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RESEARCH PAPER

Incontinence during and following hospitalisation: a prospective study of prevalence, incidence and association with clinical outcomes

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Abstract

Background: Incontinence is common in hospitalised older adults but few studies report new incidence during or following hospitalisation.
Objective: To describe prevalence and incidence of incontinence in older inpatients and associations with clinical outcomes.
Design: Secondary analysis of prospectively collected data from consecutive consenting inpatients age 65 years and older on medical and surgical wards in four Australian public hospitals.
Methods: Participants self-reported urinary and faecal incontinence 2 weeks prior to admission, at hospital discharge and 30 days after discharge as part of comprehensive assessment by a trained research assistant. Outcomes were length of stay, facility discharge, 30-day readmission and 6-month mortality.
Results: Analysis included 970 participants (mean age 76.7 years, 48.9% female). Urinary and/or faecal incontinence was self-reported in 310/970 (32.0%, [95% confidence interval (CI) 29.0–35.0]) participants 2 weeks before admission, 201/834 (24.1% [95% CI 21.2–27.2]) at discharge and 193/776 (24.9% [95% CI 21.9–28.1]) 30 days after discharge. Continence patterns were dynamic within the peri-hospital period. Of participants without pre-hospital incontinence, 74/567 (13.1% [95% CI 10.4–16.1) reported incontinence at discharge and 85/537 (15.8% [95% CI 12.8–19.2]) reported incontinence at 30 days follow-up. Median hospital stay was longer in participants with pre-hospital incontinence (7 vs. 6 days, $P = 0.02$) even in adjusted analyses and pre-hospital incontinence was significantly associated with mortality in unadjusted but not adjusted analyses.
Conclusion: Pre-hospital, hospital-acquired and new post-hospital incontinence are common in older inpatients. Better understanding of incontinence patterns may help target interventions to reduce this complication.

Keywords: continence care, hospital-associated complications, incontinence, inpatients, older, older people

Key Points

- Incontinence is very common in hospitalised older adults and may vary in complex ways through the peri-hospital period.
- Hospital-acquired incontinence affects 10.4 to 16.1% of older medical and surgical inpatients.
- Almost half of hospitalised older adults experience incontinence before, during or early following hospitalisation.
- Health professionals caring for older people need to recognise and respond to continence needs throughout care transitions.

Background and study aims

Incontinence (involuntary loss of urine and/or faeces) is a common but still taboo condition associated with aging [1], with implications for patient safety, dignity and costs of health and community care [1–4]. Complications associated with incontinence include pressure injury, incontinence-associated dermatitis, urinary tract infection, falls, depression and social isolation [5–7]. Urinary incontinence is associated with higher risk of mortality in older adults following hospital admission [8] and longer hospital stays [4]. Older people may have pre-existing incontinence when they present to hospital, or it may develop or deteriorate during hospitalisation, related to acute illness, comorbid conditions, functional and cognitive status changes, and medications as well as hospital care processes [6, 7, 9, 10]. Hospital-acquired incontinence is a hospital-acquired complication similar to falls, pressure injuries, delirium and functional decline [11]. Hospitalised older patients may view new persistent incontinence as a state worse than death [12], reflecting the threats that incontinence and requiring continence care pose to dignity and autonomy [13]. However, there are limited longitudinal data describing changes in continence status occurring around the time of hospitalisation.

The objectives of this study were to describe the prevalence and incidence of incontinence in older adults hospitalised on acute medical or surgical wards and explore associations with clinical outcomes. The primary aims were to describe the prevalence of incontinence before hospitalisation, at discharge and 30 days after discharge; and the incidence of new incontinence at discharge (‘hospital-acquired incontinence’) and at 30-day follow-up. The secondary aim was to investigate the association of pre-hospital incontinence and hospital-acquired incontinence with outcomes (length of stay, facility discharge, 30-day readmission and 6-month mortality).

