

Use of Urinary Collection Devices in Skilled Nursing Facilities in Five States

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OBJECTIVES: To assess use of urinary collection devices (external, intermittent, and indwelling catheters; pads or briefs) and examine predictors of indwelling catheters in skilled nursing facilities (SNFs).

DESIGN: Retrospective cohort study.

SETTING: SNFs in California, Florida, Michigan, New York, and Texas.

PARTICIPANTS: All patients admitted to SNFs in 2003 who remained there for 1 year (N = 57,302).

MEASUREMENTS: Characteristics of patients who used different collection strategies (indwelling, intermittent, and external catheterization; pads or briefs) and predictors of indwelling urinary catheterization from the Nursing Home Minimum Data Set using multinomial logistic regression.

RESULTS: The prevalence of indwelling catheterization was 12.6% at admission and 4.5% at the annual assessment ($P < .001$). Intermittent and external catheterization were infrequently used (<1% at admission and annual assessment). Paraplegia, quadriplegia, multiple sclerosis, and comatose state were strongly associated with indwelling catheterization. Male residents were more likely to use an indwelling catheter at every assessment, as were obese patients; individuals with diabetes mellitus, renal failure, skin conditions, deep vein thrombosis, aphasia, or end-stage disease; and those who were taking more medications.

CONCLUSION: Coinciding with federal regulations, urinary catheterization was lower than has been reported previously and declined over time. Further reduction should be targeted at the evaluation of skin problems, appropriateness of multiple medications, and alternative measures in pa-

tients with diabetes mellitus, obesity, deep vein thrombosis, and communication problems. *J Am Geriatr Soc* 56:854–861, 2008.

Key words: urinary catheterization; nursing homes

Approximately 1.5 million residents currently live in 16,100 nursing homes within the United States.¹ Because of concerns about the quality of care these individuals receive, the Nursing Home Quality Initiative was launched in November 2002 to enhance the quality of life for nursing home residents.² As a part of this initiative, publicly available quality measures were developed that reflect the adequacy and appropriateness of care.²

Several of the quality measures address care related to urinary incontinence, because this is a common problem in residents of skilled nursing facilities (SNFs), affecting 62% of elderly patients, with estimated costs of \$5.32 billion in 2000.^{3,4} Incontinence is not considered a normal aspect of aging, and measures to reverse this condition are recommended whenever possible.⁵ The Agency for Healthcare Research and Quality updated clinical practice guidelines for management of urinary incontinence in 1996, and they were more recently consolidated into an algorithm to enhance decision-making.^{6,7}

Of particular concern is the long-term use of indwelling urinary catheters.^{7,8} For facilities that receive payments from the Centers for Medicare and Medicaid Services (CMS), the use of indwelling catheters requires valid medical justification, and their presence is a publicly reported quality measure.^{5,7,8} This is a reflection of previous research demonstrating that catheter use results in greater risk of urinary tract infection, bacteremia, and mortality.^{9,10} SNF residents who receive long-term indwelling catheterization are three times as likely to die within a year as similar patients without catheters.¹¹ Other possible complications of chronic urinary catheterization include prostatitis, urethral irritation, hematuria, bladder calculi, and bladder spasm.¹² Indwelling catheters may also lead to patient discomfort

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and restrict a patient's activities of daily living.^{13,14} Indeed, limitation of mobility due to indwelling catheters has led them to be referred to as a "one point" restraint.¹⁵ Given the clinical and economic consequences of indwelling catheter use,¹⁶ identifying proper urinary collection strategies in nursing home patients is of paramount importance. The use of urinary collection devices was therefore evaluated in a large cohort of residents in SNFs in five states to identify predictors of chronic indwelling catheterization and possible medical reasons for their use.

METHODS

Study Population and Design

A retrospective cohort study was conducted to evaluate the types of urinary collection devices used by long-term SNF residents in California, Florida, Michigan, New York, and Texas. All residents who were newly admitted to these SNFs in 2003 (100% sample) were followed for 1 year. Only those who remained in the facility for an entire year were included.

This study received approval from CMS and the human subjects review board at the University of Michigan.

