



# HHS Public Access

Author manuscript

*Urol Nurs.* Author manuscript; available in PMC 2017 March 21.

Published in final edited form as:  
*Urol Nurs.* 2013 ; 33(4): 194–200.

## Effect of Weight on Indwelling Catheter Use among Long-Term Care Facility Residents

**Holly C. Felix, PhD, MPA [Assistant Professor],**  
University of Arkansas for Medical Sciences, Little Rock, AR

**Jeffrey D. Thostenson, MS [Research Associate],**  
University of Arkansas for Medical Sciences, Little Rock AR

**Zoran Bursac, PhD [Associate Professor], and**  
University of Arkansas for Medical Sciences, Little Rock, AR

**Christine Bradway, PhD, RN, FAAN [Associate Professor of Gerontological Nursing]**  
University of Pennsylvania School of Nursing, Philadelphia, PA; and a member of the Urologic Nursing Editorial Board

### Abstract

This study examined the effect of obesity on the use of indwelling urinary catheters among long-term care facility residents and found initial increases in usage by weight category, which declined during the next 12 months.

### Keywords

Obesity; older adults; long-term care facilities; indwelling urinary catheters

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Long-term use of indwelling urinary catheters for urinary incontinence (UI) is not recommended (Centers for Disease Control and Prevention [CDC]/National Healthcare Safety Network, 2009; Centers for Medicare & Medicaid Services [CMS], 2005) because indwelling urinary catheters can increase the risk for urinary tract infections, urethral complications, bladder stones, and bladder cancer (Igawa, Wyndaele, & Nishizawa, 2008), as well as mortality (Landi et al., 2004). Nevertheless, their use can be considered for management of UI in very specific circumstances (see Table 1). However, overuse or inappropriate use of indwelling urinary catheters may occur (Doughty & Kisanga, 2010).

Long-term care facilities provide a range of medical and nonmedical services to individuals who need assistance with activities of daily living due to disability or chronic illness. Although long-term care can be provided in the home or other community-based settings, it is most often provided in long-term care facilities, such as nursing homes. After substandard care in longterm care facilities was documented in the mid-1980s, federal efforts to reform and monitor long-term care increased. These efforts included the development of a standardized resident assessment tool (the Minimum Data Set [MDS]) (see Figure 1) and a set of 24 quality indicators, one of which focuses on the prevalence of indwelling urinary catheters (Capitman, Leutz, Bishop, & Casler, 2005). Additionally, federal tags (F-tags) have been developed to provide care protocols for certain conditions. F-tag 315 provides detailed

guidance to longterm care facilities for the management of UI, including appropriate use and management of indwelling urinary catheters (Doughty & Kisanga, 2010).

The current national indwelling urinary catheter prevalence rate of 5% of long-term care facility residents (CMS, 2011) is within recommended thresholds, which range from 2.1% to 6.5% (Rantz et al., 2000). Certain longterm care facility residents, however, may be at risk for overuse of indwelling urinary catheters. Research has shown that obesity (body mass index [BMI] greater than or equal to 30) is associated with UI (Hunnskaar, 2008). Obese long-term care facility residents require significantly more assistance from staff for the performance of activities of daily living, including using the toilet (Felix, 2008). One long-term care facility staff member reported in a qualitative study on the provision of continence care for obese longterm care facility residents that “it’s more difficult for us [caregivers] ... it always takes two [nursing aides] to clean [the resident] up after every incontinent episode...” (Bradway, Miller, Heivly, & Fleshner, 2010, p. 125).

Because of staff burden to address UI among obese residents, we hypothesized these residents may be more likely to have an indwelling urinary catheter. At least one study that examined indwelling urinary catheters in long-term care facilities in five states found that those weighing 250 or more pounds were more likely to have an indwelling urinary catheter at admission, at quarterly assessments, and at one year (Rogers et al., 2008). However, this disparity in use is not regularly monitored, nor has it been recently examined. Given the rising rates of obesity among older Americans (Flegal, Carroll, Ogden, & Curtin, 2010), and the association between obesity and long-term care facility admission (Elkins et al., 2006; Valiyeva, Russell, Miller, & Safford, 2006), further examination of this issue is warranted, and it prompted the current analysis to assess differences in the utilization rates of indwelling urinary catheters among obese and non-obese long-term care facility residents.

