Urinary incontinence in subacute care — a retrospective analysis of clinical outcomes and costs

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ABSTRACT

Objective: To investigate the effect of incontinence on clinical outcomes and costs for patients in subacute care.

Design: Retrospective analysis of data collected over a 3-month period in 1996.

Setting: 54 medical facilities in Australia and New Zealand providing subacute care in an inpatient setting.

Patients: 6773 episodes of care provided to 6455 rehabilitation and geriatric evaluation and management patients.

Main outcome measures: Urinary continence status, treatment outcomes, length of stay, discharge destination, and nursing and allied healthcare costs.

Results: Discharge destination differed between incontinent and continent patients (57% compared with 82%, respectively, discharged home, and 29% compared with 12%, respectively, discharged to a nursing home or to further care). There was a difference in cost between patients who were continent and those who were incontinent throughout their episode of care (rehabilitation: $185.60 [95% CI, $181–$190] per day for incontinent and $156.82 [95% CI, $153–$160] for continent patients; and geriatric evaluation and management: $164.62 [95% CI, $157–$172] for incontinent and $121.40 [95% CI, $114–$129] for continent patients). However, multilevel analyses showed that, after allowing for age and level of functional independence, the contribution of continence status to the cost of care depended on the functional independence of the patient (cognitive function for orthopaedic patients [$P < 0.01$] and motor function for stroke patients [$P = 0.04$]).

Conclusion: The relationship between continence status and cost of care is complex. However, the cost differences found in our study need to be considered in payment systems, allocation of staff levels on wards and in development of casemix classifications.

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THE PREVALENCE OF urinary and faecal incontinence is rising as our population ages, with potentially large cost implications for the healthcare budget.[1] Studies from many different countries have assessed the costs and management of urinary incontinence.[2] A recent Australian report, based on a small face-to-face study of 100 women with incontinence, extrapolated the personal and treatment costs of incontinence for Australian women living in the community.[3] However, to date, there are no Australian studies of the cost of caring for incontinent elderly patients in subacute hospital wards.

The goal of subacute care is to improve functional status and quality of life in patients who may be elderly and infirm and require a longer length of stay. The care of incontinent patients can require more staff time, extra laundry expenses, and additional items, such as catheters and continence pads. Further costs arise because incontinent patients are often older and less functionally independent in other ways than continent patients with similar impairments.

We compared clinical outcomes, length of stay and costs of care (nursing and allied healthcare costs) of continent and incontinent patients in subacute care (rehabilitation and geriatric evaluation and management). In addition, we aimed to identify factors that affect the cost of care and to quantify the proportion of the cost attributable to incontinence.

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METHODS

Data collection

In 1996, clinical, demographic and cost data were collected over a 3-month period for 30 604 episodes of care provided at 99 sites across Australia and five sites in New Zealand, including public and private hospitals and community health centres providing subacute and non-acute care. This dataset was used by the Centre for Health Service Development at the University of Wollongong to develop a national casemix classification for patients receiving subacute and non-acute care. Details of the complete dataset and the recommended classification — the Australian National Sub-Acute and Non-Acute Patient (AN-SNAP) classification[4] — are reported elsewhere.[5-7]

Continence status

From this dataset, we derived the continence status for 6773 complete episodes of care provided to 6455 patients in two categories — rehabilitation, and geriat-

ric evaluation and management — in an inpatient setting (patients were admitted and stayed for one or more nights) at 54 facilities. As no direct measure of incontinence had been collected for the 1996 study, we used patient scores from the Uniform Data System (UDS) Functional Independence Measure (FIM).[8] The FIM is a measure of independence comprising 18 items, including 13 motor and five cognitive items. These items are scored from 1 to 7, with 1 complete dependence and 7 complete independence. The total FIM score ranges from 18 to 126, with a lower value indicating poorer function. One of the FIM motor items, bladder management, relates to urinary incontinence. Based on the definitions in the FIM manual for scoring items,[8] patients in our retrospective analysis were classified as incontinent if their score for the FIM bladder management item on admission was 6 or less, and continent if their score was 7.