Study Variables

The Long-Term Care Minimum Data Set (MDS) from CMS was used for all analyses.¹⁷ For each resident, information was extracted from assessments performed by the facilities, once at admission and then every 3 months until the first annual assessment was completed, for a maximum of five assessments. Information regarding the use of indwelling catheters and external catheters within the previous 14 days was recorded for each assessment. Information regarding intermittent catheterization and the use of pads and briefs was available only from the fuller assessments performed at admission and 1 year. Use of these individual collection strategies was not mutually exclusive; some patients used more than one type of device in the 14 days before the assessment.

Initially, demographic characteristics of the patients who used indwelling catheters, intermittent catheters, external catheters, and pads or briefs were examined. Independent variables were patient characteristics at the time of admission, such as age, sex, weight, conditions, and diagnoses. Skin condition was defined as presence of an ulcer (pressure or stasis), abrasions, bruises, burns, open lesions, rashes, skin desensitization, skin tears or cuts, or surgical wounds within the 7 days before the admission assessment. Two items were used to define dehydration: the presence of dehydration in the previous 7 days or information that the patient did not consume all or almost all liquids provided during the 3 days before the assessment. Impaired cognition was defined as severely impaired cognitive skills for daily decision-making. Lack of bowel control was determined as bowel incontinence all of the time or frequently (2–3 times per week) during the 14 days before the assessment. The MDS also provided the number of different medications used in the 7 days before the assessment and whether the patient was deemed to have end-stage disease, with 6 or fewer months expected to live.

Data Analyses

For bivariable associations of categorical data, Pearson chi-square tests were used; to assess linear trends in use over time, chi-square tests for trend were used.¹⁸ Predictors of indwelling catheterization were examined using multinomial logistic regression. Indwelling catheter use (dependent variable) was defined with four mutually exclusive groups of patients: no indwelling catheter at any of the five assessments (reference category), indwelling catheter at the admission assessment only, periodic use of indwelling catheter (at some of the assessments but not at all), and indwelling catheter use at every assessment (also referred to as continuous catheterization). Information regarding catheterization was available only during the 14 days before each of the five assessments. Imputation according to best-subset regression was used for missing data, which ranged from 0% to 5.5% in the study variables.¹⁹ Robust standard errors were calculated with clustering by facility using Huber/White/sandwich estimators. Alpha was set at 0.05, two-tailed. Analyses were conducted in Stata/SE 9.2 (Stata Corp., College Station, TX).

RESULTS

Patient Characteristics

There were 57,302 patients admitted to 4,071 SNFs in 2003 in California, Florida, Michigan, New York, and Texas who remained in the facilities for an entire year. Characteristics of these patients are given in Table 1. The majority were female, non-Hispanic white, and between the ages of 75 and 94. Most were widowed (51.2%); 20.8% were married. The majority of residents were admitted from an acute care hospital. In these five states, New York had the greatest number of new SNF admissions who remained within the facility for the entire year. Skin conditions and lack of bowel control were common. Diabetes mellitus was present in one-fourth of the patients, and a history of stroke was recorded in 21.5% of the subjects. Medication usage was also common, with 28.8% prescribed more than 10 different drugs at the time of admission.

Urinary collection strategies according to patient characteristics are shown in Table 2. Of the 57,302 patients, 7,242 (12.6%) were using an indwelling catheter upon admission. This declined to 4.5% at 1 year ($P < .001$). The use of an indwelling catheter was 5.4% in this population at the 3-month assessment, 4.7% at the 6-month assessment, and 4.3% at the 9-month assessment. The test for trend over time (admission to Year 1) was significant ($P < .001$). A small percentage of patients used indwelling catheters and pads or briefs at Year 1 (2.8%); this percentage at the time of admission was 8.2% (indicating any usage within the previous 14 days).

There was an inverse relationship between age and the use of an indwelling catheter, with usage by younger patients more likely at the annual assessment ($P < .001$). Men were also more likely to use an indwelling catheter than women ($P < .001$). At the time of admission, approximately 12% in each racial or ethnic group used indwelling catheters, which then declined at Year 1 to approximately 3.5% for Native Americans and Asians and 4.5% for whites, blacks, and Hispanics ($P < .001$). There were significant differences in indwelling catheterization according to state

Table 1. Characteristics of Newly Admitted Patients in Skilled Nursing Facilities

