

Editorial

A Fall Is a Major Event in the Life of an Older Person

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FALLING is a common occurrence. Many of us trip and fall as we go about our daily lives. However, in an older person, a fall can have disastrous consequences. Falls are a major cause of death in older persons (1). Falls are the key event in the pathogenesis of hip fracture (2). Hip fractures are associated with a marked decline in functional status in the year following their occurrence (3,4). Persons who fall often develop fear of falling (5), which leads to isolation and depression (6-8). Fear of falling is strongly associated with impaired instrumental activities of daily living (8). Falling is not only an important marker of frailty (9-11), but frequent falls can play a role in accelerating the downward spiral in a frail older person (12). In California, the mean cost of hospitalization following a fall was \$17,086 (13).

Fallers are often more functional than nonfallers when compared within similar levels of performance. Thus, in the New Mexico Aging Process Study, it was the highly active older individuals who had the most falls (14). In a nursing home study, among wheelchair-bound persons, it was those who had a higher functional level who were more likely to fall (15). Pavol and colleagues (16) demonstrated that, in healthy elderly persons, walking rapidly was the most important reason that an older person fell following an induced trip. Other factors associated with falling after a trip were moving the body's center of gravity forward and weakness in back and knee extensor muscles.

In this issue of the *Journal*, Fletcher and Hirdes (17) in a large study of elders receiving community-based services reported that 27% of them fell once and 10% more than once. In their study, factors associated with falling included being male, having an impaired gait, being frail, and having environmental hazards in the house. In addition, persons with poor self-rated health were more likely to fall. Pavol and colleagues (18), also in this issue, found that older persons and repeated fallers are more likely to fall when a slip is induced. However, they found that with repeated exposure to a perturbation, older adults can learn to recover and not fall.

Impaired balance represents a major cause of falls (19,20). Simple tests such as the unipedal stance, tandem walk, and the get-up-and-go test are good predictors of impaired balance and the propensity to fall (21,22). Functional reach appears to be a poor test to identify fallers (23), although a multidirectional reach test that includes sideways

and backwards reaches appears to be a more promising tool for determining stability limits (24). This is in keeping with the study of Rogers and colleagues (25), which demonstrated that older fallers have a greater sideways body motion toward the stepping side. In addition, fallers tend to lift off earlier and have a longer step duration. Lord and Fitzpatrick (26) have developed the choice stepping reaction time (CSRT) as a composite measure of fall risk. The CSRT is a significant independent predictor of falls risk. It consists of stepping onto one of four panels that are illuminated in random order.

The factors regulating balance are multifactorial as previously elucidated by Woollacott in the *Journal* (27). These include alterations in cerebral function, such as a decrease in neuronal endrites and beta-adrenergic input (28), proprioceptive input (29), and quadriceps strength (30-32). Brauer and colleagues (33) found that recovery of balance was cognitively demanding. Their research demonstrated that an elderly person had more difficulty maintaining balance when required to perform a second task at the same time. Thus, cognitively impaired persons are less likely to be able to maintain balance when they experience a trip. A number of studies have demonstrated that balance and resistance exercises can improve balance and reduce falls (34-36). Tai Chi, the ancient Chinese exercise form, appears to be particularly useful for improving balance (37). Interestingly, weighted vest exercise, which improves bone mineral density (38), also improves lateral stability, lower body muscular strength, and muscular power (39).

Diabetes mellitus is an important cause of falls and injurious falls in older persons (40-42). Even very old persons with diabetes have worse neuromuscular performance than do those without diabetes (43). In addition, persons with diabetes mellitus are more likely to have cognitive impairment (44). Foot abnormalities are common in persons with diabetes, and foot abnormalities are a cause of falls (45). There is a need for research into balance function in older diabetics and approaches to reverse this problem.

Loss of muscle mass, or sarcopenia, represents a major contributor to the pathogenesis of falls (46,47). Following hip fracture, muscle mass and strength are strong predictors of mobility recovery (48). Resistance exercises are the best available method to reverse sarcopenia (34,49,50). However, there is increasing interest in the ability of anabolic hormones to increase lean muscle mass. Testosterone re-

placement, in particular, has been shown to increase lean muscle mass and improve strength in older hypogonadal men (51–54). Testosterone also increases bone mineral density, thus decreasing the propensity to develop a hip fracture (55,56). Low bioavailable testosterone levels are correlated with declining functional status (57). Growth hormone also increases lean muscle mass but does not appear to increase strength (58,59). A recent study in the *Journal* has shown synergetic effects of testosterone and growth hormone on enhancing muscle strength and bone mineral density (60, 61). Testosterone has also been shown to increase muscle mass and bone mineral density in older women (62,63). There is a need for studies examining the effect of testosterone in frail older men and women.

Poor nutritional status is an important contributor to sarcopenia and falls (64,65). Aggressive nutritional treatment plays a role in improving muscle strength and preventing falls (66). Vitamin D replacement increases strength and decreases hip fractures (67). Polypharmacy remains an important cause of falls (68,69). Selective serotonin reuptake inhibitors have been associated with an increase in falls and hip fracture (70). The mechanism by which they do this is uncertain but may be associated with the hyponatremia that these drugs can produce (71). Antidepressants such as amitriptylene are particularly likely to produce falls. Draganich and colleagues (72) showed that amitriptylene, but neither paroxetine nor desipramine, slowed the ability of older subjects to cross obstacles. The potential effect of antidepressants to produce falls should not, however, lead to nontreatment of depressed older persons, as aggressive treatment of depression in home-bound individuals results in decreased hospitalizations (73).