Methods

Study design, setting and participants

This study was a secondary analysis of prospectively collected data from consenting older inpatients admitted to eight acute care wards (five medical, three surgical) in four publicly funded hospitals in Queensland, Australia. Two temporally separate cohorts of consecutive participants were enrolled from October 2015 to April 2016 ($n = 474$, pre-intervention cohort) and October 2016 to April 2017 ($n = 539$, cluster randomised trial) using identical inclusion and exclusion criteria and measurement methods [11, 14, 15]. Participants from both cohorts were combined for this observational descriptive analysis to enhance precision of estimates as there was no difference in hospital-associated incontinence in intervention wards during the trial phase [14].

Patients were eligible to participate if they were aged 65 years and older and admitted to a study ward for 3 days or more. Patients with terminal or critical illness, severe cognitive impairment without a substitute decision maker, or unable to communicate in English were excluded. Participants were enrolled within 3 days of hospital admission, and participated in assessments at admission, discharge from the treating team, and 30 days after discharge. Assessments consisted of a structured face-to-face interview by a single trained clinician data collector at each hospital; 30 day follow-up assessment was conducted by telephone. Research assistants received 2 days of training and were supported by a data dictionary and regular telephone meetings with the data manager and chief investigator. All participants (or an appropriate surrogate decision maker) provided informed consent including consent for data use in related studies. The secondary analysis reported in this paper was approved by Royal Brisbane and Women’s Hospital Human Research Ethics Committee (LNR/2020/QRBW/5586).

Incontinence measures

Urinary and faecal incontinence were collected by participant self-report based on the consensus definitions of incontinence as a complaint of involuntary loss of urine or faeces [16, 17], as there were no validated brief screening tools for hospital settings. Urinary incontinence before admission was assessed by asking, ‘In the past two weeks did you ever lose urine when you didn’t want to?’ and at discharge and 30 days, ‘Do you currently ever lose urine when you don’t want to?’, with responses coded as yes or no; participants with an indwelling catheter (IDC) were coded separately and excluded from analyses. Faecal incontinence before admission was assessed by asking, ‘In the past two weeks did you ever leak, have accidents or lose control with stool when you didn’t want to?’ and at discharge and 30 days, ‘Do you currently ever leak, have accidents or lose control with stool when you don’t want to?’; participants who had a stoma were excluded from analyses. Research assistants could provide prompts using colloquial terms for urine and stool if required. Any incontinence was calculated as participants reporting urinary or faecal incontinence or both.

Descriptive variables

Other measures collected from structured patient interviews and medical record included age, sex, co-morbidities [18], emergency or elective admissions, usual living situation (community or residential aged care), functional status prior to admission (the need for human assistance with basic [dressing, eating, mobility, transfers, toileting and eating] and instrumental [managing medications, finances, shopping, meal preparation, housework, telephone and transport] activities of daily living) and cognitive status at admission using the Short Portable Mental Status Questionnaire (SPMSQ) [19]. Proxy respondents (e.g. close family carer) provided responses if required, to minimise exclusion of those with cognitive or communication disabilities. A frailty index was constructed using 39 baseline variables across multiple domains [20].

Outcomes

Length of stay was defined as days from admission to discharge from the study ward. Facility discharge was defined as continuing acute, rehabilitation or convalescent care or new residential aged care admission. Thirty-day readmission was obtained from statewide public hospital admissions data and 6-month mortality from the Queensland death registry.

Analysis

Participant flow and characteristics were summarised. Missingness was explored by comparing baseline characteristics of participants with complete data at all three timepoints and those missing data. Analyses were reported for urinary, faecal and any incontinence. Prevalence of incontinence was described as percentage of participants who reported incontinence 2 weeks prior to admission, at discharge, and 30 days later, using all data available at each time point. 'Hospital-acquired incontinence' was defined as the percentage of participants who reported incontinence at discharge assessment amongst those who had not reported pre-hospital incontinence. 'Post-hospital incontinence' was defined as the percentage of participants who reported incontinence at 30 days amongst those without pre-hospital incontinence. A sensitivity analysis included only participants with complete continence data at all time points, and 'trajectories' of incontinence were described in this subgroup.

