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Self-care Management Questionnaire for Long-term Indwelling Urinary Catheter Users

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Abstract

Aims—Self-management is believed to be an important behavioural capacity in people with chronic illness, and self-efficacy is an important component contributing to self-management. Two new and related measures for urinary catheter self-efficacy (C-SE) and self-management (C-SMG) were developed based on existing tools and tested for psychometrics for use in a randomized clinical trial (RCT) teaching urinary catheter self-management.

Methods—The instruments were evaluated at baseline (intake face to face interview) with 202 persons and with 158 of the same individuals six months later by telephone interviews. Exploratory factor analysis was conducted in an iterative process related to items' theoretical and statistical appropriateness. To assess construct validity and goodness of fit for model testing, confirmatory factor analysis was conducted with the samples at intake and 6 months. Also, bivariate analyses were conducted of the measures in relation to each other.

Results—Both scales were modified reducing the items to 13 in each, with four factors in C-SE and three factors in C-SMG. Reliability testing (Cronbach's alpha) was viewed as satisfactory for both scales, though some of the subscale (factors) reliabilities were lower in the self-management measure. Confirmatory factor analysis was adequate. Correlation of the two instruments (r= .25, p< 001) suggests that they are related scales.

Conclusion—With a change in the C-SMG scale from 3- to 5-level responses and subsequent testing, both new scales are appropriate for use separately or together as a questionnaire related to catheter self-care management in intervention research with long-term indwelling urinary catheter users.

Keywords

measurement; instrument; self-management; self-monitoring; urinary catheterisation

Introduction and Background

An indwelling urinary catheter is often used by people with persistent urinary retention caused by neurogenic bladder or an obstruction interfering with bladder emptying. While

intermittent catheterisation (IC) several times a day is the primary bladder emptying method of choice, persons who lack hand dexterity or a caregiver to assist might need an indwelling catheter. Bathroom access can also be difficult for some people performing IC, particularly for women who transfer to the toilet.

Behavioural approaches could be of benefit in clinical trials designed to address persistent catheter-related problems. Self-efficacy, a part of self-management capacity, measures confidence to perform specific behaviours. The construct has been well studied and is known to be a powerful predictor of behavioural change.[1] Self-management is a broad construct in which health care professionals support patients toward their self-care to identify problems, make decisions, and take appropriate actions.[2] Awareness and self-monitoring are presumed to be iterative and key components of self-management,[3] which also includes a feedback loop to self-efficacy[2] (see Figure 1). That is, the more *useful* self-management behaviours are, the more self-efficacy or confidence related to specific behaviours the person is likely to attain, which could in turn improve self-management behaviours.[4,3]

Development of the New Index of Catheter Self-Care Management

In general, indwelling urinary catheter users are not given sufficient tools to self-manage, and many learn by trial and error. The current study reported herein is a nested study within a randomized clinical trial (RCT) to develop and test measures for use in a new indwelling catheter self-management intervention with the goal of increasing long-term catheter users' catheter-related self-efficacy (confidence) and self-management skills. The intervention was guided by Self-efficacy Theory,[1] which "reflects a capacity to organize and integrate cognitive, social, and behavioural skills to meet a variety of purposes".[4,p.142]

The parent study (RCT) intervention involved three home visits with a trained study nurse, two visits in the first month, and a booster at four months. The experimental group participants were taught to self-monitor urine flow using a 3-day urinary diary and an educational booklet. Individualizing to their needs, and based on our pilot study,[5] a focus of the intervention was for participants to consume optimal and consistent levels of fluid and to prevent accidental dislodgement of the catheter. The control group received only their usual care, most often through a home care agency or urological clinic. It was hypothesized that the intervention would have a direct effect on catheter self-management, as well as indirectly through enhanced self-efficacy upon outcomes of catheter-associated urinary tract infection (CAUTI), blockage, and accidental dislodgment.[6]

Participation in the parent study lasted 12 months, and 74% (N=150) completed the full study. Fifty-six percent used a urethral catheter and 44% had a suprapubic catheter, the range in age was 19-96, and 51% were men. Ethics approval was obtained for the study, which took place between September 2008 and August 2012. The manuscript reporting the group difference assessment is currently in press.