1: Number (%) of episodes in each functional impairment group* and proportion of episodes in each group with patients incontinent at the beginning of their episode

Impairment category	Number (%) of episodes	Proportion of episodes with incontinent patients
Orthopaedic conditions	2172 (32.1%)	48.1%
Stroke	1268 (18.7%)	64.9%
Debility	444 (6.6%)	64.0%
Pain syndromes	422 (6.2%)	27.0%
Neurological conditions	380 (5.6%)	60.0%
Other disabling impairments	358 (5.3%)	50.3%
Cardiac	329 (4.9%)	38.3%
Brain dysfunction	328 (4.8%)	61.3%
Amputation of limb	310 (4.6%)	51.9%
Pulmonary	280 (4.1%)	53.6%
Spinal cord dysfunction	271 (4.0%)	81.2%
Arthritis	124 (1.8%)	41.9%
Major multiple trauma	63 (0.9%)	65.1%
Burns	12 (0.2%)	66.7%
Congenital deformities	7 (0.1%)	71.4%
Developmental disabilities	5 (0.1%)	40.0%
Total	6773 (100.0%)	53.7%

*Uniform Data System Functional Impairment Group Codes.[12]

Costs

In the AN-SNAP study, the costs of nursing, allied health, goods and services, and medical and surgical supplies were collected ("core costs"), as well as other costs — medical, imaging, pathology, pharmacy, capital costs and volunteer time. These "non-core costs" could not be collected consistently across both the public and private sectors and across jurisdictions, so they were excluded from our analysis. Nursing and allied health staff costs were derived from log sheets of staff time and represented almost 60% of total core costs. As previous authors have shown that pathology and pharmacy costs are greater for incontinent patients,[2] we decided to focus on the "core staff costs", about which little is known in the field of incontinence. Our analysis therefore only included nursing and allied healthcare costs.

Definitions

- The quantum of care was an episode, defined as a period of contact between a patient and a provider occurring in one setting and in which there is no major change in the goal of intervention.
- The length of stay was defined as the number of days on which care was provided, and was calculated as the end date minus the admission date plus one.
- The cost per day was calculated by dividing the nursing and allied health staff costs by the length of stay. All costs were expressed in 2002 Australian dollars.

Ethical approval

The study was approved by the Ethics Committees of the University of New South Wales and the University of Wollongong.

Statistical analysis

We compared continent and incontinent patients with respect to age and treatment outcomes (discharge destination, the change in functional independence and the continence status at the end of the episode of care).

Patients may or may not have maintained their continence status throughout their episode; on admission they were either continent or incontinent, and at discharge their continence status may have changed or may have remained unaltered. Thus, episodes were allocated to one of four groups defined by continence status (as given in Box 2). For each group, average length of stay and daily core staff costs and their 95% confidence intervals were calculated.

The two largest impairment groups of rehabilitation patients — orthopaedic and stroke patients — were selected for a more detailed analysis. For each of these impairment groups, we selected only those patients whose continence status remained unaltered throughout their episode of care, so as to facilitate the statistical analysis. The orthopaedic dataset comprised 1599 episodes from 39 facilities, while the stroke dataset consisted of 887 episodes from 40 facilities.

For these impairment groups, we used a statistical model to investigate the difference in costs between patients who were continent and those who were incontinent throughout their episode of care. The data had been collected at a large number of different facilities with the result that a high proportion (about 40%) of the variability in the staff cost

data was observed between facilities rather than between patients within facilities. To enable the variability of costs between patients to be separated from the variability due to differences between facilities, a multilevel model was fitted to the data. Type of impairment was controlled by selecting subsets of the data and analysing them separately. All available variables thought likely to contribute to the cost of care were included in the initial statistical model, thereby adjusting the effect of continence status. These variables included age, FIM cognitive score on admission (total of FIM items 14–18), FIM motor score on admission (total of items 1–13) and the Resident Classification Instrument (RCI)[9] behaviour total. These variables have previously been found to be related to the cost of care.[10,11]

We then fitted a final model which incorporated continence status and only those variables that we found to be significantly related to the cost of care in the initial model. Variables, such as the RCI behaviour score, that were not significant in the initial model were excluded from this final model.

