (CDC) provides criteria for determining the presence of a UTI. Specifically, catheter-associated UTI (CAUTI), symptomatic UTI (SUTI), and asymptomatic bacteremic UTI all include as one criteria for the diagnosis of a UTI a urine culture with $\geq 10^5$ CFU/ml of no more than two species of microorganisms in which one is a bacterium (CDC,

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2016). However, CAUTI is specific to patients with indwelling bladder catheters, whereas the criteria for SUTI apply to infections in the absence of indwelling devices. In this study, the participating organization uses on the rehabilitation nursing unit the SUTI criteria for determining a UTI for patients with neurogenic bladders.

In addition to a positive urine culture, the diagnosis of SUTI includes a range of possible symptoms involving pain, dysuria, increased incontinence, and gross hematuria (CDC, 2016). However, making a UTI diagnosis is often difficult in patients with neurogenic bladders receiving IC, because many classic symptoms of dysuria, urgency, and frequency are absent (Biardeau & Corcos, 2016; Vigil & Hickling, 2016). The most recent Consortium for Spinal Cord Medicine (CSCM, 2006) guideline provides defining criteria for UTI for patients with spinal cord injury: "(1) significant bacteriuria, (2) pyuria indicating an increased white blood cells in the urine, and (3) signs and symptoms, such as discomfort or pain over the bladder or kidney area, urinary incontinence, increased spasticity, autonomic dysreflexia, cloudy urine with increased odor, malaise, lethargy, or sense of unease" (p. 16). In a study with spinal cord patients using IC, the presence of cloudy urine had the highest accuracy, and leukocytes in the urine had the highest sensitivity for predicting UTI (Massa, Hoffman, & Cardenas, 2009).

The high incidence of UTI in patients with neurogenic bladders (Vigil & Hickling, 2016) may not only lead to increased rates of illness, hospitalizations, and cost of care (Biardeau & Corcos, 2016; Vigil & Hickling, 2016) but also interfere with quality of life (Ginsberg, 2013). Manack et al. (2011) examined reimbursement claims based on antibiotic use and healthcare encounters. Although the presence of an indwelling catheter or use of IC was not determined, the study found a 29%–36% UTI rate for patients with neurogenic bladders. In a descriptive study examining IC in patients with spinal cord injury, recurrent SUTI was identified as a significant issue, which indicated a need for further study regarding the prevention of infection for patients using IC (Edokpolo, Stavris, & Foster, 2012). Girard et al. (2015) discovered a 4.8% UTI incidence rate (n = 1,510) in hospitalized geriatric patients with indwelling catheters or with those receiving IC. In contrast to national guidelines that recommend using IC to reduce UTI, Girard et al. found that patients receiving IC had higher infection rates (29.7%) compared to patients with indwelling catheters (9.9%). This result was identified as possibly due to inadequate staff knowledge about IC in comparison to knowledge about indwelling catheters.

Staff nurses' KAB for managing IC are associated with the occurrence of hospital-acquired infections. Appropriate attitudes of healthcare workers are essential for infection prevention (Alkubati, Ahmed, Mohamed, Fayed, & Asfour, 2015; Liang et al., 2015; White-Williams et al., 2013). Jain, Dogra, Mishra, Thakur, and Loomba (2015) found the knowledge and attitudes of physicians and nurses were inadequate when assessing the need for IC and preventing UTI. A Minnesota survey found nurses with more education in UTI prevention were more likely to rate prevention interventions as effective (Drekonja, Kuskowski, & Johnson, 2010).

The most current Guideline for Prevention of Catheter-Associated Urinary Tract Infections developed with the Health Infection Control Practices Advisory Committee (HICPAC; Gould et al., 2009) indicates that IC is best performed at regular intervals in conjunction with a bladder scanner to prevent bladder overdistension. The HICPAC guideline outlines the knowledge needed to prevent catheter-related UTI including providing periodic education regarding catheter insertion, maintenance, and removal. The CSCM (2006) guideline provides indications, benefits, and risks of common methods, including IC, for bladder management for patients with spinal cord injury. However, guidelines alone do little to change practice and improve outcomes (Medves et al., 2010; Miia, Tero, Pekka, Hannu, & Helvi, 2013). Barriers to implementation of guidelines for UTI prevention include conflicting professional interpretations, variability in patient factors, lack of available equipment, organizational constraints, lack of staff education, and the complexity of practice (Flottorp & Oxman, 2003; Girard et al., 2015; Lugtenberg, Burgers, Zegers-van Schaick, & Westert, 2010).