Characteristic	n (%)
Age	
< 45	1,926 (3.4)
45–54	2,479 (4.3)
55–64	4,150 (7.2)
65–74	7,743 (13.5)
75–84	19,686 (34.4)
85–94	18,695 (32.6)
≥95	2,623 (4.6)
Female	39,542 (69.0)
Race	
White, not Hispanic	42,806 (74.7)
Black, not Hispanic	7,416 (12.9)
Hispanic	5,416 (9.5)
Asian	1,462 (2.5)
Native American	202 (0.4)
Admitted from	
Acute care hospital	33,158 (57.9)
Private home or apartment with no home health services	7,622 (13.3)
Nursing home	6,813 (11.9)
Board and care, assisted living, or group home	4,421 (7.7)
Private home or apartment with home health services	2,517 (4.4)
Psychiatric hospital or mental retardation and developmental disabilities facility	1,441 (2.5)
Rehabilitation hospital	717 (1.2)
Other	613 (1.1)
State	
New York	16,970 (29.6)
California	13,331 (23.3)
Texas	12,243 (21.4)
Florida	8,707 (15.2)
Michigan	6,051 (10.5)
Conditions at admission	
Skin condition	33,397 (58.3)
Lack of bowel control	22,738 (39.7)
> 10 medications	16,474 (28.8)
Diabetes mellitus	14,332 (25.0)
Stroke	12,324 (21.5)
Anemia	10,949 (19.1)
Impaired cognition	8,086 (14.1)
Cardiac dysrhythmias	5,975 (10.4)
Hemiplegia or hemiparesis	5,574 (9.7)
Hip fracture	3,317 (5.8)
Renal failure	2,690 (4.7)
Aphasia	2,018 (3.5)
Dehydration	1,788 (3.1)
Weight 250 lbs or more	1,185 (2.1)
Deep vein thrombosis	1,177 (2.1)
Missing limb	1,029 (1.8)
Multiple sclerosis	639 (1.1)
End-stage disease	627 (1.1)
Hypotension	610 (1.1)
Traumatic brain injury	420 (0.7)
Quadriplegia	400 (0.7)
Paraplegia	360 (0.6)
Comatose	325 (0.6)

($P < .001$), with New York exhibiting the lowest use and Florida and California the highest.

The predominant catheter type was indwelling, with few patients using intermittent or external catheterization. (Fewer than 1% of patients used such strategies at admission or at Year 1.) Overall, the use of pads or briefs was the most common urinary collection strategy; a majority of patients were using this strategy at admission (56.1%) and Year 1 (57.8%). Older patients and women (both $P < .001$) were more likely to use pads or briefs at admission and at Year 1. Compared to other racial and ethnic groups, Asians were the most likely to use pads or briefs at admission (61.1%) and at year 1 (59.6%). Patients in Texas were less likely to use pads or briefs than patients in other states ($P < .001$).

Profile of Patients with Catheterization

Table 3 presents a profile of the types of patients who were most likely to have an indwelling catheter. The first column includes patients with catheterization only at admission. The last column describes patients who were catheterized at every assessment throughout the year. Periodic use of indwelling catheters (at some of the assessments but not at all) is also listed. There were 325 patients who were comatose on admission, 24.3% of whom had an indwelling catheter at the time of admission only and were switched to other types of urinary collection strategies during the rest of the year, 23.4% of whom had periodic catheter usage throughout the year, and 14.5% of whom had indwelling catheters at each assessment. The remaining comatose patients did not use indwelling urinary catheters. Patients who were most likely to use an indwelling catheter at every assessment were those with paraplegia (33.1%), quadriplegia (23.2%), and multiple sclerosis (21.8%).

Predictors of Catheterization

Age- and race-adjusted odds ratios (ORs) generated in the multinomial logistic model are given in Table 4 (ORs simultaneously adjusted for all variables listed in the table). The reference category for all ORs was no use of indwelling urinary catheters. The presence of neurological conditions was strongly predictive of catheterization. Comatose patients were five times as likely to have an indwelling catheter at admission only, six times as likely to have continuous use of an indwelling catheter, and nearly eight times as likely to have periodic usage of indwelling catheters as patients not in a comatose state. Patients with paraplegia were 16 times as likely to use indwelling catheters at every assessment as patients without paraplegia. The odds of using an indwelling catheter at every assessment were 11 times greater in patients with multiple sclerosis. Individuals with quadriplegia also had significantly greater use of indwelling catheterization at each assessment, with an OR of 8.03. The results for hemiplegia and stroke were similar in that they were both associated with catheterization only at the time of admission.

