

Prevalence of falls among seniors maintained on hemodialysis

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Abstract. *Background:* Increasing numbers of seniors are starting renal replacement therapy. Many may experience a loss of functional independence including mobility impairment. Seniors on dialysis commonly have multiple comorbidities that are associated with an increased risk for falls in the general population. Falls lead to serious injury, loss of independence, hospitalization and institutionalization. Despite such morbidity, little attention has been directed toward this marker of frailty in the dialysis population. In this brief preliminary report, we set out to determine the prevalence of falls among seniors on dialysis. *Methods:* A cross-sectional interview based survey was used to determine one year fall prevalence in patients aged 65 years and older receiving in center hemodialysis therapy. *Results:* A total of 135 ambulatory seniors were interviewed. Thirty-seven (27%) people reported having fallen in the past 12 months. An additional 21(16%) reported a fall prior to the past year. Four percent recalled a fall associated fracture or head injury requiring treatment. *Conclusions:* Falls are very common amongst seniors on hemodialysis. Further prospective study of the incidence and risk factors for falls in this population is needed to allow targeted interventions.

Key words: Aged, Elderly, Falls, Frailty, Fracture, Hemodialysis, Kidney disease, Prevalence

Introduction

Each year, one third of seniors aged 65 and over who live in the community have a fall; half of this group sustain repeat events [1–3]. Consequences of falls are considerable. Unintentional injury is the fifth leading cause of death in the US and in the elderly, most often results from falls [4]. Although serious injury, such as fracture, results from a small proportion of falls (5%), the health care burden remains high [3]. The annual cost of providing care for fall related fractures alone in the United States exceeds \$US11 billions [5]. Other consequences include the fear of falling syndrome with subsequent activity restriction, as well as decreased quality of life, functional decline and increased institutionalization [6, 7]. Falls are common and represent a marker of underlying frailty and functional dependence thus highlighting

the need for comprehensive evaluation of underlying causes.

There are numerous well established risk factors for falls [3]. Seniors on dialysis have many of the characteristics found to increase fall risk in community dwelling elderly. In addition to polypharmacy, these include diabetes, peripheral neuropathy, autonomic dysfunction, vascular disease, depression, cognitive impairment, and sleep disorders [8–10]. Other characteristics such as marked fluid, electrolyte and weight shifts during dialysis therapy may represent unique risk factors in dialysis patients who are prone to dizziness, hypotension and arrhythmias in the post-dialysis period. Elderly patients may have increased vulnerability to postural instability due to abnormalities in autonomic function and vascular tone which limit their reserves for adjusting to the rapid changes occurring during dialysis therapy [11].

As the population with kidney disease grows, demand for dialysis therapy is dramatically increasing, especially amongst the elderly: 50% of patients starting renal replacement therapy in Canada are over 65 years of age, representing the fastest growing age group starting dialysis [12]. Persons with chronic kidney disease have many co-morbidities, are maintained on multiple medications, and have increased rates of functional dependence [13]. Physical activity levels are also decreased compared to sedentary healthy peers such that the capabilities of more than 40% of patients are limited to self-care [13, 14]. Decreased levels of physical functioning are associated with increased hospital admissions, institutionalization, and greater need for health care services [15, 16].

It is suspected that falls are an under-recognized and preventable cause of excess morbidity in the elderly on dialysis. However, falls have received little recognition despite the evidence of high rates of their consequences: Hip fracture rates for US dialysis patients are four times higher than that seen in age and sex matched peers in the general population and increasing age magnifies this risk [17–19]. As there is currently little information about the burden of falls in the elderly on dialysis, we aimed to determine the prevalence of falls in persons 65 years and over on maintenance hemodialysis.

Subjects and methods

This cross-sectional survey was conducted in April 2002 in two in center hemodialysis units of a large teaching hospital in Toronto. Potential subjects were identified from the unit rosters, which are updated on a monthly basis. Persons were eligible if they were age 65 years or over, ambulatory (with or without assistance), were not currently inpatients, and spoke English or another language for which English translation was available. Subjects were asked if they had fallen to the ground or other lower level in the past 12 months regardless of whether they had been injured [20]. Further details of any complications were not sought, however any volunteered information was recorded. Wilcoxon rank sum and Chi squared tests were used to test for differences in age and sex between fallers and those who did not report falls

in the past 12 months. Age was analysed as both a continuous and a categorical variable (subjects aged 65–79 years and 80+ years were evaluated separately) in order to examine for potential differences in fall prevalence.

Results

Persons 65 years and over comprised 45% of the dialysis population in the two units and the majority (92%) received dialysis therapy three times per week. Of these 166 persons, 95 (59%) were male and the mean age was 75.0 ± 6.3 years (range: 65–93 years). Thirty-one potential subjects were excluded for the following reasons: language barrier (22), hospitalization (4), having transferred to another site (2), transplantation (1), having deceased during the survey period (1), or withdrawal from dialysis (1).

The remaining 135 had a mean age of 74.9 ± 6.2 years (range: 65–93 years) and 61% were male. Thirty-seven persons (27%) reported having fallen in the past 12 months and an additional 21 (16%) reported having fallen prior to that time, but not in the preceding 12-month period. Six patients (4%) volunteered that they had sustained a fracture or head injury as a result of the fall. One of the four inpatients, that were not included in the analysis, had been admitted for treatment of a hip fracture.

Those who reported a fall in the past 12 months were not significantly older than those who reported no falls ($p = 0.32$) and there was no significant difference in fall prevalence when the 'young-old' (persons aged 65–79) were compared with the 'old-old' age groups (aged 80 and older) ($p = 0.90$). Although it appeared women were more likely to have reported a fall this did not reach statistical significance (45.9% of fallers were women compared 35.7% of those reporting no falls, $p = 0.28$).