Our purpose in this paper is to propose a new Urinary Catheter Self-Care Management Questionnaire which includes two scales , i.e., of indwelling urinary catheter self-efficacy (C-SE) and self-management (C-SMG) for use in research and practice with people using long-term indwelling urinary catheters.

Methods

The Self-efficacy and Self-management measures were assessed as a part of the parent study RCT at baseline (prior to randomization, N=202) and at six months (N=158), and the data in this report are from these time points.

Pilot of New Measures

Prior to conducting the RCT, a pilot study was conducted to establish recruitment and assessment protocols. The Catheter Self-efficacy Scale was not included in the pilot study, but was developed for the RCT. The Catheter Self-Management Scale was developed and tested as part of the pilot study and further evaluated in the RCT.

Catheter Self-Management Scale (C-SMG)—The initial items for the C-SMG were based on our pilot study using the Urine Flow Questionnaire (UFQ), which was tested at baseline and six months with 11 long-term catheter users.[5] The UFQ was based on relevant literature and the research team's previous research (qualitative and descriptive studies involving direct contact and interviews with catheter users)[5, 7-9] to measure aspects of urine flow. It consists of three subscales with eight items each for constructs of awareness, self-monitoring, and self-management behaviours. The 24 items were related to: fluid intake including caffeinated drinks, urinary output, catheter blockage, CAUTI, emptying of drainage bag, and blood in the urine. The Awareness subscale consists of dichotomous (yes/no) items measuring a patient's awareness (i.e., noticing or perceiving) of various urine flow properties and patterns. The Self-monitoring subscale pertains to observations and periodic measurements related to urine flow. The Self-management behaviours subscale was designed to measure self-care activities or behaviours to promote optimal urine flow and fewer catheter-related problems. A 5-point Likert scale was used for the latter two subscales, with responses of "strongly agree" to "strongly disagree".

Content validity ratings were obtained from three experts (two internationally known nurse researchers and one urologist with expertise in urinary catheter management). Items were scored: 1 Not Relevant; 2 Unable to assess or in need of such revision it would no longer be relevant; 3 Relevant, needs minor revision; or 4 Very relevant and succinct. 99% of the items were scored as 4, did not need revision. Minor changes were made as suggested. All of the pilot study participant responses at baseline and six months were recorded by two of the authors in face-to-face interviews. Participants did not seem to have any difficulty understanding the questions or the word choices. Cronbach alphas for internal consistency reliability were 0.64, 0.71 & 0.73 for awareness, self-monitoring, and self-management, respectively at six months.[5]

Testing the Scales in the RCT

Urinary Catheter Self-efficacy Scale (C-SE)—The C-SE scale was based on an adaptation of the Stanford Self-Efficacy Chronic Disease (SSCD) measures. [4, 10] All items were modified slightly from the SSCD to reflect the population, for instance by substituting the word "catheter" for "disease" and by including "nurse" with "physician." There were 15 items in our new Catheter Self-efficacy Scale, with 4 sub-scales: Communicate with Physician/Nurse (3 items), Manage the Catheter in General (3 items), Manage Symptoms

and Problems (2 items), and Perform Self-management (7 items). Reliabilities for the Stanford-based scales in their *original formats* were: 1) 0.73 internal consistency for Communicate with Physician/[Nurse] and 0.89 for test/retest; 2) 0.87 internal consistency for Manage the Disease (Catheter) in General with 5 items and 3) 0.91 internal consistency and 0.89 test/rest for Manage Symptoms and Problems with 4 items.[4] Perform Self-management is a new subscale we added related to drinking fluids with 4 items and preventing dislodgement with 3 items. These items did not have a preliminary reliability score because self-efficacy was not addressed during the pilot study. The content for this subscale (Perform Self-management) was based on the pilot study results in which attention to fluid intake and preventing dislodgement were viewed by study participants as the most valuable parts of the intervention.[5] Items reflect increases in complexity of behaviours and in varying situations to better assess self-efficacy development. An example item is: "How confident are you that you can……drink adequate fluids, in a consistent way, throughout the day?" Scoring for all C-SE items used a 10 point Likert-type scale, with anchors of 1 = "not at all confident" and 10= "totally confident"; higher scores indicate more self-efficacy.[4]