## Methods

This study utilized a longitudinal cohort design that followed all older adults (65 years of age or older) admitted to any federally certified long-term care facility in Arkansas and resided there for at least one year.

## Data Source

Data were obtained from the Arkansas MDS. The MDS contains federally required assessment data on physical and mental health conditions, quality of life, and well-being (among other domains) of all residents in federally certified long-term care facilities in the United States (see Figure 1) (Wunderlich & Kohler, 2001).

## Variables

The dependent variables on indwelling urinary catheter use for quarters two, three, and four were created using the Quality Measures User’s Manual formula of long-term care facility residents with an indwelling urinary catheter in the numerator and all residents in denominator (Abt Associates, Inc., 2004). The indwelling urinary catheter quality measure formula excludes the admission assessment. Therefore, the indwelling urinary catheter-dependent variable at admission in quarter one used the response from the MDS question on

continence applications and programs (question H3) on the admission assessment. Section H of the MDS assesses bladder and bowel continence of long-term care facility residents in the 14 days prior to the date of the assessment. Continence self-control is assessed on a five-point scale ranging from complete control (continent) to inadequate control (incontinent). Questions also assess use of continent appliances and programs (e.g. toileting plan, pads, or catheters) and whether continence control is achieved with the assistance of appliances.

The primary independent variable of interest was BMI, which was calculated using the standard formula of weight (in kilograms) divided by height (in meters) squared (National Heart, Lung & Blood Institute [NHLBI] Obesity Education Initiative Expert Panel, 1998), and resident height and weight as recorded on the MDS admission assessment. BMI was categorized into five levels (see Table 2), with normal weight serving as the reference category in multivariate analyses. Age, gender, race/ethnicity, and assessment time were included as additional covariates. Other clinical characteristics (e.g. ADL score, cognitive status) obtained from the MDS and facility characteristics (e.g. number of beds, staff) obtained from the Nursing Home Compare database, as well as a race-weight status interaction term, were included in initial models but were not retained in the final model for parsimony sake because they were not significant and did not contribute to the model.

### Analytic Methods

Descriptive statistics were used to characterize long-term care facility residents in the analytic file. Two-sample *t*-tests and Chi-square tests were used to assess the equality of demographic characteristics of long-term care facility residents based on BMI category. To account for repeated measures on residents and the clustering of residents within long-term care facilities, a generalized estimating equation (GEE) model was used to examine the effect of obesity on the indwelling urinary catheter indicator over time.

The University of Arkansas for Medical Sciences Institutional Review Board approved the study under expedited procedures.

### Results

Table 2 lists characteristics of the 3,879 Arkansas long-term care facility residents included in the analysis. These residents were mostly female (66.9%) and were on average 84.1 years of age (8.4 SD). The average BMI was 25.8 (6.5 SD), with 19.5% of residents at admission being classified as obese (BMI  $\geq 30$ ). At admission, 24.2% of African Americans were obese, compared to 19.2% of Caucasians ( $p = 0.02$ ), and 22.7% of females were obese compared to 15.7% of males ( $p < 0.0001$ ). Table 3 shows the percentage of all residents with indwelling urinary catheters at admission and at quarter points over the observation year, as well as by residents by obesity status. At admission, the prevalence rate of indwelling urinary catheters among all residents was 16.8%, which declined to 4.1% by the fourth quarter. Obese residents had a significantly higher prevalence rate of indwelling urinary catheters than non-obese residents at admission (19.4% vs. 16.2%,  $p = 0.034$ ) and a borderline significantly higher prevalence rate ( $p = 0.09$ , suggesting a trend toward statistical significance) at the second quarter than non-obese residents (7.3% vs. 4.6%). However, rates were not statistically different at quarters three and four.

Results of the GEE model (see Table 2) indicate that residents with severe obesity had an increased odds (odds ratio [OR] = 1.69) of having an indwelling urinary catheter; however, the odds were not statistically significant. The only variable for which a significant association was detected was time; as time (by quarter of the year) progressed, the likelihood of an indwelling urinary catheter was significantly lower ( $p = 0.04$ ). In addition to severe obesity (BMI > 35), two other variables trended toward a statistically significant association with indwelling urinary catheter use: gender and race. There was a trend toward females being less likely (OR = 0.67,  $p = 0.09$ ) to have an indwelling urinary catheter than males. There was also a trend toward African Americans being more likely (OR = 1.6,  $p = 0.08$ ) to have an indwelling urinary catheter than Caucasians.