The association between pre-hospital and hospital-acquired incontinence and length of stay was examined using Mann Whitney U test, and in a general linear model using log-transformed length of stay, adjusted for age, sex, comorbidity score, elective status, pre-hospital functional status (dependent in any basic activity of daily living vs. independent) and cognitive status (SPMSQ score < 8 on admission to hospital). The association with facility discharge, 30 day readmission and 6-month mortality in patients discharged alive was explored in logistic regression models, unadjusted and adjusted for the same variables. Odds ratios and 95% confidence intervals were estimated from regression co-efficients. Analyses were conducted using SPSS (IBM Corporation) version 29. Confidence intervals for estimates of proportions were calculated using binomial exact methods [21].

Results

We identified 4,138 patients aged 65 and older admitted during the study periods, of whom 1810 (43.7%) were eligible (1,670 discharged before 72 h, 340 admitted to another ward, 231 not screened, 67 terminally ill, 20 other reasons) and 1,013 (55.9% of eligible) consented to participate. Of these, three were missing pre-hospital incontinence data, and 40 had a pre-existing IDC and/or stoma, providing 970 participants with data for the current study. Continence data were available for 834 (85.8%) participants at discharge and 776 (79.8%) participants at 30 days; 708 (72.8%) participants had full data available for all time points. Proxies reported data for 72/970 (7.4%) participants at baseline, 71/834 (8.5%) at discharge and 84/776 (10.8%) at 30 days; those with proxy responses had higher rates of incontinence at each time point. Participant flow describing missing and excluded cases for each follow-up point is shown in Appendix Figure 1.

Participant characteristics are shown in Table 1. Participants were mostly older people living in the community with mild to moderate frailty and two or more co-morbidities who were admitted to hospital emergently. Most required assistance with instrumental activities of daily living, and one third had cognitive impairment on admission. Participants with missing data were older, with greater frailty and comorbidity, greater levels of cognitive impairment and functional dependence, more likely to come from residential aged care, had longer hospitalisations and were more likely to require facility discharge when compared with the restricted cohort with full data (Appendix Supplementary Table 1).

Figure 1 and Appendix Supplementary Table 2 describe the prevalence of patient-reported incontinence prior to admission, at discharge and 30 days later in all participants with data for each time point. Urinary and/or faecal incontinence was self-reported in 310/970 (32.0% [95% CI 29.0–35.0]) participants 2 weeks before admission, 201/834 (24.1% [95% CI 21.2–27.2]) at discharge and 193/776 (24.9% [95%CI 21.9–28.1]) 30 days after discharge. Urinary incontinence was more common than faecal incontinence at all timepoints (Figure 1). Hospital-acquired incontinence was reported in 74/567 (13.1% [95% CI 10.4–16.1]) participants who had been continent prior to admission, whilst post-hospital incontinence was reported in 85/537 (15.8% [95%CI 12.8–19.2]). Hospital-associated incontinence did not differ significantly by ward type (medical 12.9% vs. surgical 13.3%, $P = 0.90$) or elective status (emergency 13.4% vs. elective 11.1, $P = 0.55$). Post-hospital incontinence was more common in patients

Table 1. Participant characteristics for participants with baseline data ($n = 970$)

Age, mean (SD)	76.7 (7.7)
Female, *n* (%)	474 (48.9)
From residential aged care, *n* (%)	38 (3.9)
Elective admission, *n* (%)	155 (16.0)
Frailty index, mean (SD)	0.26 (0.15)
Charlson comorbidity score, median (IQR)	2 (1.3)
Medications at admission, mean (SD)	7.6 (4.6)
Urinary incontinence 2 weeks before admission, *n* (%)	251 (25.9)
Faecal incontinence 2 weeks before admission, *n* (%)	143 (14.7)
Any incontinence 2 weeks before admission, *n* (%)	310 (32.0)
Dependent in any basic ADL 2 weeks before admission, *n* (%)	220 (22.7)
Dependent in any instrumental ADL 2 weeks before admission, *n* (%)	626 (64.5)
Cognitive impairment (SPMSQ score < 8 at admission), *n* (%)*	311 (32.1)