Catheter Self-management Scale (C-SMG)—Items for the RCT involved use of a new 31 item instrument which was based on the 24 items tested in the pilot study's Urine Flow Questionnaire (UFQ) with the same constructs of: Awareness, Self-monitoring, and Self-management.[11] While we realized that the 24 items were somewhat overlapping, we wanted to be sure to have a full set of questions related to each of the three constructs from the UFQ prior to refining the questionnaire through factor analysis. Seven items related to quality of life and catheter pain were added to the UFQ to make the new C-SMG with 31 items. Our item responses were somewhat similar to those of the Stanford program and used a five point scale estimating frequency of the behaviour: 0= do not do this, 1= monthly or less often, 2 =several times a month, 3=weekly, 4= several times a week, 5=several times a day or daily; however, we collapsed the scale to make it more user-friendly in a simplified ordinal scale with 3 categories: 1=not at all, 2=sometimes, and 3=most or all of the time. An example of an item with the initial stem is: I want you to tell me how often you do these activities, if at all: Keep track of fluid intake amount by writing it down or thinking about it.The choices are: 1=not at all, 2=sometimes or 3=most or all of the time. [8]

Procedures and Data Analysis—Data were collected from our initial intake face-to-face home interviews with 202 trial participants, and with 158 of the same individuals six months later through telephone call interviews. Electronic data collection made it possible for the data analyst (one of the co-authors) to view all data for completeness or scoring which might mean a question was unclear. Also as a part of the parent study, monthly phone calls were conducted with the two study interviewers, and "problem logs" were used to reconcile any responses that were unclear or confusing. There were no problems identified related to either of the two scales.

Using these data, exploratory factor analysis (EFA) was conducted by the research team in an iterative process which involved several discussions of items both theoretically (appropriateness to most catheter users and quality of life issues) and statistically (cross loadings, stability over time). Means and SDs were used to determine variability of items.

Also, subscale alphas were examined to determine the best fit after removal of items with low factor loadings.

1. For the self-efficacy scale, two items were removed due to low factor loadings: “Pay attention to the urine throughout the day (color, clarity, sediment, etc.)” and “Do the different tasks and activities needed to manage your catheter to reduce your need to see a doctor or nurse,” leaving 13 items.
2. For the self-management scale, in the process of exploratory factor analysis we recognized that there was more overlap in items (both conceptually and statistically) than anticipated and the self-management scale seemed to be excessively redundant related to constructs of awareness, self-monitoring and self-management. Therefore through an iterative process of analysis and discussions the team decided to remove 18 items. 13 items were left: 7 related to awareness and self-monitoring and 6 related to self-management behaviours.
3. To assess construct validity and goodness of fit for model testing, confirmatory factor analysis (CFA) was conducted with the samples at intake and 6 months. We also examined the correlation between the two scales.

Results

A catheter-related self-efficacy scale (C-SE) and a catheter self-management scale (C-SMG) were developed and tested for psychometrics for use in our parent study research to teach long-term urinary catheter users’ self-management skills. Together the two scales, i.e., self-efficacy and self-management, address related constructs believed to be essential to catheter self-care.[6]

Urinary Catheter Self-efficacy Scale (C-SE)—In exploratory factor analysis, a four factor solution with 13 items worked best for both Intake and 6 months’ data: Communication, Prevent Interference with Daily Activities, Prevent Dislodgement, and SE Fluid Intake. Table 1 shows the Intake data (N=202) means (SDs), factors (subscales) identified during EFA, reliabilities for each subscale, and correlations of items to subscales and to the full measure. All of the reliabilities were viewed as satisfactory. The Cronbach’s alpha for the 13 item scale was 0.89, and factors ranged from 0.76-0.88. Related to CFA, the following results suggest that, though not perfect, construct validity is adequate for the measure. Confirmatory factor analysis tests included: CFI (comparative fit index) 0.93; TLI (Tucker-Lewis Index) 0.94; RMSEA (root mean square error of approximation) Estimate 0.07; 90 % C.I.= 0.05, 0.09, Probability <= .05 is 0.03; and the SRMR (Standardized root mean square residual) Value = 0.05.

