Indwelling Urethral Catheter and Mortality in Frail Elderly Women Living in Community

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Aim: Urinary incontinence is one of the most common, disruptive and often disabling conditions affecting frail older people living in community. The aims of present study were to describe the prevalence of bladder catheter in a population of older women living in community and to examine the relationship between urinary catheter and mortality. Methods: This was an observational cohort study. We analyzed data from the Italian Silver Network Home Care project that collected data on patients admitted to Home Care programs. A total of twelve Home Health Agencies participated in such project evaluating the implementation of the Minimum Data Set for Home Care (MDS-HC) instrument. A total of 1,004 women were enrolled in the present study. The main outcome measures were prevalence of bladder catheter and 1-year survival according to catheterization. Results: The prevalence of incontinent patients with bladder catheter was 38.1%. Incontinent patients with indwelling bladder catheter did not show significant difference for age and comorbidity while they showed a significant higher level of physical and functional impairment, as expressed by higher score in activities of daily living (ADL) scale (6.5 ± 1.3 vs. 5.5 ± 2.2, P < 0.001) and higher prevalence of sensory impairment, pressure ulcers (44% vs. 12%, P < 0.001), and urinary tract infections (21% vs. 10%, P < 0.001). After adjusting for age and for all the variables significantly different between catheterized and not-catheterized subjects at baseline, subjects with indwelling bladder catheter were more likely to die compared to those without catheter (RR, 1.44; 95% CI 1.01–2.07). Conclusions: Catheterization has an important prognostic implication for frail old women living in the community, independent of age and other clinical and functional variables. A failure in decreasing the unnecessary bladder catheter use and the duration of catheterization among frail incontinent women should be considered an indicator of poor quality of care.

Key words: bladder catheter; frail elderly; geriatric assessment; home care; MDS; mortality

INTRODUCTION

Urinary incontinence is one of the most common, disruptive and often disabling conditions affecting frail older people living in community [Resnick, 1995; Diokno, 2001]. Urinary incontinence is highly prevalent in the elderly, affecting 5–30% of elderly persons living in the community [Herzog and Fultz, 1990; Maggi et al., 2001], 40–70% of acute hospital elderly inpatients [Sier et al., 1987], and 40–50% of nursing home residents [Ouslander, 1990]. Along with its medical, psychological, and social consequences, urinary incontinence represents a large economic burden, increasing health care expenses [Resnick, 1995; Wagner and Hu, 1998; Abrams et al., 2002].

Part of these clinical and economic problems related to urinary incontinence is due to the use of urinary catheters. Many authors have documented that indwelling catheters cause significant morbidity, including polymicrobial bacteriuria, febrile episodes, nephrolithiasis, bladder stones, epididymitis and chronic renal inflammation and pyelonephritis [Temml et al., 2000; Patel and Arya, 2001; DuBeau, 2002; Foxman, 2002]. However, the appropriate use of bladder catheters and their associated risk for urinary tract infection and death remain an important and not enough studied issue, especially among older people living in community.

Purposes of the present study are to ascertain the prevalence of bladder catheter use and to explore the relationship

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between urinary catheter and the risk of 1-year all-cause mortality in a large population of frail and very old women living in community.

MATERIALS AND METHODS

Study Population

Data were collected as part of the national Home Care program named Silver Network Home Care project, under the sponsorship of the Italian Gerontology and Geriatrics Society, the Italian General Practitioners Society, and the Pfizer Italy [Landi et al., 1999b]. The purpose of this project was to reorganize the care of the frail older people living in community, adopting an integrated social and medical care program along a case management approach and using, as screening and geriatric assessment tool, the Minimum Data Set for Home Care (MDS-HC) instrument [Morris et al., 1996, 1997].

The database has been described in details elsewhere [Landi et al., 1999b] and is briefly summarized here. This is a population-based, longitudinal, multi-linked database that comprises: (1) data collected with Minimum Data Set for Home Care (MDS-HC) on over 3,000 patients in 12 Home Health Agencies in Italy, and (2) data on all the medications used by each patient at the time of the MDS-HC assessment—drugs were coded using the Anatomical Therapeutic and Chemical (ATC) codes.