Aphasia and impaired cognition were also independently associated with indwelling catheterization. Impaired cognition was associated with indwelling catheterization at admission and periodic catheterization but not continuous catheterization, although aphasia was associated with all

Table 2. Characteristics of Patients with Different Urinary Collection Strategies at Admission and Year 1

Characteristic	Indwelling Catheter		Intermittent Catheter		External Catheter		Pads or Briefs	
	Admission	Year 1	Admission	Year 1	Admission	Year 1	Admission	Year 1
	n (%)							
Age								
< 45	269 (14.0)	160 (8.3)	23 (1.2)	25 (1.3)	57 (3.0)	45 (2.3)	849 (44.1)	834 (43.3)
45-54	357 (14.4)	180 (7.3)	13 (0.5)	15 (0.6)	26 (1.0)	28 (1.1)	943 (38.0)	928 (37.4)
55-64	545 (13.1)	275 (6.6)	26 (0.6)	12 (0.3)	38 (0.9)	27 (0.6)	1,847 (44.5)	1,795 (43.2)
65-74	1,120 (14.5)	447 (5.8)	49 (0.6)	15 (0.2)	35 (0.4)	14 (0.2)	4,118 (53.2)	4,192 (54.2)
75-84	2,522 (12.8)	835 (4.2)	143 (0.7)	30 (0.2)	24 (0.1)	14 (0.1)	11,549 (58.7)	12,029 (61.1)
≥85	2,429 (11.4)	663 (3.1)	165 (0.8)	41 (0.2)	24 (0.1)	10 (0.0)	12,852 (60.3)	13,335 (62.6)
Sex								
Male	2,375 (13.4)	1,204 (6.8)	137 (0.8)	73 (0.4)	197 (1.1)	137 (0.8)	8,879 (50.0)	8,994 (50.7)
Female	4,867 (12.3)	1,356 (3.4)	282 (0.7)	65 (0.2)	—	—	23,276 (58.9)	24,116 (61.0)
Race or ethnic group								
Non-Hispanic white	5,465 (12.8)	1,921 (4.5)	348 (0.8)	108 (0.3)	107 (0.3)	73 (0.2)	24,167 (56.5)	25,216 (58.9)
Non-Hispanic black	885 (11.9)	336 (4.5)	34 (0.5)	18 (0.2)	52 (0.7)	32 (0.4)	4,057 (54.7)	4,022 (54.2)
Other	892 (12.6)	303 (4.3)	37 (0.5)	12 (0.2)	45 (0.6)	33 (0.5)	3,934 (55.6)	3,875 (54.7)
State								
New York	1,701 (10.0)	696 (4.1)	135 (0.8)	54 (0.3)	80 (0.5)	61 (0.4)	9,946 (58.6)	10,141 (59.8)
California	2,066 (15.5)	659 (4.9)	77 (0.6)	20 (0.1)	57 (0.4)	36 (0.3)	7,657 (57.4)	7,910 (59.3)
Texas	1,260 (10.3)	526 (4.3)	41 (0.3)	26 (0.2)	19 (0.2)	—	6,061 (49.5)	6,111 (49.9)
Florida	1,384 (15.9)	421 (4.8)	54 (0.6)	13 (0.2)	33 (0.4)	23 (0.3)	4,966 (57.0)	5,173 (59.4)
Michigan	831 (13.7)	258 (4.3)	112 (1.8)	25 (0.4)	15 (0.2)	—	3,528 (58.3)	3,778 (62.4)

time periods of catheterization (admission only, periodic, and continuous).

Patients with a skin condition were more likely to use indwelling catheters at admission, periodically, and continuously than patients without a skin condition, with ORs ranging from 2.34 to 3.10. Dehydration was associated with indwelling catheterization at admission and periodically but not with continuous use. In addition, anemia and lack of bowel control were significantly associated with

catheterization (at admission, periodically, and continuously).

Patients with hip fracture were more likely to be catheterized at admission and periodically than patients without hip fracture, although they were not more likely to use catheters continuously than patients without hip fractures.