## Discussion

The use of indwelling urinary catheters among older residents in federally certified long-term care facilities in Arkansas in 2008 at admission was 16.8% among all new residents, and was significantly higher among newly admitted obese, older long-term care facility residents (19.4%). These rates were considerably higher than the national quality benchmark for indwelling urinary catheter (Rantz et al., 2000). However, over one year, the use of indwelling urinary catheters among older long-term care facility residents, both obese and non-obese, decreased substantially, with no statistical difference persisting among residents based on obesity status. Federal guidelines call for minimal use of indwelling urinary catheters with long-term care facility residents. High indwelling urinary catheter rates at admission, with sharp declines in the following three months, suggest nursing staff, in collaboration with other health care providers and the long-term care facility resident, are able to either achieve continence or implement strategies (other than use of an indwelling urinary catheter) to successfully manage the resident's UI.

Indwelling urinary catheter use can increase risk for infections, other medical complications (Igawa et al., 2008), and even death (Landi et al., 2004), and are therefore not recommended for the long-term. Findings from the study reported here are congruent with national guidelines and best-practice models that require long-term care facility staff to carefully assess the resident's need for an indwelling urinary catheter, develop individualized plans of care for catheter removal, and manage UI with a variety of evidence-based interventions that do not include a long-term indwelling urinary catheter (e.g., scheduled or prompted voiding, judicious medication use for overactive bladder or urgency UI, behavioral strategies) CDC/ National Healthcare Safety Network, 2009; CMS, 2005; Newman & Wein, 2009), as indicated by the sharp decrease in indwelling urinary catheter use found from admission to quarter four. These findings indicate that quality improvement efforts – consistent continence care monitoring and treatment by nursing staff – can improve long-term care and resident outcomes. Counter to our hypothesis and previous research (Rogers et al., 2008), we did not detect a high likelihood for the use of indwelling urinary catheters among severely obese, older long-term care facility residents compared to those of normal weight, except at admission. Our study did not identify the location from which new residents were admitted (e.g. hospital or home). Admission from one location versus another may explain differences in indwelling urinary catheter rates at admission and warrants further investigation.

Despite negative consequences and national guidelines, little evidence exists regarding the consequences or any potential benefits of indwelling urinary catheter use in an obese long-term care facility population. Bradway et al. (2010) observed that some obese long-term care facility residents and their caregivers may prefer indwelling urinary catheters over other incontinence control strategies to minimize the day-to-day bathing and skin care challenges associated with using absorbent pads and reduce barriers to engaging with others residents. This observation may account for the higher odds (albeit not significantly different) for indwelling urinary catheter usage among obese long-term care facility residents found in the current study. However, the current study did not examine individual patient or caregiver preferences for UI management. Future research should examine this issue further with obese long-term care facility residents taking into account this limitation of the current study by assessing indwelling urinary catheter usage rates, positive and negative outcomes of catheterization, and patient and caregiver preferences in choosing UI management strategies. Further, future research should also support development and testing of protocols for continence care and best practices associated with indwelling urinary catheter use in obese long-term care facility residents.

Finally, male long-term care facility residents were more likely than female long-term care facility residents to have an indwelling urinary catheter, and African-American long-term care facility residents were more likely than Caucasian long-term care facility residents to have an indwelling urinary catheter. The increased likelihoods were not statistically significant but could have implications for future research. Older men are at high risk for urinary retention due to prostate disease (Meigs et al., 1999), which could explain the higher use of indwelling urinary catheters among this group. However, in numerous studies of both community-dwelling and long-term care facility older adults, women are disproportionately affected by UI (Aslan, Beji, Erkan, Yalcin, & Gungor, 2009; Boyington et al., 2007; Goode et al., 2008; Landefeld et al., 2008; Moore & Gray, 2004). How or if this relates to gender differences in indwelling urinary catheter use in long-term care facility residents requires further exploration. In addition, relatively little is known about racial differences in UI, particularly in the long-term care facility setting. In one study (Boyington et al., 2007), African-American long-term care facility residents were more likely to have UI than their Caucasian counterparts (OR = 1.07, 95% CI: 1.01-1.14) with a significantly higher prevalence in specific regions of the United States; indwelling urinary catheter use was not described in that study. To our knowledge, racial differences in UI and indwelling urinary catheter use between obese and non-obese long-term care facility residents have not been described. This is strongly recommended as an area for future research.