The study population consisted of all patients admitted to Home Care programs in these twelve Home Health Agencies from 1998 to 2000 (n = 3,103). For the present analyses, we selected all women with urinary incontinence (n = 1,117); subsequently we excluded 113 patients admitted to Home Care services with explicit diagnoses of terminal illness and/or cancer. As a result, the final analyses of the sample consisted of 1,004 subjects. All patients in the sample were assessed by a trained staff who collected data on the MDS-HC form following the guidelines published in the MDS-HC manual [Landi et al., 1996; Landi et al., 1999a], independent of the study protocol. The project was approved and monitored by the steering committee of the Catholic University and the local state authorities.

MDS-HC Assessment Data

The MDS-HC [Morris et al., 1997] contains over 350 data elements including socio-demographic variables, numerous clinical items about both physical and cognitive status, as well as all clinical diagnoses. The MDS-HC also includes information about an extensive array of signs, symptoms, syndromes, and treatments being provided [Morris et al., 1997]. A variety of different, multi-item summary scales are embedded in the MDS-HC measuring, for example, physical function (ADLs; instrumental activities of daily living—IADLs) [Landi et al., 2000] and cognitive status (cognitive performance scale—CPS) [Hawes et al., 1995; Landi et al., 2000]. The MDS-HC has already paved the way to a representative database that proved a powerful tool for health researches [Landi et al., 2001a,b].

Urinary Incontinence and Bladder Catheter

A multidisciplinary team of professionals (general practitioner, nurses, and geriatrician) evaluated urinary incontinence during the MDS-HC baseline assessment [Landi, 1999a]. According to MDS-HC manual, we used a single question about the urinary incontinence and a single question about the bladder catheterization. Urinary incontinence was measured with a five-point scale ranging from 0 (complete control) to 4 (inadequate control with multiple daily episodes). The team was instructed to ask simple and direct questions about whether the patients experienced incontinence. Because some patients had limitations in verbal communication, the assessors were also instructed to record all voids and incontinence episodes for 14 days. Independent, dual assessments of urinary incontinence in a different sample of nursing home patients during the testing and revision of the MDS showed that the inter-rater reliability for incontinence of all grades was excellent (weighted kappa correlation coefficient = 0.90) [Brandeis et al., 1998]. The patients were divided in two groups: the first group with indwelling catheter and the second one without it. Patients were considered with indwelling catheter when a catheter was held correctly in the bladder for more than 2 weeks.

Survival Status

Vital status was obtained from general practitioners and confirmed by the National Death Registry. Time to death was calculated from the date of first MDS-HC assessment to the date of death. All subjects were followed-up for 12 months (mean follow-up was 9.5 ± 4.3 months).

Analytic Approach

All demographic variables, measures of physical and cognitive function, and comorbid conditions were collected at MDS-HC baseline assessment on the admission to the Home Care program. Firstly, data were analyzed first to obtain descriptive statistics. Continuous variables are expressed as mean values ± standard deviation. Differences in socio-demographic, functional and clinical characteristics between catheterized, and not-catheterized patients were analyzed. Quantitative parameters with normal distribution were tested by one-way ANOVA, after a pre-test for homogeneity of variances. Categorical variables were analyzed by the chi-square test. A \( P < 0.05 \) level was chosen for statistical significance.

Cox proportional hazard analysis, adjusted for age and for all the variables significantly different between catheterized and not-catheterized subjects at univariate analysis, was
performed to assess the relative risk of death. Hazard rate ratios (RRs) and corresponding 95% confidence intervals (95% CIs) were derived from the final models. The impact of bladder catheter on survival was also tested comparing the survival curves obtained with the Kaplan–Meier method. Differences between curves were evaluated using the log-rank test.

All analyses were performed using SPSS software.

RESULTS

The principal characteristics of the study population are shown in Table I. Mean age was 83.3 years (SD = 9.5 years). Overall, patients had a moderate-to-severe impairment in basic ADL; similarly, cognitive function was compromised in a large number of patients (more than 35% showed a CPS score more than 2, indicating moderate to severe cognitive impairment). The prevalence of bladder catheter use among incontinent women was 38.1%. Incontinent patients with indwelling bladder catheter did not show significant difference for age and comorbidity. They showed a significant higher level of physical and functional impairment, as expressed by higher score in ADL scale (6.5 ± 1.3 vs. 5.5 ± 2.2, \(P < 0.001\)) and higher prevalence of sensory impairment, pressure ulcers (44% vs. 12%, \(P < 0.001\)), and urinary tract infections (21% vs. 10%, \(P < 0.001\)). On the other hand, catheterized patients showed a lower rate of depression compared to those not-catheterized.