Discussion

In this survey, more than one quarter of community dwelling ambulatory seniors aged 65–93 years of age on hemodialysis reported a fall in the past 12 months; a finding similar to the reported prevalence in community dwelling seniors without

chronic kidney disease [1–3]. The true prevalence of falls in this group of elderly hemodialysis patients is likely to have been higher. Fall ascertainment relies on self-reporting and can be subject to inaccuracies in recall. Previous work, using a similar definition of falls, demonstrated that seniors underestimate events by 13% over a 12 month period, and by more than 30% over shorter periods of recall [21]. Recall of injurious falls appears to be worse. From Cummings and colleagues' experience, those who sustained injurious falls over prospective follow up were less likely to recall their falls: Up to half did not recall a fall within the past three months and 40% did not recall injurious falls [21].

In this study, those fell were similar in age and gender to those who did not fall in the past year. Other risk factors and markers of frailty should be sought in this population in order to identify and target those at highest risk who may be likely to benefit from fall prevention interventions. We conclude that falls are relatively common in seniors on dialysis and that further work to prospectively measure both falls and their risk factors in this population will be useful in directing efforts at fall prevention. Until kidney disease-specific information is available, recommendations on fall risk assessment and interventions from current guidelines for the general elderly population may help direct clinical decision making [22].

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Potential Conflicts of Interest

None disclosed.

References

1. Blake AJ, Morgan K, Bendall MJ et al. Falls by elderly people at home: prevalence and associated factors *Age Ageing* 1988; 17: 365–372.
2. Prudham D, Evans JG. Factors associated with falls in the elderly: a community study *Age Ageing* 1981; 10: 141–146.
3. Tinetti ME, Speechley M, Ginter SF. Risk factors for falls among elderly persons living in the community *N Engl J Med*. 1988; 319: 1701–1707.
4. Arias E, Anderson RN, Kung HC et al. Deaths: final data for 2001 *Natl Vital Stat Rep* 2003; 52: 1–115.
5. Ray NF, Chan JK, Thamer M, Melton LJ III. Medical expenditures for the treatment of osteoporotic fractures in the United States in 1995: report from the National Osteoporosis Foundation. *J Bone Miner Res* 1997; 12: 24–35.
6. Cumming RG, Salkeld G, Thomas M, Szonyi G. Prospective study of the impact of fear of falling on activities of daily living, SF-36 scores, and nursing home admission. *J Gerontol A Biol Sci Med Sci* 2000; 55: M299–M305.
7. King MB, Tinetti ME. Falls in community-dwelling older persons. *J Am Geriatr Soc*. 1995; 43: 1146–1154.
8. Jassal SV, Douglas JF, Stout RW. Prevalence of central autonomic neuropathy in elderly dialysis patients. *Nephrol Dial Transplant* 1998; 13: 1702–1708.
9. Sabbatini M, Minale B, Crispo A et al. Insomnia in maintenance haemodialysis patients. *Nephrol Dial Transplant* 2002; 17: 852–856.
10. Fukunishi I, Kitaoka T, Shirai T et al. Psychiatric disorders among patients undergoing hemodialysis therapy. *Nephron* 2002; 91: 344–347.
11. Jassal SV, Coulshed SJ, Douglas JF, Stout RW. Autonomic neuropathy predisposing to arrhythmias in hemodialysis patients. *Am J Kidney Dis* 1997; 30: 219–223.
12. Canadian Institute for Health Information (CIHI). End-Stage Renal Disease (ESRD) update: Provincial Comparisons of ESRD Patients Starting Renal Replacement Therapy (RRT) in 2000 and ESRD Patients on Dialysis on December 31, 2000. 2002.
13. Ifudu O, Mayers J, Matthew J et al. Dismal rehabilitation in geriatric inner-city hemodialysis patients. *JAMA* 1994; 271: 29–33.
14. Johansen KL., Chertow GM, Ng AV et al. Physical activity levels in patients on hemodialysis and healthy sedentary controls. *Kidney Int* 2000; 57: 2564–2570.
15. Rocco MV, Soucie JM, Reboussin DM, McClellan WM. Risk factors for hospital utilization in chronic dialysis patients. Southeastern Kidney Council (Network 6). *J Am Soc Nephrol* 1996; 7: 889–896.
16. Sankarasubbaiyan S, Holley JL. An analysis of the increased demands placed on dialysis health care team members by functionally dependent hemodialysis patients. *Am J Kidney Dis* 2000; 35: 1061–1067.
17. Alem AM, Sherrard DJ, Gillen DL et al. Increased risk of hip fracture among patients with end-stage renal disease. *Kidney Int* 2000; 58: 396–399.
18. Stehman-Breen CO, Sherrard DJ, Alem AM et al. Risk factors for hip fracture among patients with end-stage renal disease. *Kidney Int* 2000; 58: 2200–2205.
19. Ball AM, Gillen DL, Sherrard D et al. Risk of hip fracture among dialysis and renal transplant recipients. *JAMA* 2002; 288: 3014–3018.
20. The prevention of falls in later life. A report of the Kellogg International Work Group on the Prevention of Falls by the Elderly. *Dan Med Bull* 1987; 34 Suppl 4: 1–24.

21. Cummings SR, Nevitt MC, Kidd S. Forgetting falls. The limited accuracy of recall of falls in the elderly. *J Am Geriatr Soc.* 1988; 36: 613–616.
22. Guideline for the prevention of falls in older persons American Geriatrics Society, British Geriatrics Society, and American Academy of Orthopaedic Surgeons Panel on Falls Prevention. *J Am Geriatr Soc* 2001; 49: 664–672.

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