Weight was a predictor of indwelling catheterization, independent of sex. In this population, 3.0% of men and 1.6% of women weighed 250 pounds or more, and contin-

Table 3. Common Admission Conditions in Patients with Indwelling Urinary Catheters in Skilled Nursing Facilities

Catheter Use at Admission Only			Periodic Catheter Use*			Catheter Use at Every Assessment†		
Condition	% Usage	n/N	Condition	% Usage	n/N	Condition	% Usage	n/N
Comatose	24.3	(79/325)	Comatose	23.4	(76/325)	Paraplegia	33.1	(119/360)
Hip fracture	19.6	(651/3,317)	Paraplegia	15.8	(57/360)	Quadriplegia	23.2	(93/400)
Aphasia	18.0	(363/2,018)	Quadriplegia	14.7	(59/400)	Multiple sclerosis	21.8	(139/639)
Dehydration	14.1	(252/1,788)	Multiple sclerosis	12.1	(77/639)	Comatose	14.5	(47/325)
Hemiplegia or hemiparesis	13.0	(723/5,574)	Traumatic brain injury	9.8	(41/420)	End-stage disease	6.9	(43/627)
Missing limb	12.9	(133/1,029)	End-stage disease	8.8	(55/627)	Weight ≥250 lbs	6.2	(74/1,185)
Lack of bowel control	11.9	(2,708/22,738)	Missing limb	8.6	(89/1,029)	Missing limb	5.9	(61/1,029)
Cardiac dysrhythmias	11.3	(678/5,975)	Aphasia	8.6	(173/2,018)	Deep vein thrombosis	5.4	(63/1,177)
Skin condition	11.0	(3,658/33,397)	Deep vein thrombosis	7.1	(84/1,177)	Traumatic brain injury	5.2	(22/420)
Traumatic brain injury	11.0	(46/420)	Lack of bowel control	6.8	(1,546/22,738)	Renal failure	5.1	(138/2,690)
Stroke	10.9	(1,342/12,324)	Impaired cognition	6.6	(537/8,086)	Hypotension	4.9	(30/610)
Impaired cognition	10.6	(860/8,086)	Renal failure	6.4	(171/2,690)	Aphasia	4.8	(96/2,018)

* Catheter usage recorded periodically during the first year after admission.

† Catheter usage recorded at every assessment during the first year after admission.

Table 4. Adjusted Odds Ratios for the Use of Indwelling Catheters in Skilled Nursing Facilities Using Multinomial Logistic Regression