The healthcare organization participating in this study uses the Elsevier's Clinical Skills (http://www.confidenceconnected.com/products/elsevier-clinical-skills/) standard titled "Urinary Catheter: Straight and Indwelling Catheter Insertion (Male and Female)" to determine regular IC performance (Perry, Potter, & Ostendorf, 2014). Elsevier's Clinical Skills, is an evidence-based standard that includes regularly updated learning resources and skills. However, although the study facility uses the Elsevier standard as the organization's standard of practice for all nursing units, the standard is primarily focused on acute care patients.

Because rehabilitation nurses are the frontline defense in infection control, the objective of this study was to develop a reliable and valid survey to answer the following questions: (1) What are the KAB of rehabilitation nurses regarding UTI prevention for patients with neurogenic bladders receiving IC? (2) What nursing characteristics are associated with varying survey results? (3) What are the barriers rehabilitation nurses report that inhibit prevention of UTI? Findings may guide future studies in creating and testing education and interventions that will

assist rehabilitation nurses in preventing UTI in patients with neurogenic bladders using IC.

Methods

Design

This study used a cross-sectional survey design administered in hard copy format and through Qualtrics Research Core online survey system (www.qualtrics.com). The study received institutional review board approval from the Allina Health System in Minneapolis, MN, and St. Catherine University in St. Paul, MN. The survey was available to consenting Allina Health System rehabilitation nurses from December 2014 to January 2015.

Sample

Ninety-four nurses who worked full or part time at one of three inpatient rehabilitation units in the Allina Health System were recruited to participate. The three units are part of the Courage Kenny Rehabilitation Institute located at the Abbott Northwestern Hospital (ANW), the United Hospital, and the Transitional Rehabilitation Program in Golden Valley, MN. Participants were recruited through personal invitation, presentations, and e-mail, with two e-mail reminders to increase the response rate.

Survey Development

As part of an interprofessional evidence-based practice program, St. Catherine University faculty and students from nursing, library science, and occupational therapy joined a staff nurse and nurse mentor from Abbott Northwestern Hospital to develop, administer, and analyze the survey results. The library science student conducted the literature search using the following key terms: UTI, IC, CAUTI, neurogenic bladder, neuropathic bladder, self-catheterization, bladder scan, clean versus sterile, urological care, urethral catheterization, urinary catheters, bladder management and spinal cord injury, guidelines, protocols, and standards. The search used the terms separately and then combined the terms with the Boolean terms "and," "or," and "not." The primary criteria for selecting literature for appraisal were alignment with the research questions and publication dates from 2000 to 2017 in which research evidence, guidelines, and protocols were identified. The literature was appraised and synthesized to guide the development of survey items.

No prior survey was found for understanding nursing competency for UTI prevention specific to IC. This study focused on the components of competence rather than on the actual competency of the nurses. Competence refers to having the knowledge and capability to perform in a given situation, whereas competency involves one's actual performance in a situation (Cowan, Wilson-Barnett, & Norman, 2007; McConnell, 2001).

Thus, the team derived nursing competence statements from the HICPAC (Gould et al., 2009) and the CSCM (2006) guidelines for preventing UTI as a primary basis for constructing the survey. The statements define the requisite components of competence for given tasks (Moyers, 2014), such as using a standardized technique for IC, using bladder scanners, and performing IC regularly (every 4–6 hours). In addition to using these standards and the literature, the team examined the facility's standards for conducting IC to identify additional potential elements for the survey. For example, the rehabilitation unit's physician order sets state that the target goal for the post volume residuals (PVRs) of urine should be less than 500 ml. However, the literature is unclear on what the precise urine volume should be before implementing IC. Sources identify amounts from 400 to 500 ml and, in some instances, provide ranges from 150 to over 1,000 ml, depending on the patient's bladder capacity (Blok et al, 2017; Brouwer et al., 2015; di Benedetto, 2011; Ersöz, Koyuncu, Akyüz, & Özgirgin, 2016; Newman & Willson, 2011). Because of the lack of specific evidence for the amount of urine in the bladder necessitating IC, a question about specific urine volumes was not included in the survey.