[a]Data missing for 24 cases. SD standard deviation, IQR interquartile range, ADL activities of daily living, SPMSQ Short Portable Mental Status Questionnaire

Table 2. Association of incontinence prior to hospitalisation with discharge and post-hospital outcomes in 957 participants surviving to discharge. Multivariable analyses were adjusted for age, sex, comorbidity, elective status, physical and cognitive function

	Any pre-hospital incontinence ($n = 303$)	No pre-hospital incontinence ($n = 654$)	Unadjusted odds ratio	*P*	Adjusted odds ratio	*P*
Facility discharge, *n* (%)	83 (27.4)	153 (23.4)	1.24 (0.91–1.69)	0.18	1.07 (0.76–1.51)	0.71
30-day readmission, *n* (%)	67 (22.1)	129 (19.7)	1.16 (0.83–1.61)	0.40	1.02 (0.72–1.45)	0.91
6-month mortality, *n* (%)	52 (17.2)	71 (10.9)	1.76 (1.16–2.51)	0.007	1.30 (0.84–2.01)	0.23

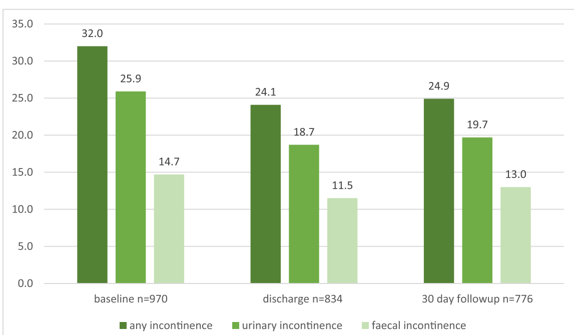

Figure 1. The percentage of participants 2 weeks before hospitalisation, at hospital discharge and at 30-day follow-up who self-reported any, urinary or faecal incontinence

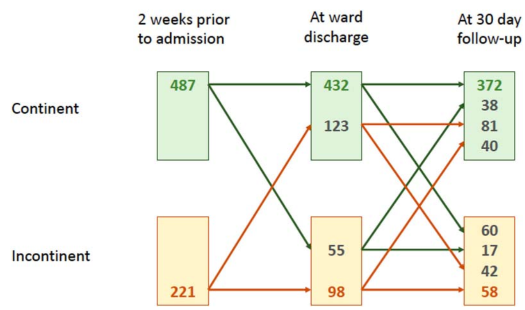

Figure 2. Continence trajectories for 708 participants with complete data at all time points (2 weeks prior to admission, at acute care discharge and 30 days later)

discharged from medical wards than surgical wards (19.7% vs. 10.8%, $P = 0.005$) but did not differ by elective status (emergency 16.4% vs. elective 13.0%, $P = 0.42$).

On face value the prevalence figures suggest a decrease in incontinence with hospitalisation, but they conceal complex patterns of change over time. Figure 2 illustrates continence trajectories within the restricted cohort ($n = 708$) with complete data (Appendix Supplementary Table 3). Of 487 (68.8%) participants without pre-hospital incontinence, 55 (11.3%) reported hospital-acquired incontinence and 77 (15.8%) reported post-hospital incontinence. Amongst 708 participants, 372 (52.5%) were continent at all three time points, 336 (47.5%) reported incontinence at one or more time point and 58 (8.2%) reported incontinence at all three time points. However, of 221 participants with pre-hospital incontinence, 123 (55.7%) reported that they were continent at the time of discharge, and 121 (54.8%) reported that they were continent at 30 day follow-up. Similar patterns were found for urinary and faecal incontinence separately (Appendix Supplementary Figure 2).