## Limitations

There are several limitations to this work that should be noted. First, this study was unable to identify why a catheter was in place and for how long it had been in place at the time of admission. It is possible that the catheter was in place for a medical reason, such as to prevent urine contamination while treating a non-healing wound. Being able to differentiate the reason(s) for catheterization in the analysis would have been helpful in identifying the characteristics of residents who were inappropriately catheterized and determining the duration of indwelling urinary catheter use in our study subjects. Finer detail on factors

associated with indwelling urinary catheters, such as duration of use, would add important information useful to caregivers involved in developing interventions for catheter removal and targeting other residents at highest risk for indwelling urinary catheters.

Second, this study was limited to data from long-term care facilities in one state and from one year. Additional data from more states and from multiple years would allow trends in catheterization to be monitored.

## Conclusion/Recommendations

This study examined the association between indwelling urinary catheter usage and obesity among long-term care facility residents. The results of this study determined that there are higher rates of indwelling urinary catheter usage at admission overall and significantly higher rates of indwelling urinary catheter usage if obesity is present at the time of admission to a long-term care facility. However, indwelling urinary catheter usage rates declined within 12 months after admission, and statistical differences associated with obesity disappeared. These results suggest that long-term care facility staff are able to assist residents to achieve continence or employ alternate strategies to address persistent incontinence.

Despite these positive findings, additional research for this study population should be performed. Obesity has been correlated to other health conditions, and the effect obesity has with or without other co-morbidities on incontinence is unknown. The type of admission to the long-term care facility may have an impact on the presence of an indwelling urinary catheter; data from residents admitted from acute care facilities may have a higher prevalence of indwelling urinary catheter than those admitted from home. The intervention(s) employed by the staff of the long-term care facility should be evaluated, as this will determine which intervention is most successful. Comparison of any intervention to the standard practice will identify the strength, cost savings, and timing of the intervention. While the most appropriate evidence-based care has yet to be determined, results of this study indicate that the use of indwelling urinary catheters among long-term care facility residents can be decreased.

## Acknowledgments

The authors acknowledge support from the Arkansas Center for Minority Health Disparities, funded by the National Institute for Minority Health Disparities under award 5PO20MD002329.

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## Research Summary

### Background/Objectives

Use of indwelling urinary catheters among residents of long-term care facilities is low and within recommended thresholds. Utilization rates may be different by individual characteristics, including obesity status. We hypothesized that the challenges of providing continence care for obese (body mass index  $\geq 30$ ) long-term care facility residents might increase the use of indwelling urinary catheters among these residents.

### Design

Longitudinal cohort design.

### Setting

All federally certified long-term care facilities in Arkansas.

### Participants

All older adults ( $N = 3,879$ ) admitted to federally certified long-term care facilities in Arkansas in quarter one of 2008.

### Measurements

Minimum Data Set assessments at admission and at each quarter were used to determine indwelling urinary catheter use and to obtain height and weight to calculate body mass index.

### Results

There were significantly higher rates of indwelling urinary catheter use among obese residents at admission and in the second quarter of the year. However, no differences between obese and non-obese residents were detected in the third and fourth quarter when usage rates were nearly the same.

### Conclusions

This research found initial differences in the usage of indwelling urinary catheters among long-term care facility residents by weight status, with a higher percentage of obese residents having indwelling urinary catheters than non-obese residents over the six months post-admission. Although lower usage rates of indwelling urinary catheters are preferred for clinical reasons, obese long-term care facility residents may prefer them to other incontinence strategies, which should be explored in future research.

### Level – II

(Polit & Beck, 2012)

Federal regulations require continuous and standardized clinical assessments of all residents of federally certified nursing homes in the United States. The MDS is a tool used to conduct the assessment, which covers 15 health status and physical functioning categories (listed below) and is designed to help nursing home staff identify and monitor changes (particularly declines) in health status or functioning. Assessments are conducted upon admission to a facility quarterly, annually, and at the point of a significant event (e.g. admission to a hospital). Data extracted from the MDS are also used to calculate the quality indicators used by the Centers for Medicare & Medicaid Services to monitor the quality of nursing home care.