In conjunction with a methodologist, the interprofessional team developed the UTI KAB Survey using the BACK (i.e., behaviors, attitudes, characteristics, and knowledge) survey methodology (Matross, 1993). Knowledge questions focused on information about UTI and its prevention, the need for ongoing education, and the use of Elsevier Clinical Skills for guiding practice. Attitude questions assessed the nurse's beliefs about current IC practices, use of evidence for prevention, and education. Behavior questions asked about implementation of preventive activities.

Rehabilitation nurses assisted with the development of the final 37 Likert-like survey questions that assessed knowledge (11), attitudes (16), and behaviors (10) of the nurses. The questions used an 11-point scale with ratings of 0–10. The response anchors varied, depending on the type of question (e.g., not at all beneficial to extremely beneficial, completely dissatisfied to completely satisfied, not at all to a very great extent), with zero representing the most negative anchor. Additional questions asked nurses to identify prevention behaviors, select barriers to implementation, and classify frequency of handwashing by other nurses.

Analysis

The data were analyzed using IBM SPSS version 21.0 (IBM SPSS, Armonk, NY). Descriptive statistics examined nurse characteristics of education, shift, work and unit location, and years of experience as an RN and as

a rehabilitation nurse. Barriers to UTI prevention behaviors were analyzed using box plots. The rest of the survey data were first explored to ensure the assumptions for inferential analyses were met. A principal component analysis (PCA) with varimax, orthogonal rotation was the exploratory factor analysis method used to examine 37 questions of the survey, excluding the ranking of barriers, the knowledge questions requiring a correct answer, and the handwashing question. Sampling adequacy was determined through the methods of MacCallum, Widaman, Zhang, and Hong (1999). Cronbach's alpha determined internal consistency of each component or factor.

Scores for items within the three scales identified in the factor analysis were averaged to determine the participant's score on each scale. Differences in means for the scales were analyzed with a *t* test between the two education levels of associate and baccalaureate degrees and with an analysis of variance to determine differences among shifts and level of experience as a registered nurse and as a rehabilitation nurse and length of service on the unit. Regression analyses examined possible characteristics for predicting scale scores.

Results

Demographics

Sixty-four surveys (n = 94; paper surveys n = 28) resulted in a response rate of 68% and a completion rate of 80%. Of the 60 nurses who had complete surveys, 30 (50%) were associate or diploma trained, and 30 (50%) had a baccalaureate degree or above. Most nurses worked the day shift with 35% having 6 years or more of experience in rehabilitation nursing (Table 1).

Survey Reliability

A PCA was initially run on 37 survey questions. Using the procedures of MacCallum et al. (1999) to determine sampling adequacy, 14 questions were removed, and the PCA was rerun. Visual inspection of the scree plot from the PCA indicated that three components should be retained (Cattell, 1966). A varimax orthogonal rotation produced strong loadings of attitude items on Component 1, knowledge items on Component 2, and behavior items on Component 3, explaining 54.5% of the total variance. Internal consistency was computed using Cronbach's alpha with the following results: Factor 1 or attitude (10 items), r = .891; Factor 2 or knowledge (8 items), r = .828; and Factor 3 or behavior (5 items), r = .752. The high internal consistency suggested items fit well within their respective factors.

Table 1 Demographic Variables, Experience, Location, Shift, and Degree Type

	n	Valid %
Years of nursing experience		
0–2 years	13	21.7
2–3 years	9	15.0
3–6 years	10	16.7
6–11+ years	28	46.7
Years of rehabilitation nursing		
0–2 years	16	26.7
2–3 years	14	23.3
3–6 years	9	15.0
6–11+ years	21	35.0
Years on rehabilitation unit	18	
0–2 years	15	30.0
2–3 years	14	25.0
3–6 years	13	23.3
6–11+ years	18	27.1
Location		
Abbott Northwestern	41	69.5
United	12	20.3
Golden Valley	6	10.2
Shift		
Day shift	36	60.0
Evening shift	16	26.7
Night shift	8	13.3
Degree		
Associate or diploma	30	50.0
Baccalaureate and above	30	50.0

Survey Findings

For the three scales examining prevention of UTIs in patients using IC, the nurses scored a mean of 6.86 (*SD* = .2081) on attitude, 6.68 (*SD* = .2087) on knowledge, and 7.04 (*SD* = .2813) on behavior. No differences in the means of the KAB scales on the survey were found among the three shifts and the four levels of experience as an RN, as a rehabilitation nurse, and as a nurse on the rehabilitation unit. Differences with education did exist with attitude scores, in which the nurses with associate degrees had higher scores (Table 2). Work location significantly predicted 17% of the variance in the attitude scores, with ANW being the primary predictor, whereas education was not a significant predictor (Table 2).