During a follow-up of 12 months from the initial MDS-HC assessment, 93 subjects (15%) died in the not-catheterized group compared to 93 subjects (24%) in the catheterized one \((P = 0.001)\). There was uneven distribution of the risk. After adjusting for age and for all the variables significantly different between catheterized and not-catheterized subjects at baseline (ADL score, depression, sensory impairment, pressure ulcers, urinary tract infections, and stroke disease), subjects with indwelling bladder catheter were more likely to die compared to those without catheter (RR, 1.43; 95% CI 1.01–2.04). Adjusted survival curves according to bladder catheterization are shown in Figure 1.

DISCUSSION

In this observational study, we found that urethral catheterization has an important prognostic implication for frail incontinent women living in the community, independent of age and other clinical and functional variables. Even adjusting for several confounders, such as physical and sensory impairment, presence of pressure ulcers, urinary tract infections, and depression, mortality was more frequently observed among subjects with indwelling bladder catheter.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total sample (n = 1,004)</th>
<th>Catheterized (n = 383)</th>
<th>Not-catheterized (n = 621)</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean ± SD)</td>
<td>81.3 ± 9.0</td>
<td>81.2 ± 9.1</td>
<td>81.3 ± 9.2</td>
<td>0.7</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>284 (29)</td>
<td>114 (30)</td>
<td>170 (27)</td>
<td>0.07</td>
</tr>
<tr>
<td>Widowed</td>
<td>606 (60)</td>
<td>238 (62)</td>
<td>638 (62)</td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>114 (11)</td>
<td>31 (8)</td>
<td>83 (13)</td>
<td></td>
</tr>
<tr>
<td>Living alone</td>
<td>175 (17)</td>
<td>65 (17)</td>
<td>110 (17)</td>
<td>0.4</td>
</tr>
<tr>
<td>ADL score (mean ± SD)</td>
<td>5.9 ± 1.9</td>
<td>6.5 ± 1.3</td>
<td>5.5 ± 2.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CPS score (mean ± SD)</td>
<td>3.3 ± 2.2</td>
<td>3.5 ± 2.2</td>
<td>3.2 ± 2.1</td>
<td>0.1</td>
</tr>
<tr>
<td>No. of diseases (mean ± SD)</td>
<td>4.0 ± 2.4</td>
<td>4.1 ± 2.3</td>
<td>4.0 ± 2.4</td>
<td>0.5</td>
</tr>
<tr>
<td>No. of medications (mean ± SD)</td>
<td>3.7 ± 2.7</td>
<td>3.8 ± 2.6</td>
<td>3.6 ± 2.5</td>
<td>0.2</td>
</tr>
<tr>
<td>Depression</td>
<td>232 (23)</td>
<td>66 (17)</td>
<td>166 (27)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Sensory impairment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vision</td>
<td>465 (46)</td>
<td>209 (54)</td>
<td>156 (41)</td>
<td>0.05</td>
</tr>
<tr>
<td>Hearing</td>
<td>293 (29)</td>
<td>123 (32)</td>
<td>170 (27)</td>
<td>0.05</td>
</tr>
<tr>
<td>Pressure ulcer</td>
<td>365 (17)</td>
<td>154 (14)</td>
<td>211 (21)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>145 (14)</td>
<td>82 (21)</td>
<td>63 (10)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Principal associated diseases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart failure</td>
<td>199 (20)</td>
<td>75 (20)</td>
<td>124 (20)</td>
<td>0.4</td>
</tr>
<tr>
<td>Hypertension</td>
<td>383 (38)</td>
<td>135 (35)</td>
<td>248 (40)</td>
<td>0.07</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>198 (29)</td>
<td>85 (22)</td>
<td>113 (18)</td>
<td>0.08</td>
</tr>
<tr>
<td>Stroke</td>
<td>328 (33)</td>
<td>149 (39)</td>
<td>179 (29)</td>
<td>0.001</td>
</tr>
<tr>
<td>Diabetes</td>
<td>156 (15)</td>
<td>56 (15)</td>
<td>100 (16)</td>
<td>0.2</td>
</tr>
</tbody>
</table>

ADL, activities of daily living (range 0–7, a higher number indicates higher impairment); CPS, cognitive performance scale (range 0–6, a higher number indicates higher impairment).