Median length of stay was 6 days (interquartile range IQR 5–9 days). Thirteen patients died during admission; amongst 957 survivors, 236 (24.7%) were discharged to facility care, 196 (20.5%) had an unplanned hospital readmission within 30 days and 136 (14.2%) died within 6 months. Hospital stay was longer in patients with pre-hospital incontinence compared to those without (median 7 days [interquartile

Table 3. Association of hospital-acquired incontinence with discharge and post-hospital outcomes. Multivariable analyses were adjusted for age, sex, comorbidity, elective status, physical and cognitive function

	Hospital-associated incontinence (n = 74)	No hospital-associated incontinence (n = 760)	Unadjusted odds ratio	P	Adjusted odds ratio	P
Facility discharge, n (%)	23 (31.1)	168 (22.1)	1.59 (0.94–2.68)	0.08	1.35 (0.77–2.36)	0.29
30-day readmission, n (%)	14 (18.9)	163 (21.4)	0.86 (0.47–1.57)	0.61	0.93 (0.50–1.73)	0.81
6-month mortality, n (%)	7 (9.5)	96 (12.6)	0.72 (0.32–1.62)	0.43	0.75 (0.32–1.73)	0.49

range IQR 5–10] vs. 6 days [IQR 4 to 9], P = 0.02) and in those with hospital-acquired incontinence compared to those without (median 7 days [IQR 5–10] vs. 6 days [IQR 4–9], P = 0.05). This association remained statistically significant in adjusted analyses for pre-hospital incontinence (P = 0.04) but was no longer significant for hospital-acquired incontinence (P = 0.22). Tables 2 and 3 show the association of pre-hospital incontinence and hospital-acquired incontinence with other outcomes. Participants with pre-hospital incontinence had significantly higher 6-month mortality, but this association was attenuated in adjusted analyses. Other associations were not statistically significant.

Discussion

In this secondary analysis of a prospective cohort of acutely hospitalised older adults, one third of participants reported incontinence in the 2 weeks prior to hospitalisation, with one in four experiencing urinary incontinence and one in seven experiencing faecal incontinence (Figure 1). About one quarter of patients reported incontinence at discharge and at 30-day follow-up, but these figures concealed complex trajectories of incontinence which have not been well characterised previously. In previously continent participants, 13.1% experienced new incontinence at hospital discharge, and 15.8% reported incontinence at 30 days. Somewhat unexpectedly, more than half of previously incontinent participants did not report incontinence at discharge or at 30 days follow-up. Overall 47.5% of the cohort described incontinence at one or more time points, highlighting how commonly incontinence is experienced in the peri-hospital period for older hospitalised adults. Hospital-acquired incontinence was equally common in medical and surgical patients, although post-hospital incontinence was more common in medical patients.

Incontinence is a much-feared complication of hospitalisation [12] and has been proposed as an indicator of poor quality of hospital care [22]. Cross-sectional studies in adult inpatients from Australia, Ireland, the Netherlands, Austria, the United States of America and Brazil report 6–29% urinary incontinence and 5–22% faecal incontinence [2, 5, 23–27]. Cohort studies in older inpatients in Australia, Israel, Italy, the United States and Singapore have reported pre-hospital urinary incontinence in 13–48% and faecal incontinence in 19–46% [6, 25, 28–30]. Few studies have specifically reported hospital-associated incontinence. In a cross-sectional prevalence study during hospital admission, Condon et al reported that prevalence rates in older inpatients were much higher than baseline self-report rates of urinary (29% vs. 12%) and faecal (12% vs. 5%) incontinence [23]. In prospective cohort studies, Zisberg reported new urinary incontinence in 17.1% of older general medical patients in Israel [6], Chong reported new urinary incontinence in 14.5% of geriatric unit inpatients in Singapore [29], and Lakhan reported new urinary incontinence in 12.8% and new faecal incontinence in 8.9% of older general medical inpatients in Australia [28]. Bell reported new incontinence in 14.3% of patients discharged from acute care to specialised nursing facilities in the United States [31], whilst Palmer reported new incontinence in 21% of older hip fracture patients [10]. None of these studies reported on post-hospital incontinence. Van Seben *et al.* reported that 36% of older inpatients from six wards in the Netherlands were incontinent at 30 days and were likely to remain incontinent at 3 months, but did not specify what proportion were hospital-acquired [32].