The responses from participants with the lowest ratings (0–5) were with the knowledge questions (Items 14, 17, and 18) specific to the frequency and helpfulness of the Elsevier Clinical Skills standard and the adequacy of training on the online system, the attitude question (Item 5) about searching for evidence, and the behavior questions (Items 39 and 43) about the use of dexterity and cognitive assessments of other disciplines in making decisions about patient readiness for self-catheterization (Table 3). For questions requiring a single correct response, 17 nurses (28.3%) incorrectly identified the root cause of a UTI

Table 2 Significant Participant Characteristics Predicting Survey Results

	Means/*SD*	Statistic
Education and attitudes		
Associate/diploma	7.277/1.234	$t(58) = 2.052$, $p = .045$*
Baccalaureate/graduate	6.445/1.845	
Location and attitudes		
Abbott Northwestern	7.043/1.557	$F(2, 47) = 4.801$, $p = .013$* *Post hoc analysis: Abbott Northwestern* $t(47) = 2.287$, $p = .027$*
United	6.781/1.368	
Golden Valley	6.200/2.257	

*Statistically significant at $p \leq .05$.

and did not select microorganisms as the correct answer. Seventeen nurses (28.8%) did not select the Elsevier's Clinical Skills standard as the organization's standard of care. Twenty-four nurses (41.4%) indicated they used the most conveniently available catheter (Figure 1) versus selecting the catheter based on patient need. In terms of nurses reporting how often other nurses washed their hands before performing IC, 45.3% reported nurses always washed their hands, whereas 50.8% reported a rating lower than 10, and 3.9% did not respond to the question. In addition, 8.5% of those nurses with ratings lower than 10 gave a rating below 5 on the 11-point scale (0 = *never* and 10 = *always*) regarding other nurses washing their hands. With a ranking of 10 indicating a significant barrier, nurses ranked time, staff availability, and patient variables as moderate barriers to using standardized IC techniques (Figure 2). Shift change, patient schedule, and time demands were viewed as barriers to using IC at regular intervals to prevent high PVR for patients (Figure 3).

Discussion

This study assessed rehabilitation nurses' KAB related to preventing UTI in patients with neurogenic bladders requiring IC. The HICPAC 2009 (Gould et al., 2009) guideline recommends ongoing education and training for staff performing IC. Nurses understood that UTIs are a serious issue and rated the importance of having knowledge for this patient population at a high level. Nurses were satisfied with their initial and current level of UTI and prevention education.

Approximately a fourth of the nurses selected decreased patient cognition and immune function as the root cause of a UTI instead of microorganisms. Helping rehabilitation nurses focus more on the root cause versus patient-associated factors that increase the risk for infection may ensure more consistent preventative practices under the nurse's control (Venier, 2015), such as avoiding introducing pathogens from contaminated hands or poor IC technique. Girard et al. (2015) in a survey of nurses in