2: Urinary continence status at beginning and end of the episode, length of stay and core staff costs,* by impairment group

Urinary continence status at beginning and end of episode	Number of episodes (%) (n=6773)	Average length of stay (days) (95% CI)	Average core staff costs* per day ($) (95% CI)
Rehabilitation			
Incontinent–incontinent	2046 (30.2%)	27.1 (26.1, 28.0)	185.60 (181, 190)
Incontinent–continent	892 (13.2%)	31.6 (30.1, 33.2)	160.69 (155, 167)
Continent–incontinent	161 (2.4%)	25.7 (22.8, 28.6)	168.12 (151, 186)
Continent–continent	2561 (37.8%)	20.3 (19.8, 20.9)	156.82 (153, 160)
Geriatric evaluation and management			
Incontinent–incontinent	574 (8.5%)	19.1 (17.9, 20.4)	164.62 (157, 172)
Incontinent–continent	127 (1.9%)	20.1 (17.7, 22.4)	138.97 (123, 155)
Continent–incontinent	49 (0.7%)	20.1 (15.7, 24.5)	140.33 (114, 166)
Continent–continent	363 (5.3%)	17.1 (15.9, 18.3)	121.40 (114, 129)

*Nursing and allied healthcare costs.

3: Final multilevel analysis of variables affecting cost of care (one or more nights) for inpatients with orthopaedic or stroke conditions

	Orthopaedic conditions		Stroke	
Variable	Estimated cost and rate of change in cost (95% CI)	P	Estimated cost and rate of change in cost (95% CI)	P
Average daily staff cost*	159.61 (140.60, 178.67)	< 0.01	175.34 (147.6, 203.1)	< 0.01
Age	−0.40 (−0.68, −0.12)	< 0.01		
FIM motor score on admission	−1.43 (−1.71, −1.15)	< 0.01	−1.77 (−2.25, −1.29)	< 0.01
FIM cognition score on admission	−0.66 (−1.38, 0.05)	0.07	−0.83 (−1.58, −0.08)	0.03
Urinary continence status	1.90 (−1.33, 5.13)	0.25	3.47 (−13.70, 20.64)	0.69
Continence and FIM cognition score	−0.57 (−0.99, −1.16)	< 0.01	—†	
Continence and FIM motor score	—†		0.76 (0.04, 1.48)	0.04

*For a continent patient with an average score on all other variables. † Not included in final model as not significant. FIM = Functional Independence Measure.[8]

RESULTS

Patient profile

Most episodes (84%; 5660) were for rehabilitation. More than half of all episodes were provided to patients who were incontinent at the beginning of their episode of care (52% [2938] of rehabilitation and 63% [701] of geriatric evaluation and management episodes).

We were unable to investigate differences between men and women as sex of the patients was not included in the database. However, we were able to investigate the relationship between age and incontinence. As expected, incontinence becomes more prevalent as age increases. Median age for incontinent patients was 77 years (interquartile range, 68–84 years) compared with 74 years for continent patients (interquartile range, 66–81 years).

Box 1 shows the number of episodes in each UDS functional impairment group.[12] The most common impairment categories were orthopaedic conditions (32% of all episodes) and stroke (19% of all episodes). Within these two impairment groups, in 48% and 65% of episodes, respectively, patients were incontinent.

Patient outcomes

The patients' continence status tended to remain unchanged throughout their episode of care (Box 2). For example, in the overnight rehabilitation category, in 45% of episodes (2561/5660), patients were continent at the beginning of the episode and remained continent; likewise in 36% of episodes (2046/5660), patients were incontinent at the beginning of the episode and remained incontinent.

