Fraction of Nursing Home Admissions Attributable to Urinary Incontinence

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ABSTRACT

Objective: To calculate the proportion of nursing home admissions of the elderly that is attributable to urinary incontinence (UI).

Methods: The fraction of nursing home admissions attributable to UI was computed from published values for the prevalence of UI and relative risks corrected for variables independently associated with nursing home admission.

Results: The attributable fraction of nursing home admissions due to UI in the elderly population was 0.10 (95% confidence interval [CI] 0.08–0.13) for men and 0.06 (95% CI 0.05–0.09) for women. Extrapolation to the US population in 2000 suggests an annualized cost of nursing home admissions due to UI of $6.0 billion ($3.0 billion each for elderly men and women).

Conclusions: The estimates of the fraction of nursing home admissions attributable to UI exceed those previously assumed and show an imbalance between the sexes. Policies that support reimbursement for treatments of UI in the community might help prevent or delay institutionalization and offset some of the costs.

Keywords: cost of illness, health expenditures, nursing homes, urinary incontinence.

Introduction

Urinary incontinence (UI) is thought to be a frequent catalyst for admission of the elderly into nursing homes. In recent cost-of-illness analyses nursing home admissions were calculated to be either the single largest direct cost category among community-dwelling adults, making up 28% of the $14.2 billion cost [1], or the second largest direct cost category, after routine care, accounting for 22% of the $10.8 billion total direct cost of UI in the elderly [2]. The costs of nursing home admissions are borne predominantly (48%) by state Medicaid programs [3] and make up a substantial part of their budgets.

The actual cost of nursing home admissions due to UI is uncertain. The total cost of nursing home admissions due to UI depends on their number, which is a function of the prevalence of UI in the community, and the probability of admission to a nursing home because of UI. Both of these parameters are elusive. Estimates of the prevalence of UI vary widely, in part because there is no single accepted definition of UI [4]. In population-based studies of older people the prevalence rate of daily incontinent episodes is 0.04 (0.02–0.11) for men and 0.14 (0.03–0.17) for women (numbers are median and range) [4]. More importantly, the probability of admission to a nursing home due to UI is difficult to estimate, because common comorbidities of UI are themselves reasons for admission.

Finally, there is the problem of selecting the most appropriate “cost of illness” measure. Birnbaum et al. [5] distinguished three different ways of defining and measuring cost-of-illness: the cost of treatment (the cost of treating UI); the incremental cost per patient (the additional cost associated with a patient with UI, due both to UI and associated comorbidities); and the incremental cost of illness (the additional cost attributable solely to UI). The incremental cost of UI is the most appropriate to understanding the specific cost impact of UI, as it controls for comorbid conditions and patient demographics [5].

The primary objective here is to calculate the proportion of nursing home admissions of the elderly that is due to UI, that is, to apply the third of the methodologies described by Birnbaum et al. to nursing home admissions due to UI. A secondary objective is to estimate the incremental cost of the proportion of nursing home admissions due to UI.

Methods

Attributable fraction (AF) is the appropriate statistic. It represents the proportion by which the incidence rate of nursing home admissions would be reduced if UI were eliminated (i.e., by a hypothetical, perfectly successful treatment). Among subjects with UI, the attributable fraction $AF_{UI}$ is given by:
where RR is the relative risk of admissions due to UI with UI, AFUI, is 0.69 (0.63–0.74) for men and 0.50 mental AF of nursing home admissions among subjects Calculated from the data of Thom et al. [7], the increment as a whole, AFp, is 0.10 (0.08–0.13) for men and 0.06 (0.05–0.09) for women. In other words, 10% of nursing home admissions among elderly men and 6% among elderly women were attributable solely to UI in the study by Thom et al.

A crude extrapolation from the data of Thom et al. to the US population in 2000, when there were 14.4 million elderly men and 20.6 million elderly women, suggests that the incremental number of nursing home admissions attributable annually to UI is 103,000 (89,700–116,000): 51,600 (47,100–55,100) men and 51,800 (42,700–60,400) women; (51600 men = 14,400,000 × PUI × IUI × AFUI; 51800 women = 20,600,000 × PUI × IUI × AFUI). The annual cost of a nursing home stay in 2004 was $57,800 (the cost in 1999 of $46,700 [3] inflated to 2004 dollars using the medical care inflation rate [8]). The annual numbers of nursing home admissions attributable incrementally to UI in the United States thus imply annualized (i.e., for the 12-month period after admission) costs of $3.0 ($2.7–3.2) billion for elderly men and $3.0 ($2.5–3.5) billion for elderly women, totaling $6.0 ($5.2–6.7) billion in 2004 dollars.

Discussion
The $6.0 billion cost of additional nursing home admission due to UI contrasts with the $4.0 billion (in 2000 dollars) reported by Hu et al. [1] and $2.4 billion (in 1995 dollars) reported by Wilson et al. (inflated to 2004 dollars using the medical care inflation rate, these values are $4.7 billion and $3.4 billion, respectively) [2]. The estimates of the proportion of nursing home admissions of the elderly due to UI of 6% for elderly women and 10% for elderly men exceed the 5% assumed in the previous analyses and, furthermore, show an imbalance between the sexes. Hence, the female : male ratio of costs of nursing home admissions due to UI was 3.3:1 in the study by Hu et al. [1] and 2.3:1 in the study by Wilson et al. [2], reflecting the greater prevalence of UI among women and the preponderance of women among the elderly [1,2]. In our analysis, however, these factors were countered by the imbalance between the sexes in the fraction of nursing home admissions attributable to UI, so that the female : male ratio of costs was 1 : 1.

Previous cost-of-illness analyses used different time windows in which to compute the costs of new institutionalizations. We assumed that new institutionalizations occurred throughout any 1-year period and lasted for at least 1 year. The 1-year time windows, within which new institutionalizations and the incremental costs of those institutionalizations were counted therefore are staggered. Individuals were also assumed to require a full year of institutionalization in the analysis of Wilson et al. [2]: their 1-year time horizon included new admissions and people already institutionalized due to UI. Hu et al., however, calculated the annual cost of new nursing home admissions on the basis of an average 0.5-year’s stay, arguing that, as new nursing home admissions occur throughout the year, the average length of stay for that year begins at the mid-point of the year and lasts until the end of the year, that is, for 0.5 year [1]. Nevertheless, this approach underestimates the true annual cost of insti-
Institutionalizations by 50%, because half the costs of institutionalizations occurring in a given calendar year will be incurred in the subsequent year.

Conclusion

We have put the calculation of the proportion of nursing home admissions of the elderly that is due to UI on an explicit basis by applying the incremental cost-of-illness concept of Birnbaum et al. [5] to data of Thom et al. [7]. The resulting estimates of 6% for elderly women and 10% for elderly men exceed the 5% previously assumed and show an imbalance between the sexes. This implies a different breakdown of costs than previously assumed and different cost consequences for public health insurance programs. New treatments have the potential to delay or prevent nursing home admission, thus offsetting their cost. Policies that support reimbursement for treatments of UI in the community may help capture some of these potential savings. The upper limit of this cost offset is given by the incremental cost of nursing home admissions attributable to UI, which we estimate to be an annualized $6 billion. Future research should investigate the extent to which treatments do, in fact, prevent or delay institutionalization.


References