Table 3 Survey Items Means, Standard Deviation, and Low Versus High Ranking

Questions $n = 60$ (*$n = 59$)	*M* (*SD*)	*n* (%) Low 0–5	*n* (%) High 6–10
Knowledge questions			
Q2 Knowledge about preventing UTI	9.12 (1.44)	2 (3.3)	58 (96.7)
Q9 Importance of experience with catheterization in preventing UTI	8.87 (1.5)	1 (1.7)	59 (98.3)
Q14 Frequency of using online nursing standard	3.25 (2.47)	50 (84.7)	9 (15.3)*
Q17 Helpfulness of the online standards and skills for preventing UTI	5.72 (3.16)	27 (45)	33 (55)
Q18 Adequacy of training on the online standard and skill system	4 (3.09)	42 (70)	18 (30)
Q28 Benefit of bladder scanning	7.33 (2.8)	3 (21.7)	47 (78.3)
Q29 Importance of bladder scanning education	7.22 (2.87)	4 (23.3)	46 (76.7)
Q41 Importance of cognitive assessment when teaching self-catheterization	9.15 (1.22)	1 (1.7)	59 (98.3)
Attitude questions			
Q3 Education adequacy for preventing UTI	7.33 (2.04)	11 (18.3)	49 (81.7)
Q4 Satisfaction with initial education	6.58 (2.09)	19 (31.7)	41 (68.3)
Q5 Searching for evidence about prevention	2.83 (2.6)	53 (88.3)	7 (11.7)
Q6 Catheter-related knowledge compared to other units	7.03 (1.86)	13 (21.7)	47 (78.3)
Q8 Comparison to other units on preventing UTI	5.47 (1.84)	20 (33.3)	40 (66.7)
Q10 Adequate experience to perform catheterization safely	7.28 (2.57)	2 (20)	48 (80)
Q26 Adequacy of catheterization technique training	7.36 (2.58)	16 (27.1)	43 (72.9)*
Q31 Adequacy of bladder scanner training	8.15 (2.47)	7 (11.9)	52 (88.1)*
Q32 Adequacy of training on using bladder scanner results	8.38 (2.03)	5 (8.3)	55 (91.7)
Q44 Influence of cognitive assessment in determining self-cauterization readiness	7.18 (2.47)	11 (18.3)	49 (81.7)
Behavior questions			
Q34 Adequacy of training on bladder scanner cleaning	8.68 (1.89)	3 (5)	57 (95)
Q39 Use of assessment of manual dexterity in decision-making	5.87 (3.27)	23 (38.3)	37 (61.7)
Q40 Influence of dexterity assessment on ability to self-catheterize	6.58 (2.99)	17 (28.3)	43 (71.7)
Q42 Using cognitive assessments in determining self-cauterization readiness	7.03 (3.15)	17 (28.3)	43 (71.7)
Q43 Using other discipline's cognitive assessments in determining self-cauterization readiness	5.51 (2.94)	28 (47.5)	31 (52.5)*

Note. UTI = urinary tract infections.

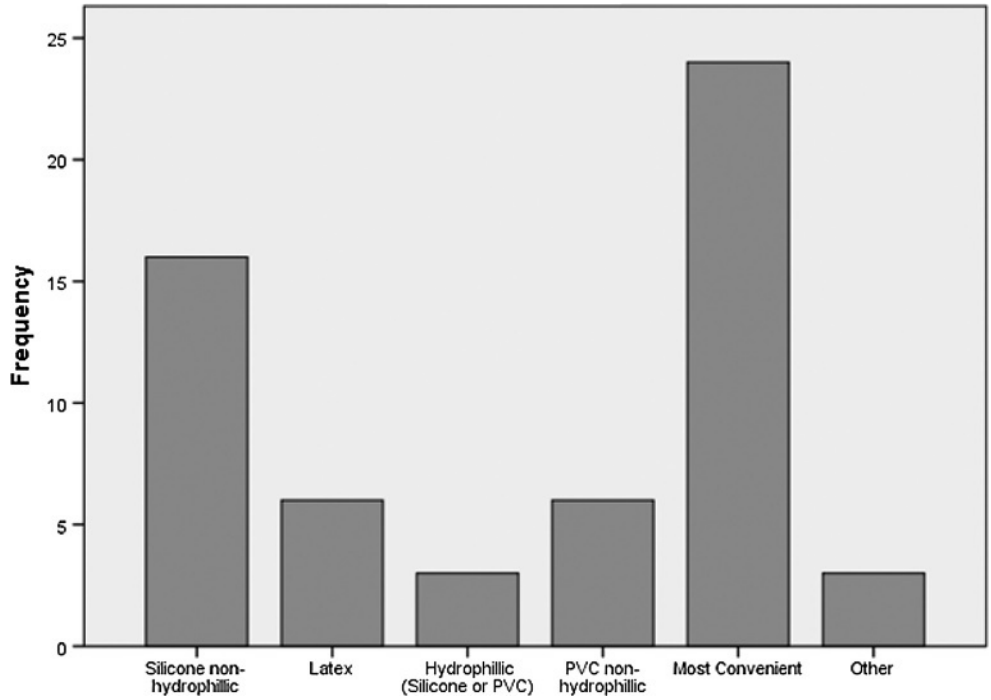

Figure 1. Catheter type.

geriatric hospitals regarding IC practices indicated nurses did not use appropriate techniques or perceive catheterization as placing patients at risk for infection.