Characteristic	Use at Admission Only		Periodic Use		Use at Every Assessment	
	Odds Ratio (95% Confidence Interval)	P-Value	Odds Ratio (95% Confidence Interval)	P-Value	Odds Ratio (95% Confidence Interval)	P-Value
Comatose	5.55 (3.98–7.74)	<.001	7.91 (5.64–11.09)	<.001	5.99 (3.84–9.34)	<.001
Skin condition	3.10 (2.82–3.40)	<.001	2.34 (2.10–2.61)	<.001	2.56 (2.21–2.96)	<.001
Paraplegia	2.72 (1.82–4.05)	<.001	6.42 (4.54–9.08)	<.001	16.05 (11.61–22.18)	<.001
Hip fracture	2.69 (2.43–2.99)	<.001	1.21 (1.02–1.44)	.03	0.99 (0.76–1.29)	.95
Quadriplegia	2.63 (1.86–3.72)	<.001	3.61 (2.54–5.15)	<.001	8.03 (5.73–11.25)	<.001
Multiple sclerosis	2.50 (1.87–3.35)	<.001	4.50 (3.44–5.90)	<.001	10.99 (8.36–14.45)	<.001
Lack of bowel control	2.24 (2.09–2.42)	<.001	2.31 (2.10–2.54)	<.001	2.38 (2.11–2.69)	<.001
Dehydration	1.91 (1.60–2.27)	<.001	1.61 (1.27–2.03)	<.001	1.03 (0.73–1.44)	.88
Aphasia	1.78 (1.54–2.05)	<.001	1.53 (1.27–1.85)	<.001	1.49 (1.16–1.93)	.002
Missing limb	1.66 (1.36–2.04)	<.001	1.66 (1.31–2.10)	<.001	1.68 (1.26–2.24)	<.001
Weight ≥250 pounds	1.53 (1.23–1.90)	<.001	1.38 (1.06–1.81)	.02	2.05 (1.56–2.69)	<.001
End-stage disease	1.40 (1.06–1.85)	.02	1.91 (1.41–2.59)	<.001	2.57 (1.83–3.60)	<.001
Cardiac dysrhythmias	1.37 (1.24–1.51)	<.001	1.02 (0.89–1.17)	.77	1.11 (0.94–1.32)	.23
Hemiplegia or hemiparesis	1.37 (1.22–1.55)	<.001	1.16 (1.00–1.35)	.05	1.07 (0.87–1.31)	.51
Renal failure	1.32 (1.15–1.52)	<.001	1.34 (1.12–1.60)	.001	1.71 (1.40–2.09)	<.001
Stroke	1.26 (1.15–1.38)	<.001	1.09 (0.97–1.22)	.15	1.05 (0.89–1.22)	.58
Anemia	1.20 (1.11–1.30)	<.001	1.20 (1.08–1.33)	<.001	1.37 (1.21–1.56)	<.001
Impaired cognition	1.16 (1.06–1.28)	.001	1.40 (1.25–1.56)	<.001	1.09 (0.94–1.27)	.27
Diabetes mellitus	1.16 (1.07–1.25)	<.001	1.29 (1.17–1.42)	<.001	1.27 (1.12–1.43)	<.001
Deep vein thrombosis	1.14 (0.94–1.39)	.18	1.29 (1.02–1.65)	.04	1.35 (1.01–1.80)	.04
Number of medications	1.05 (1.05–1.06)	<.001	1.06 (1.05–1.07)	<.001	1.08 (1.07–1.09)	<.001
Male	0.94 (0.88–1.02)	.14	1.26 (1.15–1.38)	<.001	2.13 (1.89–2.41)	<.001
State						
New York	1.00 (reference)		1.00 (reference)		1.00 (reference)	
California	1.48 (1.31–1.68)	<.001	1.02 (0.90–1.17)	.73	1.26 (1.06–1.50)	.007
Texas	1.08 (0.95–1.24)	.24	1.14 (0.99–1.30)	.07	1.22 (1.02–1.46)	.03
Florida	1.64 (1.44–1.87)	<.001	1.17 (1.01–1.36)	.04	1.33 (1.10–1.59)	.002
Michigan	1.44 (1.23–1.68)	<.001	1.09 (0.92–1.29)	.33	1.09 (0.85–1.40)	.48

Adjusted for age and race. Reference category consisted of patients who did not use indwelling catheters.

uous indwelling catheterization in these heavier patients was 5.9% in men and 6.5% in women. When adjusted for all factors as listed in Table 4, patients who weighed 250 pounds or more at the time of admission were twice as likely to have an indwelling catheter at every assessment as patients who weighed less. Weight also increased the likelihood of periodic and admission use of indwelling catheterization. When weight was categorized into six groups, there appeared to be a threshold effect of weight at 250 pounds; catheter usage gradually increased as weight increased but leveled off at 250 pounds. The area under the receiver operating characteristic curve was 0.5206 when weight was modeled and 0.5020 when body mass index was used, so weight was used in the final model.

Patients admitted with end-stage disease were 2.57 times as likely to use an indwelling catheter at each assessment as patients without terminal illness. End-stage disease was also related to catheterization periodically and at admission. Renal failure and diabetes mellitus were independently associated with indwelling urinary catheter use at admission, periodically, and at every assessment. In addition, patients with missing limbs had 66% to 68% greater

odds of catheterization. Patients admitted with deep vein thrombosis also had a greater likelihood of subsequent catheterization throughout the year (OR = 1.29 for periodic use and 1.35 for continuous use).

Only 333 subjects (0.6%) were not receiving any medications at the time of admission. Approximately one-quarter of patients were using five medications or fewer, and 28.8% were using more than 10 medications at the time of admission. There was a significant association between the number of medications and indwelling catheter use. For each additional medication, the odds of catheterization at every assessment were 8% greater.

Male sex was a predictor of periodic and continuous indwelling catheter use (but not at admission only) when adjusted for all other factors listed. Men were twice as likely to have an indwelling catheter at every assessment as women ($P < .001$). Although age was significantly associated with catheterization without consideration of other factors (Table 2), it was not significantly associated with periodic or continuous use of indwelling catheters after adjustment for the variables in Table 4. Several conditions, such as a comatose state, paraplegia, quadriplegia, and multiple

sclerosis, tended to be more prevalent in younger residents ($P < .001$), and it is likely that these conditions accounted for the greater use of catheterization.