There were marked differences in the discharge destinations of patients according to continence status on admission: 82% (2569/3134) of episodes in continent patients ended with discharge to home, but this occurred in 57% (2079/3639) of episodes in incontinent patients. Instead, those with an incontinence condition were more likely to go to a nursing home or to move on to further care (29% [1052/3639] compared with 12% [387/3134] of episodes in continent patients). Functional improvement, as measured by change in FIM scores, was greater for incontinent than for continent patients, possibly due to the higher initial scores of the continent group allowing less room for improvement.

Length of stay and cost of care

The average daily cost was consistently higher for incontinent patients (Box 2). The less costly continent patients also had a shorter duration of stay.

The results of the multilevel analysis are presented in Box 3. When FIM scores for motor and cognition items and age were included in the model, the additional contribution of incontinence to the cost depended on the patient's functional independence.

Among orthopaedic patients, those who were younger or functionally more dependent were more expensive to treat ($P < 0.01$ for both variables). Orthopaedic patients with low FIM cognition scores were also found to be more expensive to treat, but only if they were incontinent ($P < 0.01$ for the interaction). Among stroke patients, those with lower cognition scores tended to be more expensive ($P = 0.03$). Stroke patients with high FIM motor scores were more expensive to treat if they were incontinent, whereas those who were functionally more dependent were more expensive to treat if they were continent ($P = 0.04$ for the interaction).

Although statistically significant, not all of these variables had a large effect on the cost of care. For example, orthopaedic patients who were 10 years younger than the average age cost only $4 per day more to treat. The largest effect found was for continent stroke patients, for whom a 10-point difference in admission FIM motor score corresponded to a difference in daily cost of $17.70.

DISCUSSION

Our study suggests that there are differences in costs and length of stay between continent and incontinent subacute care patients. An improvement in continence status from incontinent to continent occurred in 1019 patients. That this occurred in 16% of episodes in the rehabilitation group compared with 11% of episodes in geriatric evaluation and management patients is not surprising, as the primary treatment goal for rehabilitation patients is to improve functional status, whereas geriatric evaluation and management patients have complex, multidimensional medical problems and the primary goal is to optimise health status and/or living arrangements.

The results in Box 2 would appear to conflict with those in Box 3. In Box 2, the average daily staff cost was significantly higher for incontinent patients than for continent patients. Patients who were incontinent throughout their episode of care were most expensive, while those who began and remained continent were least expensive. However, the multilevel analysis of overnight stroke and orthopaedic rehabilitation patients (Box 3) suggests that the relationship between cost and incontinence is complex. The extent to which incontinence affects the cost of care appears to depend on other factors, such as the FIM motor and cognition scores at admission. Incontinence did not increase the cost of care uniformly. This is perhaps a surprising result. A possible explanation is that, although incontinent patients required more nursing time, thereby increasing nursing costs, this may have been offset by a reduction in therapy time and costs.

Our study has some shortcomings. The patient groups may not have been accurately differentiated; and the distinction between continence and incontinence using the FIM bladder management item was not as clear-cut as anticipated. For example, patients who needed to use a bedpan because of mobility problems may have been scored 5 on the bladder management item even though they did not have urinary incontinence. This is a potential problem with a retrospective analysis of a dataset, and the chosen definition is likely to have inflated the incidence rates of incontinence. It would be a useful, if costly, exercise to replicate the study prospectively in a select number of settings with standardised conditions and costing.

There could also have been a sampling bias. Because the data were collected for a 3-month period, longer episodes could have been under-represented. Accurate costs specific to each patient were not available in the database to the degree required for this type of analysis.

Nevertheless, if there are true differences in cost of care and length of stay between continent and incontinent patients, it is important that these are reflected in payment systems. The different treatment needs of incontinent patients (who tend to be more functionally dependent in other ways as well) has important implications for extra workloads placed on staff and for planning staff levels on wards. There are implications for casemix classifications such as AN-SNAP that require data on resource utilisation. When new versions of such casemix classifications are being developed, continence status is a variable that should be considered.

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COMPETING INTERESTS

None identified.

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