Education for staff hand hygiene may be needed given the nurses' responses to how frequently they believed other nurses washed their hands before performing IC. Research supports that routine handwashing rates are universally low (Allegranzi & Pittet, 2009; Erasmus et al., 2010) and that clinicians overestimate their own compliance (O'Boyle, Henly, & Larson, 2001). In examining

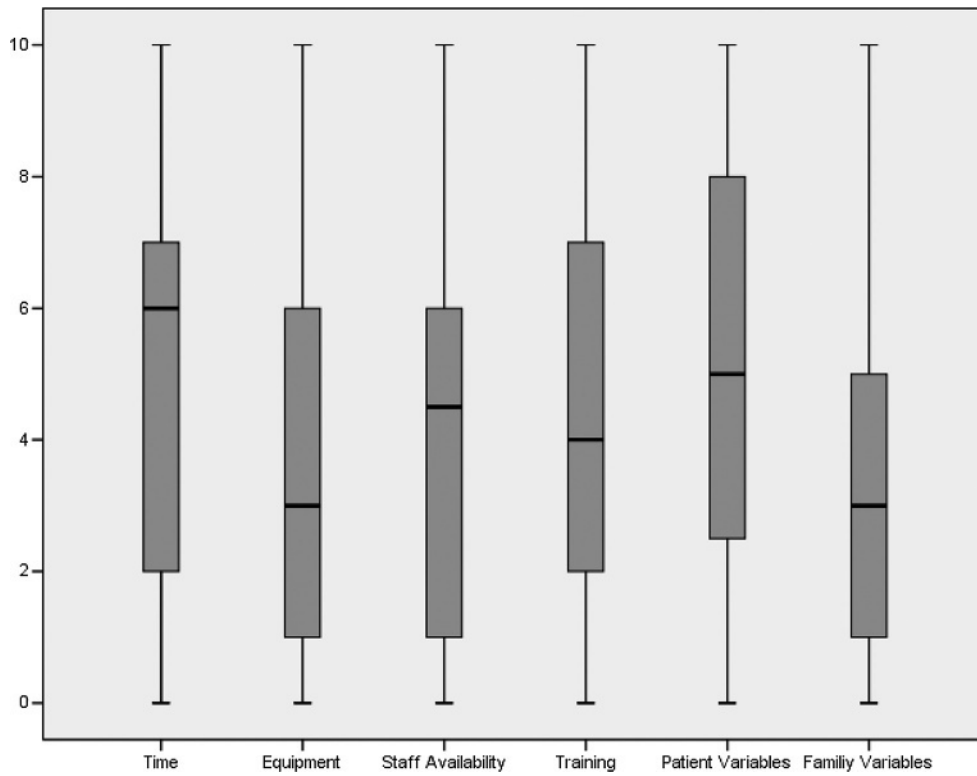

Figure 2. Barriers for using standardized technique for intermittent catheterization.

