

## PROSPECTIVE STUDY OF LONG-TERM URINARY CATHETER USE

### Hypothesis / aims of study

Little is known about the distribution, severity, and management of catheter-related problems in people with long-term indwelling urinary catheters. The specific aims were to: (1) determine the incidence and distribution of catheter-related problems in long-term indwelling urinary catheter users (urethral and suprapubic); (2) assess appropriateness of catheter use; and (3) examine relationships among catheter complications and catheter care practices.

### Study design, materials and methods

**Design:** This prospective repeated measures study in the United States involved self-reported data collection at intake, 2, 4, and 6 months to describe catheter practices in long-term urinary catheter users and their catheter-related problems. Two arms were used for sampling: a home care agency with 10 individuals and the Internet with 33 people having spinal cord injury. Self-reported data collection involved a combination of home interviews, telephone calls and an Internet survey. Participants (and/or caregivers) also kept track of catheter problems on a written log, and observed and recorded urine output for three days at baseline, 2, 4, and 6 months.

**Materials and methods:** Questionnaires involved demographics and background information, catheter care, catheter problems, and catheter-related quality of life. Home visit and follow up telephone call interviews were used with the home care agency. A university supported website was used to advertise the study to persons with spinal cord injury; this site was linked to other websites for people with spinal cord injury. Questionnaires were self-administered through a commercial Internet survey hosting service, and communication was through email, telephone, and postal mail. There was a 97% completion rate for both sites. A home care audit comparing self reported data indicated an accuracy rate 97% (n= 10).

**Statistical data analysis:** All within-subjects observations were pooled for the 43 subjects, providing over 160 observations over the four time points. Multiple linear regression was employed using general estimation equation (GEE) techniques to adjust for within-subject correlations. Models involved Poisson regression to accommodate count data. Analyses were performed using SAS version 9.1.

### Results

**Catheter related complications:** Controlling for age, gender, months with catheter, and catheter type (urethral or suprapubic), catheter size predicted urinary tract infection ( $\beta = 0.20$ ,  $p < .00$ ), and significant covariates included female gender ( $\beta 0.73$ ,  $p=0.04$ ) and younger age ( $-\beta 0.02$ ,  $p= 0.01$ ). Sediment in the urine the day of the survey predicted catheter blockage during the previous two months ( $\beta .93$ ,  $p= .02$ ), and shorter time with a catheter was a significant covariate ( $\beta -0.005$ ,  $p= .01$ ). Additional analyses, including only covariates of age, gender, catheter months, and catheter type, indicated that younger people and those using the catheter for a shorter period of time had more blockage ( $\beta -0.03$ ,  $p=.05$ ;  $\beta 0.006$ ,  $p< .00$ ). Older people also had better quality of life ( $\beta 0.008$ ,  $p=<.00$ ) and those using the catheter for less time had a better quality of life ( $\beta -0.001$ ,  $p= .01$ ). Female gender was the only predictor of CAUTI, with a trend toward significance ( $\beta 0.56$ ,  $p= 0.09$ ).

Incidence of all catheter related complications were higher than expected (see Table 1). The catheter associated UTI rate of 8.4/1000 catheter days was higher than the rate of previous studies of 2.8-4.2/1000 catheter days which combined both short and long term users. Catheter associated UTI (CAUTI) was defined as symptomatic UTI with presence of at least one urinary symptom and treatment with an antibiotic. Seventy percent had CAUTI in the eight months of the study, and 23% had 1 episode, 37% had 2-4, and 9% had 5-10 episodes.

Table 1. Frequencies of events and percentages of people who had catheter complications by two month periods and overall for eight months.