Significant variation between states remained after adjustment for the case mix of the patients. In particular, patients residing in Florida, California, and Texas were significantly more likely to be catheterized at every assessment than patients in New York.

DISCUSSION

Patterns of indwelling catheter use have improved in SNFs in the United States. Although 12.6% of patients admitted to such facilities had an indwelling catheter, this percentage dropped to 5.4% by 3 months and to 4.5% by 1 year. This may be a reflection of enhanced federal regulations regarding the reporting of this quality measure; the percentage of low-risk residents with incontinence and the percentage of residents who had a catheter inserted and left in their bladder were reported and are now publicly available.² It may also reflect an improvement in condition over time in post-acute patients, although the decline in catheterization was evident in all patients, regardless of the type of facility from which they were admitted. The 4.5% prevalence at 1 year compares favorably with previous reports of catheterization. A stratified, random sample of nursing home residents in Columbus, Ohio, in the early 1990s found that 10.5% of the residents used urinary catheters at the time of entry and that another 10% were catheterized within the year during their stay.¹¹ In a random sample of nursing home residents in 10 states, it was found that 11.9% of patients used an indwelling catheter (3.5% of incontinent patients and 20.0% of continent patients).²⁰ Reports of the prevalence of urinary catheterization in the 1980s varied considerably, from 7.5% to 22%.^{21–24} A study of nursing home residents in Virginia found a decrease in urinary catheterization from 15.2% before the Omnibus Budget and Reconciliation Act to 4.8% after implementation of this act.²⁵ These data suggest that the implementation of regulations to improve the quality of care regarding catheterization may have affected clinical practice, although improvement could be directed to hospitals that transfer patients into the nursing home setting; there continues to be a high prevalence of catheterization at the time of admission to the SNF. It was found that 32% of patients discharged from hospitals for hip fractures were admitted to a SNF with a urinary catheter.²⁶ The corresponding figure from the current data was 26%.

After the Nursing Home Quality Measures regarding incontinence and indwelling catheters were recommended in 2003 and made public in early 2004, CMS issued Guidance for Surveyors (Tag F315) in the following year indicating that residents who entered a facility without an indwelling catheter should not be catheterized without medical justification and that residents with bladder incontinence should receive the appropriate treatment to prevent urinary tract infections and restore as much normal bladder function as possible.^{2,27} Guidance was issued regarding indwelling catheters, in particular. The continuing use of an indwelling catheter beyond 14 days was justifiable in patients with urinary retention that could not be otherwise corrected and was characterized by post-void residual volumes greater than 200 mL, infeasibility of intermittent

catheterization, and persistent overflow, symptomatic infection, or renal dysfunction; patients with poorly healing Stage 3 or 4 pressure ulcers contaminated with urine; and patients with terminal illness or severe impairment for whom repositioning would be uncomfortable or painful.²⁷ Several of the primary justifications for using an indwelling catheter in an incontinent patient are reflected in this dataset; patients with skin conditions, end-stage disease, or renal failure constituted the majority of those with indwelling catheters. These conditions are listed as justifiable reasons for catheterization, with some guidelines listing Stage 3 or 4 ulcers only (and not other skin problems) as justification.^{5,27,28} However, the use of catheterization for addressing wound care and ulcerations has been questioned because of the lack of scientific evidence regarding efficacy.²⁹ In addition, a prospective study of patients with pressure ulcers showed that the urinary tract was not a frequent source of the microorganisms that colonized ulcers in elderly residents of long-term care facilities.³⁰ Because skin problems are common in nursing home residents, efforts to address skin integrity may be appropriate, and additional studies in this area would be desirable. No evidence was found from randomized, controlled trials to show that indwelling catheterization is inferior or superior to any other collection strategy for patients with skin problems, although there is preliminary evidence that disposable pads or briefs, especially super-absorbent products, may be beneficial in reducing skin problems in patients with urinary incontinence.³¹ Randomized, controlled trials of various strategies may enhance decision-making, particularly for patients with limited mobility, such as those with paraplegia, hemiplegia, or multiple sclerosis and comatose patients.

A novel finding of this study is the relationship between weight and indwelling catheterization. Obesity is a growing problem in the United States, the consequences of which may also be manifest in the nursing home population.³² Indwelling catheterization was used more frequently for individuals weighing 250 pounds or more. This may be a reflection of the manpower necessary to implement other strategies such as assistance to a commode. It may also reflect an inability to perform intermittent catheterization or to find large sizes of disposable briefs and the problems associated with moving the patient for placement of briefs. With the prevalence of obesity expected to increase, studies to determine the best strategies for overweight patients would be appropriate.