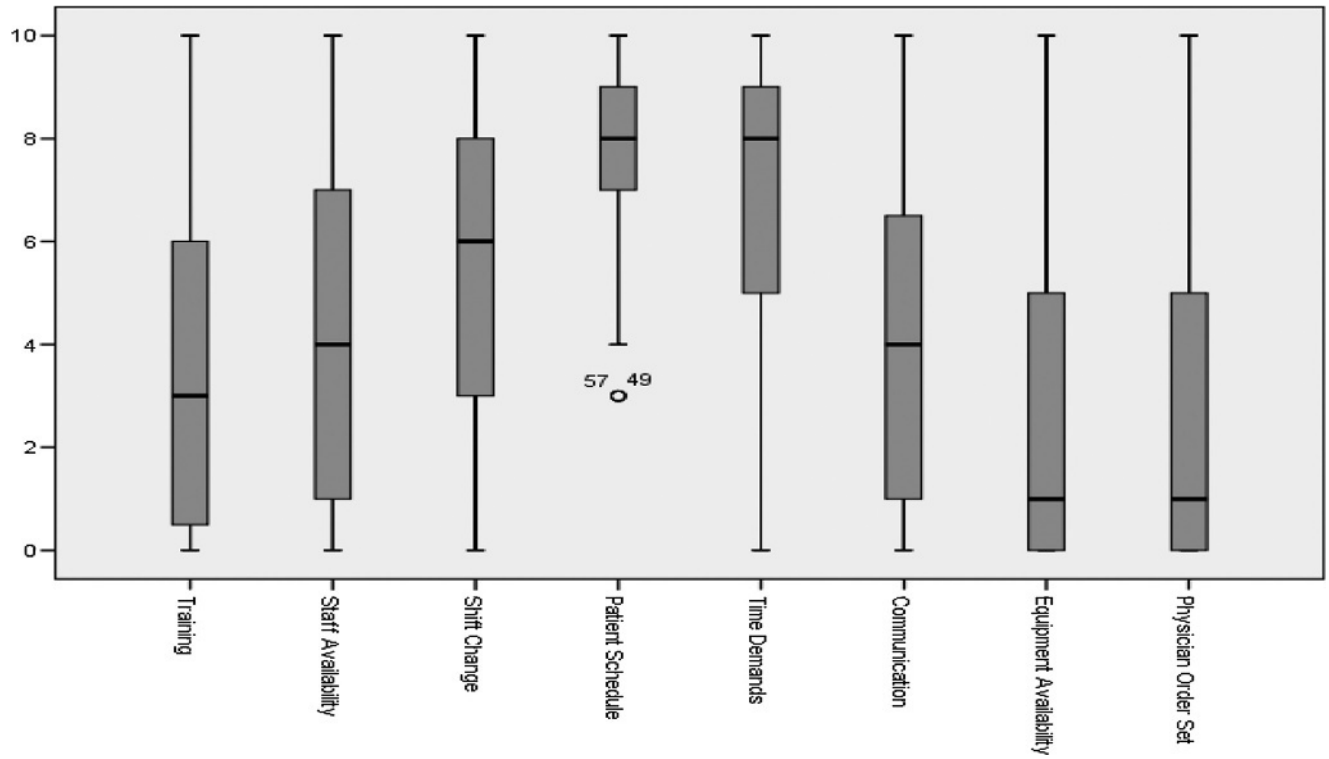

Figure 3. Barriers to performing intermittent catheterization regularly.

the survey results, there were some nurses who did not believe that using bladder scanners, a recommended practice in the HICPAC (Gould et al., 2009) guideline, was helpful in preventing UTI. Palese, Buccini, Deroma, and Barbone (2010) conducted a meta-analysis demonstrating that use of a bladder scanner to monitor bladder urinary volume prevented unnecessary catheterization, thus decreasing the risk for UTI. Although the rehabilitation nurses in this study were satisfied with their education, ongoing education that emphasizes handwashing, proper IC technique, and use of the bladder scanner for preventing infection is an important recommendation from national guidelines (Gould et al., 2009).

Rehabilitation nurses in this survey reported they did not search or use current evidence for IC and for preventing UTI. Multiple studies identify that nurses, while having a positive attitude about evidence-based practice, have difficulty accessing evidence due to workload and lack of knowledge (Duffy et al., 2015; Majid et al., 2011; White-Williams et al., 2013). Rehabilitation nurses need ongoing education about the importance of evidence-based practice, easily accessible evidence linked to the electronic health record, and support for using evidence in their practice.

Most nurses were aware that the catheterization standard available through the Elsevier's Clinical Skills was the organization's standard of care; however, 45% of the nurses found that the online standard was not helpful and that they did not use it to guide their practice. The nurses indicated they primarily asked experienced nurses when they had nursing procedure questions. Commercially available online nursing skills references offer many advantages for organizations including providing regularly updated evidence-based standards while decreasing the time nurses spend developing unit and organizational policies and procedures. However, although the online policy for bladder catheterization in this study provided nurses with general information, it did not give specific guidance for rehabilitation patients. For instance, the catheterization standard described the use of sterile technique for catheter insertion necessary in acute care, whereas rehabilitation nurses participating in the survey used clean technique as supported in the literature (Gould et al., 2009; Newman & Willson, 2011).

In addition, the Elsevier's Clinical Skills did not recommend how to select a catheter for IC based on patient need, identify the needed materials for IC, or discuss techniques that reduce UTI specific to IC. Thus, it is important that rehabilitation nurses participate in selecting the commercially available online standard systems for their organization and work with companies to incorporate rehabilitation nursing practice guidelines into their product. In addition, the rehabilitation nurses did not believe they had adequate education for using the online standard system, such as how to access the resource, find the appropriate standard, and use other aspects of the system. Education about the use of the online standard system is therefore essential.