Catheter Self-Management Scale (C-SMG)—A three factor solution with 13 items worked best for both Intake and 6 months’ data: Communication, Prevent Catheter Problems, and SMG Fluid Intake & Output. Table 2 shows the Intake data (N=202) means (SDs), factors (subscales) identified during EFA, reliabilities for each subscale, and correlations of items to subscales and to the full measure. Reliability testing (Cronbach’s alpha) was viewed as satisfactory for the full scale at 0.82. Subscales were somewhat lower, ranging from 0.54-0.76. Confirmatory factor analysis showed adequate results: CFI

(comparative fit index) 0.92; TLI (Tucker-Lewis Index) 0.90; RMSEA (root mean square error of approximation) Estimate 0.05, 90 % C.I. = 0.03, 0.03, Probability <= .05 is 0.36; and the SRMR (Standardized root mean square residual) Value = 0.06. Correlation of the two instruments (Pearson's r= .25, p< 001) suggests that they are related scales.

Discussion

Main Results—EFA and CFA were useful in developing parsimonious scales for urinary catheter self-efficacy (C-SE) and self-management (C-SMG). The positive correlation between the two scales suggests that they are related.

Strengths and Limitations—For strengths, the UFQ, upon which the C-SMG is based, was: 1) developed from qualitative and descriptive research findings in long-term (indefinite) catheter users, 2) validated for content by three experts, and 3) tested in pilot research. For the C-SE, we added 7 items (related to fluids and dislodgment) which were based on the content of the UFQ and the 8 other items of C-SE involved well validated sub-scales from the Stanford measures. Both the C-SE and the C-SMG were subject to rigorous exploratory and confirmatory factor analysis.

However, we acknowledge that we did not ask indwelling urinary catheter users for their feedback during the pilot study on the language and meaning of each item in the original UFQ. In addition, no catheter users or experts were consulted about the final C-SMG questionnaire. These are limitations of the study.

Nonetheless, our expert reviewers had provided feedback on the UFQ for the pilot study in relation to content and word choice, so any changes that were suggested were made to those items prior to the pilot study. Since two of the authors conducted all the interviews during the pilot and had not noted any time in which questions were not understood, we did not alter the UFQ' s 24 items as we created the C-SMG for the RCT.

Importantly, our analysis identified a measurement limitation in how we developed the Urinary Self-management Scale. We had decreased the response options to three (1=not at all, 2=sometimes, and 3=most or all of the time) believing that this change might make responses more realistic for study participants, and we presumed enough variability overall for the 30 item scale. However, this change might have reduced variability in the item response scale due to using a 3-point response and might have contributed to the observed low reliability estimates for the sub-scales. While there were no ceiling effects, most items were scored either 2 or 3, making the measurement close to dichotomous. However, the full C-SMG scale with the 3-point response demonstrated adequate construct validity and reliability. Further research will be necessary to evaluate whether changing the response set to the original Stanford 5 point scale will improve the psychometric properties of the instrument.

Findings in Context of Previous Research/Literature—There are no other known measures related to indwelling urinary catheter self-efficacy or self-management. This area of research has had little attention, and these two tools in this new questionnaire could help facilitate further research in this vulnerable population.

Meaning of Study—The new measure for Urinary Catheter Self-efficacy (C-SE) performed adequately and with stability during the testing at Intake and 6 months later. Reliabilities (alphas) and model testing with CFA suggest that the measure can be used in research with long-term indwelling urinary catheter users. For urinary catheter self-management (C-SMG), psychometric testing suggests that the scale has initial reliability, particularly as a full scale of 13 items. The communication sub-scale alpha of 0.54 is considered inadequate and lower than the Stanford similar sub-scale of 0.73 for communication; [4] however, the intake and output subscale of 0.76 is more robust. CFA indicates that construct validity, though not perfect, is adequate.