*Data are given as number (percent) unless otherwise indicated.
Chronic indwelling urethral catheterizations should not be used for convenience, instead of having a toileting program for frail and disabled subjects. It is always important to reconsider reasons for the use of chronic indwelling catheter. The most recent guidelines [Fantl, 1996] suggest that indwelling catheters is recommended for selected incontinent patients who are terminally ill, for patients with pressure ulcers as short-term treatment, for severely impaired individuals in whom alternative interventions are not an option, and for patients living alone without an available caregiver. Considering these recommendations, we can hypothesized that in our sample more than 50% of incontinent women were catheterized without any reasonable justifications. However, it is noteworthy that the rationale for strongly promoting intermittent over continuous catheterization remains unclear. Schnelle and Smith [2001] suggest that urethral catheter use needs supporting documentation because different options to indwelling bladder catheterization are effective and have lower rate of morbidity. However, in the same article they assert that no direct scientific evidence demonstrates that reducing utilization of such devices improves patients' outcomes.

Long-term bladder catheterization may be related to the onset of important bacteriuria, which is often very difficult to eradicate and enhances the risk of bacteraemia, pyelonephritis, and sepsis. Before applying an urethral catheter to frail incontinent elderly patients, it should be taken into account that catheterization is an invasive procedure with a considerable morbidity and mortality [DuBeau, 2002]. Some authors have demonstrated that urinary tract infections during indwelling bladder catheterizations are associated with a threefold increase in mortality among hospitalized patients [Platt et al., 1982]. Furthermore, the widespread utilization of long-term bladder catheters for incontinence has significant costs implications, with the cost of medical consequences of catheterization outweighing savings in continence devices [Ouslander, 1984].

Some limitations of the present study need to be cited. First limitation is common to observational studies. In the absence of randomization, it is likely that there are significant, not considered differences between the evaluation groups that may have biased the study results and conclusions. For example, it can be hypothesized that catheterized subjects received a lower level of medical care. However, because of the use of MDS-HC, a multidimensional assessment instrument, the present study could comprehensively investigate the different domains of elderly status influencing the decision to catheterize and survival. For this reason and to permit an analysis taking care of the largest number of potential confounders, we incorporated in our model a whole series of variables, including comorbid conditions and measures of cognitive and functional status. In addition, although we adjusted all analyses for several indicators of frailty, comorbidity, and number of medications it is still possible that receiving catheterization is simply an indicator of poor health status and lack of medical care, and its association with mortality is due to insufficient adjustment for confounding factors not measured in the study, such as measure of disease severity or number of physician's visits. Another limitation of the present study is determined by the lack of any documentation concerning the cause of death. Similarly, we did not distinguish between different types of urinary incontinence and then the final indication to use the urinary catheter. However, we were interested in characterizing the impact of catheterization itself on all-cause mortality. Finally, a limitation of our study can be found in unavailable data about the catheterization at the time of the death. However, our patients were very frail and most of them were long-term catheterized. Moreover, aim of our study was to explore whether this procedure was an independent risk factor for mortality at the time of a common baseline assessment of an older patient.

Despite all these limitations, we believe that it is important to carefully evaluate the appropriateness for the application of an indwelling urethral catheter among "frail" community living elderly subjects. As in our sample, Jain et al. [1995] have documented no reasonable justification for one-third to one-half of the overall catheterizations. For this reason, all health care providers should take advantage of every opportunity to evaluate the real need of a bladder catheter in an incontinent subject. The MDS-HC assessment tool could be used by Home Care staff and general practitioners to identify those incontinent subjects not appropriately catheterized. Research is needed to explore the potential of using MDS-HC data to target diagnostic evaluation and to monitor the appropriateness of preventive strategies for urinary incontinence in community setting.

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