The nurses identified that the greatest barriers to regularly performing IC and thus preventing high PVR were the nurses' time and patients' schedules, which are not unique issues on the rehabilitation unit. Methods for coordinating patient schedules are important for efficiency and ensuring regularly scheduled catheterization. Studies (Athlin, Idvall, Jernfält, & Johansson, 2010; Moore & Price, 2004; Strand & Lindgren, 2010) regarding pressure ulcer prevention also indicate that patient factors (e.g., patient acuity, ability to participate in care, availability) and nurses' time negatively affect the use of prevention strategies. Similarly, infection control studies also identify nurses' time as a barrier to following guidelines (Seibert, Speroni, Oh, DeVoe, & Jacobsen, 2014a, 2014b).

Although catheter selection is dependent upon clinical judgment combined with patient preference, availability and location of equipment in this study were the primary determinants for selection, which is like findings in other studies (Girard et al., 2015; Lugtenberg et al., 2010). In addition, Girard et al. found that equipment was not uniformly distributed across units. Improving the location and distribution of catheters on rehabilitation units decreases nursing time for obtaining equipment and ensures appropriate catheter selection.

Patient education for self-catheterization is dependent upon patient ability to understand instruction and manually perform the task (Seth, Haslam, & Panicker, 2014). Most nurses in the survey reported using nursing assessments in making decisions about how to educate and support patients. However, results indicated that nurses did not use other team members' assessments regarding cognition, manual dexterity, and strength for determining patient readiness. These results may indicate that nurses have little time to read documentation and communicate with the team about patient abilities. Rehabilitation team meetings should incorporate discussions about patient readiness for self-catheterization based on assessments from various disciplines.

Limitations

Sample size for the PCA was smaller than the preferred samples reported in the literature (Costello & Osborne, 2005; MacCallum et al., 1999); therefore, a confirmatory factor analysis is needed on a larger sample to ensure stability of the three KAB factors. The behavior scale requires further development due to lower internal consistency compared to the other two scales. Because the ANW location predicted attitude scores, generalizing the attitude score as reflective of the nurses across the three locations may not be appropriate. Because the education level of all nurses returning the surveys was not predictive of attitude scores, it appeared that education differences in the attitude scores were more likely due to location.

This study measures nurse perception about their competence in preventing UTI in people receiving IC. Competency requires observation and rating of actual performance; thus, perception of competency should be correlated with actual patient rates of UTI to determine the relationship of nursing practices with prevention. This study also did not address methods of teaching patients and their families in self-catheterization that prevent UTIs.

Recommendations

Recommendations for preventing UTI in patients with neurogenic bladders receiving IC:

- Reinforce knowledge regarding the root cause of UTI to support clinical judgment.
- Educate nurses about current evidence-based national guidelines for IC.
- Involve rehabilitation nurses in selecting online nursing standard systems for their organization ensuring availability of appropriate rehabilitation practice standards.
- Provide education for accessing and using an online system for nursing standards.
- Mandate nurses to wash their hands before and after IC through learning/coaching.
- Provide adequate time for nurses to provide IC care and collaborate with the rehabilitation team.
- Coordinate patient schedules to facilitate regular IC (4–6 times/day preventing high PVR).
- Provide nurses education about bladder scanner use and equipment sanitization.
- Collaborate with the rehabilitation team to determine patient readiness for self-catheterization.
- Adequately stock catheter supplies in convenient locations for staff.

Summary

The survey supported the need for ongoing and specific education about the root cause of UTI for patients with neurogenic bladders receiving IC, guidelines for prevention, and procedures for IC and using the bladder scanner. The KAB associated with UTI prevention competence did not vary by experience nor by shift. The potential response bias of work location confounded the difference in the UTI prevention attitudes between nurses educated at the associate and baccalaureate levels. Accessibility and availability of supplies were barriers to using the most appropriate catheters. Nurses having insufficient time for enabling IC to occur regularly and to collaborate with rehabilitation team members were another important barrier. Strategies were recommended to address enhancement of the nurses' KAB regarding UTI prevention.

Key Practice Points

- The UTI KAB survey provides an evidence-based approach for understanding rehabilitation nurses' approach to UTI prevention.
- Availability drove catheter selection for 41.4% of surveyed nurses.
- Clinical judgment can be improved through education on the controllable causes of UTI.
- Evidence-based strategies were not used by nurses to support prevention of UTIs during intermittent catheterization.

Acknowledgment

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