Another finding of interest was the relationship between diabetes mellitus and indwelling catheterization. Patients with diabetes mellitus, independent of renal failure and other medical conditions, were more likely to have indwelling catheters. Diabetes, per se, is not listed as medical justification for the use of urinary catheters in patients with incontinence.^{5,27,28} Because diabetes mellitus is known to increase the baseline risk of infection, and catheterization is a recognized source of infection, this may be a group of patients who would benefit from the use of other strategies.^{33–35} Studies on this topic would be desirable, because more patients are expected to be affected over time, given the increasing incidence of types 1 and 2 diabetes mellitus in the United States.³⁶

The association between aphasia and indwelling catheter use was not expected. Aphasia was a significant

predictor of continuous indwelling catheter use, independent of impaired cognition and stroke. It is unclear whether communication problems posed by aphasia would contribute to the inability to assist patients with other strategies. It has been observed, generally, that patients prefer noninvasive urinary collection methods to invasive methods.^{13,14,37} This may be a group of patients who would benefit from efforts to overcome communication barriers.

The greater use of indwelling catheters in men may be a reflection of benign prostatic hypertrophy, although information was not available on this condition in the MDS data set. Obstruction due to an enlarged prostate constitutes medical justification for catheterization. Although intermittent catheterization was an alternative, it was infrequently used in residents of SNFs.

Complications from polypharmacy in elderly people are well recognized and include bladder dysfunction.³⁸ In this study, the use of an indwelling catheter at every assessment was significantly associated with the number of different medications, and the odds of catheterization was 8% greater with each medication. Although the appropriateness of such medications cannot be fully assessed with these data, this is another potential avenue for improvement.

Because catheters have been shown to serve as “one point” restraints,¹⁵ it is disconcerting to find that patients admitted with deep vein thrombosis were at greater risk of catheterization throughout the year after admission. This is a group of patients who may benefit from strategies that do not limit mobility.

There was considerable variation in the practice of catheterization according to state, even after adjustment for case mix. California, Florida, and Texas were significantly more likely to use indwelling catheterization than New York. This indicates that progress could be made in further standardizing practices regarding quality measures. One study also found variability across states regarding urinary catheterization in nursing facilities when adjusted for aggregate resident data, nurse staffing, and facility characteristics.³⁹ Similar to the current findings, New York exhibited lower catheterization rates than California, Florida, Michigan, or Texas. Although it was not possible to assess staffing or facility characteristics in this dataset, previous research has shown that turnover of registered nurses significantly increases urinary catheterization of residents; an increase of 0 to 50% in turnover yielded an approximate doubling of catheter use.⁴⁰ Turnover of registered nurses on staff in long-term care facilities varied across states in 2002, with New York and Michigan exhibiting lower turnover (44.1% and 43.7%, respectively) than Texas (59.8%), California (48.0%), or Florida (55.2%).⁴¹ In addition to staffing, another avenue for improvement may be through management programs. In 2004, only 21.7% of the 16,100 nursing homes in the United States had special programs for continence management.¹ It may be useful to expand such programs in these states or use existing programs to target specific patients at greatest risk.

These results should be interpreted in the context of potential limitations, the most important of which was the lack of data regarding specific indications for catheter use. Although patient conditions and urinary collection devices were recorded in the MDS, indications for catheter use were

not directly assessed. Furthermore, information was not available for some medical indications such as urinary obstruction, nor could the appropriateness of using multiple medications be assessed, although this report constitutes the largest sample of residents in SNFs in the United States who were followed for 1 year to assess urinary collection strategies.

In conclusion, the prevalence of indwelling catheterization decreased over a 1-year period in SNFs. This is consistent with initiatives to recognize and decrease unnecessary catheterization through federally mandated nursing home quality measures. Although the use of indwelling catheters was expected for some types of patients, there were others who may benefit from investigations of alternative strategies. These include individuals with diabetes mellitus, obesity, deep vein thrombosis, and communication problems such as aphasia and those taking multiple medications. Trials to compare urinary collection strategies in patients with ulcerations or other skin problems would be welcome.

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