Complication	Intake # events/% (n=43)	2 Month # events/% (n=42)	4 events/% (n=41)	Month#6 events/% (n=41)	Month#Overall # events/% (n=43)
Blockage requiring Nurse visit	11/12% (n=5)	28/14% (n=6)	18/5% (n=2)	17/10% (n=4)	74/23 % (n=10)
Blockage NOT requiring Nurse visit	83/28% (n=12)	78/49% (n=20)	45/44% (n=18)	67/44% (n=18)	273/63% (n= 27)
Leakage	180/47% (n=20)	135/48% (n=20)	250/39% (n=16)	121/46% (n=19)	686/74% (n=32)
Dislodged	3/.5% (n=2)	6/14% (n=6)	14/12% (n=5)	6/15% (n=6)	29/23% (n= 10)
UTIs	25/40% (n=17)	24/38% (n=16)	18/29% (n=12)	18/34% (n=14)	85/70% (n= 30)

**Sample description:** The study included 43 participants: 23 females and 20 males. Ages ranged from 23-91years of age (mean 49, median 46). There was some diversity in racial/ethnic backgrounds: (some with more than one race) 4 American Indian or Alaskan Native, 3 Black, 1 Asian, 39 White, 2 Hispanic. The sample as a whole had used an indwelling catheter between 2 and 589 months, with a mean of 11.7 years (141 mos.) and median of 8.8 years (106 mos.). Primary medical diagnosis included: 17 spinal cord

injury (SCI) complete, 14 SCI incomplete, 1 SCI unsure, 5 MS, 2 diabetes, 3 other neurological, and 1 pressure ulcer. Reasons for using the catheter included neurogenic bladder (23), incontinence (11), obstructed urine flow (3), and immobility (17). No one used the catheter for healing wounds, and no one used it for incontinence alone.

Catheter related demographics: The Internet sample with spinal cord injury were significantly younger than the home care sample with mixed diagnoses. The mean Internet age was 44, 95% CI= 40, 47 as compared with 67 years in home care, 95% CI= 56, 78 (p = .001). The Internet sample had also used a catheter for a significantly longer period of time with a mean of 14/median 12.1 years, 95% CI= 9.8, 18.2 as compared with a mean of 5.3/median 3.9 years, 95% CI= 2.9, 7.6 (p= .001). Urine output amounts were consistently higher for the Internet sample (overall means of 2296 vs. 1647mL. in home care), and significantly at Intake and 4 months. At intake urethral and suprapubic catheters were evenly distributed, with 23 and 20 respectively, and catheter size did not vary much over time. Suprapubic catheters were significantly larger Chi sq. (p <.000, df 6) at each time point with means of 20-21Fr. compared with 17 for urethral catheters. Only two individuals out of 23 with urethral catheters had sizes greater than 18, while 15 of 20 with suprapubic catheters had sizes greater than 18.

#### Interpretation of results

Catheter complications affected large proportions of catheter users, and incidence was higher than anticipated. In previous research, catheter size and female gender have been identified as a possible contributing to catheter associated UTI, and this study provides additional evidence. People with spinal cord injury were younger, used a catheter longer, and had higher urine outputs. A large number of catheter blockages were handled by the catheter user and caregiver.

#### Concluding message

Self-reported, prospectively collected data provided critical information on the extent and distribution of catheter related problems in long-term urinary catheter users. The Internet provided access to this population over a wide geographical area, and this method of data collection could be expanded to increase knowledge in this area.

<b><i>Specify source of funding or grant</i></b>	<b>Wound, Ostomy, and Continence Nursing Foundation, United States</b>
<b><i>Is this a clinical trial?</i></b>	<b>No</b>
<b><i>What were the subjects in the study?</i></b>	<b>HUMAN</b>
<b><i>Was this study approved by an ethics committee?</i></b>	<b>Yes</b>
<b><i>Specify Name of Ethics Committee</i></b>	<b>University of Rochester (NY) Research Subjects Review Board</b>
<b><i>Was the Declaration of Helsinki followed?</i></b>	<b>Yes</b>
<b><i>Was informed consent obtained from the patients?</i></b>	<b>Yes</b>