Implications for Practice and Future Research—Test-retest reliability was not included in our development of measures; nor has there been an assessment of sensitivity to change. Both assessments would strengthen the new measures for future use.

The lack of variability in the C-SMG due to the 3-level item response option suggests that the scale be re-evaluated with a 5-point scale prior to use in research or practice. After such modification, the measures could be used in research related to catheter self-care management together or separately (Table 3; full scales).

Structured equation modelling is currently in progress related to testing key variables within each scale and how they impacted main study outcomes in relation to the parent study (RCT). Latent variables identified as factors during our testing could be evaluated with other variables believed to be related theoretically, such as those related to fluids. The new scales or sub-scales could be useful in assessing patients' need for intervention, evaluating intervention treatment effect on self-efficacy/ self-management behaviours and/or could possibly be useful in predicting catheter related outcomes such as catheter-associated urinary tract infection, catheter blockage, or accidental dislodgement.

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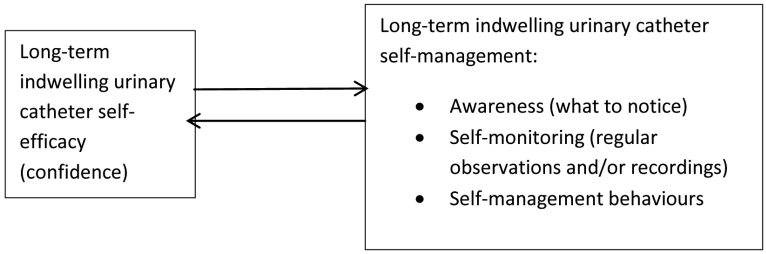

Figure 1.
Long-term indwelling urinary catheter self-efficacy and self-management

Table 1

Catheter self-efficacy sub-scale (C-SE) for intake data (N=202)

Items and Cronbach's alpha of subscales (full scale Cronbach's alpha = 0.89) Stem: How confident are you to … ? (scale 1-10)	**Means**	**SD**	**Item to sub scale r**	**Item to full scale r**
Communication (Cronbach's alpha=0.83)				
SE8: Ask your doctor or nurse things about your catheter that concern you	8.93	1.99	0.79	0.60
SE9: Discuss openly with your doctor or nurse any personal problems that may be related to your catheter	9.15	1.76	0.88	0.67
SE10: Work out differences with your doctor or nurse when they arise	8.96	1.86	0.84	0.68
SE15: Judge when the changes in your catheter mean you should contact a doctor or nurse	8.86	1.91	0.75	0.59
Prevent Interference with Daily Activities (Cronbach's alpha=0.88)				
SE11: Keep any physical discomfort or pain related to the catheter from interfering with the things you want to do	7.86	2.42	0.90	0.72
SE12: Keep the emotional distress caused by your catheter from interfering with the things you want to do	7.97	2.38	0.91	0.68
SE13: Keep catheter-related symptoms or problems (such as leakage, blockage or UTI) from interfering with what you want	7.65	2.36	0.89	0.66
Prevent Catheter Dislodgement (Cronbach's alpha=0.85)				
SE5: Keep the catheter secured or tied down so that it does not get pulled	8.42	2.33	0.84	0.70
SE6: When transferring, keep the catheter from becoming caught onto something and being pulled out	8.50	2.13	0.91	0.71
SE7: Keep the catheter and tubing from having kinks or twists in it	8.43	2.15	0.89	0.72
Fluids (Cronbach's alpha=0.76)				
SE1: Drink adequate fluids throughout the day	8.57	1.91	0.84	0.62
SE2: Make changes in fluids related to activity, temperature and travel	8.15	2.22	0.84	0.61
SE3: Keep intake of water and caffeine to a level that's good	8.45	2.05	0.78	0.62