Our study uniquely reveals complex patterns of incontinence improvement, deterioration and stability during the peri-hospital period. These patterns are likely the result of a complex interplay of elements which reduce a person's ability to address their toileting needs in a timely way, including patient factors (mobility impairment, delirium, pain, embarrassment), treatment and staff factors (e.g. medications and fluid therapies, routine use of incontinence pads, staff fear of falling and poor recognition of continence care needs) and environmental factors (e.g. unfamiliar environment and routines, clinical attachments, shared bathrooms, fear of falling) [7, 9, 33–36]. This complexity makes understanding its pathophysiology complex [7], and similar multi-level factors are recognised for other hospital-associated complications of older people such as delirium [37]. There are several potential explanations for the surprising finding that half of older participants who reported incontinence before admission did not report incontinence at discharge and follow-up. It may be methodological artefact related to how questions were framed at these different time points, as participants were asked to consider a 2-week period for the pre-admission assessment. It may reflect a high rate of functional incontinence in the period immediately prior to admissions due to rapid pre-hospital functional decline which is commonly observed in older adults presenting with acute illness [38], or perhaps the widespread use of precautionary incontinence aids (pads or diapers) in acute wards [33, 39] meant some patients did not recognise or report contained incontinence.

Our findings provide preliminary evidence that pre-hospital incontinence may be associated with longer hospital stay although these findings require further exploration [34]. The association between pre-hospital incontinence and 6-month mortality that was attenuated in multivariate adjustment is consistent with findings from a recent systematic review of eight hospital inpatient studies [8]. The review reported a significant association between urinary incontinence and mortality that was weaker in studies using multivariable adjustment, and recognised that the observed association is likely to be complex in view of shared risk factors such as age, disability and comorbidity [7, 8].

The high prevalence of pre-hospital incontinence supports the importance of continence assessment as part of a comprehensive admission assessment in older people. Reassessment at discharge may also be valuable to identify new hospital-acquired incontinence requiring additional care and identify those whose incontinence may have resolved. In practice the value of assessments may be limited by a lack of reliable screening tools, poor clinician knowledge of incontinence, discomfort asking about this intimate aspect of function, and low prioritisation of continence care in rushed throughput-focussed systems [39, 40, 41]. Unfortunately, this may perpetuate the stigma and nihilism associated with this common and distressing complications, and interventions to manage incontinence in hospital and prevent hospital-associated incontinence remain poorly defined and studied [39, 42]. Several studies suggest that staff tend to default to precautionary incontinence containment even in those who are continent and mobile, and that such practices may themselves create or perpetuate incontinence [5, 6, 33, 39–41].

Strengths of this study include a large representative older inpatient cohort recruited from several wards, and patient self-report data for urinary and faecal incontinence. We also recognise some weaknesses. Despite standardisation of definitions of incontinence [17, 18], there is still some inconsistency in the literature about wording of questions (e.g. 'loss' or 'leakage'), time frames (particularly in the peri-hospitalisation period where continence symptoms may change rapidly) and inclusion of participants with indwelling catheters or stomas, and the decisions made in our analysis may have resulted in some social desirability, recall, reporting and selection bias [43]. We did not collect daily continence data and may have under-reported episodes of incontinence during hospitalisation; nor did we describe previous continence management or care needs, inpatient processes of continence care, or the severity or frequency of symptoms that could provide a more detailed picture. Proxy responses may have introduced bias, and data were more commonly missing in patients who were older, more frail and with greater cognitive impairment, who often have complex discharge planning that makes discharge and post-discharge follow-up more challenging. Such patients also have higher incontinence risks [7], so our estimates may be conservative.

In conclusion, our multi-site study of older hospitalised adults has confirmed that incontinence is very common in the peri-hospital period, and provides new evidence that continence status may vary rapidly over time, and that hospital-acquired incontinence and post-hospital incontinence are common. Better understanding of predictors and pathways to hospital-acquired incontinence may help target and test potential interventions to reduce this distressing complication.

Declaration of Conflicts of Interest: None.

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Data Availability: Data are protected under the study's ethical approval process and are not publicly available but may be available for related studies through reasonable request to the corresponding author.

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