- |   |                               |
|---|-------------------------------|
| 1. Cognitive patterns                           | 8. Activity pursuit patterns  |
| 2. Communication and hearing patterns           | 9. Disease diagnosis          |
| 3. Vision patterns                              | 10. Other health conditions   |
| 4. Physical functioning and structural problems | 11. Oral/nutritional status   |
| 5. Continence                                   | 12. Oral/dental status        |
| 6. Psychosocial well-being                      | 13. Skin condition            |
| 7. Mood and behavior patterns                   | 14. Medication use            |
|   | 15. Treatments and procedures |

**Figure 1.**  
Minimum Data Set (MDS)

**Table 1**

## Indications for Indwelling Urinary Catheter

<b>1</b>	Urinary obstruction
	<b>A.</b> Short term for acute urinary retention
	<b>B.</b> Long term for chronic bladder obstruction not managed adequately by any other means (e.g., medications, surgery, intermittent catheterization)
<b>2</b>	Perineal/sacral wounds (Stage III or IV) not healing as a result of urine soiling
<b>3</b>	Short-term post-urinary procedure (e.g., transurethral resection of the prostate; other bladder or urethral surgery)
<b>4</b>	Acute management of intake/output
<b>5</b>	Palliative or terminal care as a comfort measure

**Sources:** CDC/National Healthcare Safety Network, 2009; CMS, 2005.

**Table 2**

Characteristics of Older Arkansas Long-Term Care Facility Residents ( $N= 3,879$ ) at Admission and Associations with Indwelling Urinary Catheter Use over One Year from GEE Model

Characteristics at Admission	GEE Model Results		
Continuous Variables	Mean (SD) at Admission	OR (95% CI)	<i>p</i> -Value
Age, years	84.1 (8.4)	0.985 (0.96, 1.01)	0.27
Categorical Variables	% ( <i>n</i> )	OR (95% CI)	<i>p</i> -Value
Underweight (BMI < 18.5)	9.0 (346)	1.00 (0.50, 2.00)	0.99
Normal weight (BMI = 18.5 to 24.9)	43.5 (1673)	Referent	–
Overweight (BMI = 25 to 29.9)	27.8 (1067)	0.982 (0.67, 1.43)	0.93
Obesity (30 to 34.9)	11.89 (456)	0.770 (0.42, 1.41)	0.40
Severe obesity (≥ 35)	7.9 (302)	1.686 (0.91,3.12)	0.10
Time (quarter intervals)	–	0.998 (1.00, 1.00)	0.04
Female	66.9 (2593)	0.673 (0.43, 1.06)	0.09
African American	10.2 (393)	1.586 (0.94, 1.67)	0.08

**Notes:** BMI = body mass index, CI = confidence interval, n = number, OR = odds ratio, SD = standard deviation; ORs generated using generalized estimating equation (GEE) model.

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**Table 3**

Percent of Older Long-Term Care Facility Residents in Arkansas with Indwelling Urinary Catheters over Four Quarters (2008) by Obesity Status, and by Race and Gender

	All (%)	O (%)	NO (%)	<i>p</i> -Value
<b>All Residents</b>				
Admission (Quarter 1)	16.8	19.4	16.2	0.03
Quarter 2	5.1	7.3	4.6	0.09
Quarter 3	4.6	5.3	4.4	0.55
Quarter 4	4.1	4.7	3.9	0.64
<b>Caucasian Residents</b>				
Admission (Quarter 1)	16.7	19.7	16.0	0.02
Quarter 2	4.8	6.7	4.3	0.15
Quarter 3	4.0	4.1	4.0	0.94
Quarter 4	4.0	5.4	3.6	0.28
<b>African-American Residents</b>				
Admission (Quarter 1)	17.9	18.3	17.8	0.92
Quarter 2	7.3	8.6	7.0	0.75
Quarter 3	8.1	9.7	7.6	0.71
Quarter 4	5.2	0.0	7.0	0.16
<b>Female Residents</b>				
Admission (Quarter 1)	16.9	19.2	16.2	0.09
Quarter 2	4.5	7.6	3.7	0.02
Quarter 3	4.2	4.7	4.0	0.69
Quarter 4	3.3	4.1	3.1	0.55
<b>Male Residents</b>				
Admission (Quarter 1)	16.7	19.9	16.1	0.19
Quarter 2	6.6	6.4	6.6	0.94
Quarter 3	5.6	7.1	5.3	0.58
Quarter 4	6.0	6.3	5.9	0.93

**Notes:** O = obese, NO = non-obese; *p* values generated using Chi-square.