Table 2

Catheter self-management Scale (C- SMG) Intake data (N-202)

Items and Cronbach's alpha of subscales (full scale Cronbach's alpha = 0.82) Stem: Do you do this….? (Scale 1-3)	Means	SD	Item to subscale correlation	Item to full scale correlation
Intake and Output (Cronbach's alpha = 0.76)				
SMG1: Pay attention to amount of fluids consumed	2.28	0.84	0.76	0.62
SMG2: Keep track of fluid intake	1.85	0.89	0.77	0.59
SMG4: Pay attention to types of fluids	2.46	0.77	0.71	0.53
SMG9: Keep track of information about urine	2.34	0.83	0.66	0.57
SMG10: Make changes in types and amounts of fluids depending on urine	2.37	0.82	0.68	0.63
Prevent catheter problems (Cronbach's alpha = 0.64)				
SMG11: Watch to be sure catheter positioned correctly	2.79	0.52	0.61	0.43
SMG15: Make sure urine bag and tubing are positioned correctly	2.85	0.46	0.52	0.36
SMG17: Pay attention to early signs of UTI	2.58	0.72	0.78	0.53
SMG18: Pay attention to early signs catheter blockage	2.40	0.84	0.82	0.63
Communication (Cronbach's alpha = 0.54)				
SMG20: Ask the healthcare provider to make changes in catheter management	1.95	0.89	0.63	0.47
SMG25: Plan for going out of the house by knowing where bathrooms are and how to empty the bag.	1.89	0.90	0.69	0.51
SMG28: Talk with other people to get support when the catheter is causing problems.	1.90	0.89	0.67	0.45
SMG31: Ask for pain medication after a catheter change if needed.	1.46	0.74	0.59	0.31

Table 3

Final scales & Intersection of Constructs for Urinary Catheter Self-Management Index

Urinary Catheter Self-Management Index	
Catheter Self-efficacy Scale	**Catheter Self-management Scale**
Communication (4 items)	Communication (4 items)
SE8: Ask your doctor or nurse things about your catheter that concern you	SMG20: Ask the healthcare provider to make changes in catheter management
SE9: Discuss openly with your doctor or nurse any personal problems that may be related to your catheter	SMG25: Plan for going out of the house by knowing where bathrooms are and how to empty the bag.
SE10: Work out differences with your doctor or nurse when they arise	SMG28: Talk with other people to get support when the catheter is causing problems.
SE15: Judge when the changes in your catheter mean you should contact a doctor or nurse	SMG31: Ask for pain medication after a catheter change if needed.
Prevent Interference with Daily Activities (3 items)	Prevent Catheter Problems (4 items)
SE11: Keep any physical discomfort or pain related to the catheter from interfering with the things you want to do	SMG17: Pay attention to early signs of UTI
SE12: Keep the emotional distress caused by your catheter from interfering with the things you want to do	SMG18: Pay attention to early signs catheter blockage
SE13: Keep catheter-related symptoms or problems (such as leakage, blockage or UTI) from interfering with what you want	
Prevent Dislodgement (3 items)	
SE5: Keep the catheter secured or tied down so that it does not get pulled	SMG11: Watch to be sure catheter positioned correctly
SE6: When transferring, keep the catheter from becoming caught onto something and being pulled out	SMG15: Make sure urine bag and tubing are positioned correctly
SE7: Keep the catheter and tubing from having kinks or twists in it	
SE Fluid Intake (3 items)	SMG Fluid Intake & Output (5 items)
SE1: Drink adequate fluids throughout the day	SMG1: Pay attention to amount of fluids consumed
SE2: Make changes in fluids related to activity, temperature and travel	SMG2: Keeps track of fluid intake
SE3: Keep intake of water and caffeine to level that's good	SMG4: Pay attention to types of fluids
	SMG9: Keep track of information about urine
	SMG10: Make changes in types and amounts of fluids depending on urine

The authors allow use of these new instruments and request only that persons who revise or test them share that information afterward.