Falls are often associated with dizziness and less often with syncope (74). While it is rare that the work-up of a single episode of syncope is productive, persons with multiple episodes and/or cardiovascular defects on the history or physical examination often are found to have cardiovascular disease that is amenable to treatment (75). Postprandial hypotension (PPH) occurs following the ingestion of a carbohydrate meal (76,77). PPH is thought to be related to release of a vasodilatory peptide such as calcitonin gene-related peptide (78). PPH is present in approximately a quarter of all persons who fall (79). PPH is more common in persons with Parkinson's disease (80) and diabetes mellitus (79). Orthostatic hypotension remains an important cause of falling in older persons and is extremely common (81). Standing and lying blood pressures should be obtained in all older persons who fall. Orthostasis is more common in the morning, so it should be checked between 7 AM and 10 AM.

Other recent falls studies have highlighted the high rate of falling in older persons with sleep disturbances (82) and visual risk factors (83). Persons with poor functional mobility have been shown to be at increased risk for falls (84). In an older person with new onset falls, delirium should be excluded as a diagnosis (85). While geriatricians should no longer need to be reminded, the use of physical restraints in older persons in hospitals and even in nursing homes remains far too common. It is clear that physical restraints are dangerous, have little or no function, and should be avoided at all costs (86,87). Using appropriate continuous quality

improvement methods (88,89) and education (90), physical restraint use can be markedly reduced with a decrease in injurious falls. The Life Care Subacute Care Unit associated with Saint Louis University has been restraint free from its inception, without any excess of falls or fractures (91). Side-rails are also becoming recognized as an important cause of bed-related falls and injuries (92).

Numerous fall risk assessment tools are available, and one of these should be routinely utilized in persons at high risk for falling (93). Yates and Dunnagan (94) showed that a simple home-based fall risk reduction program in older adults living in the community was highly effective. Recently, a number of other fall-risk prevention programs have been equally effective (95–97). Interventional programs have also reduced fall risk in nursing homes (98). Given the weight of evidence-based data, it is no longer appropriate that physicians fail to recognize older persons at fall risk and place them in a fall-risk reduction education program. Guidelines for the prevention of falls in older persons have been developed by the American Geriatrics Society (99). In addition, all persons at risk for falls should be evaluated for osteoporosis and receive at a minimum calcium and vitamin D. Studies have shown that osteoporosis is poorly treated in older persons, even following a hip fracture (100).

ACKNOWLEDGMENT

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REFERENCES

1. Richmond TS, Kauder D, Strumpf N, Meredith T. Characteristics and outcomes of serious traumatic injury in older adults. *J Am Geriatr Soc.* 2002;50:215–222.
2. Perry HM III. Facets of femoral fracture. *J Gerontol Med Sci.* 2000; 55A:M487–M488.
3. Magaziner J, Hawkes W, Hebel JR, et al. Recovery from hip fracture in eight areas of function. *J Gerontol Med Sci.* 2000;55A:M498–M507.
4. Michel JP, Hoffmeyer P, Klopfenstein C, Bruchez M, Grab B, d'Epina CL. Prognosis of functional recovery 1 year after hip fracture: typical patient profiles through cluster analysis. *J Gerontol Med Sci.* 2000;55A:M508–M515.
5. Anonymous. Fear of falling. *Harvard Women's Health Watch.* 2000; 7:7.
6. Bruce DG, Devine A, Prince RL. Recreational physical activity levels in healthy older women: the importance of fear of falling. *J Am Geriatr Soc.* 2002;50:90–96.
7. Vellas BJ, Wayne SJ, Romero LJ, Baumgartner RN, Garry PJ. Fear of falling and restriction of mobility in elderly fallers. *Age Ageing.* 1997;26:189–193.
8. 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 Med Sci.* 2000;55A:M299–M305.
9. Davis JW, Nevitt MC, Wasnich RD, Ross PD. A cross-cultural comparison of neuromuscular performance, functional status, and falls between Japanese and white women. *J Gerontol Med Sci.* 1999;54A: M288–M292.
10. Walston J, Fried LP. Frailty and the older man [review]. *Med Clin North Am.* 1999;83:1173–1194.
11. Nourhashemi F, Andrieu S, Gillette-Guyonnet S, Vellas B, Albaredo JL, Grandjean H. Instrumental activities of daily living as a potential marker of frailty. A study of 7364 community-dwelling elderly women (the EPIDOS Study). *J Gerontol Med Sci.* 2001;56A:M448–M453.

12. Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. *J Gerontol Med Sci.* 2001;56A:M146–M156.
13. Ellis AA, Trent RB. Do the risks and consequences of hospitalized fall injuries among older adults in California vary by type of fall? *J Gerontol Med Sci.* 2001;56A:M686–M692.
14. Vellas BJ, Garry PJ, Wayne SJ, Baumgartner RN, Albaredo JL. A comparative study of falls, gait and balance in elderly persons living in North America and Europe: methodology and preliminary results. In: Vellas B, Toupet M, Rubenstein L, Allarede JL, Christensen Y, eds. *Falls, Balance and Gait Disorders in the Elderly.* Amsterdam: Elsevier; 1992:93–116.
15. Perry HM III, Dicknele S, Boesch J, et al. Falls in wheelchair-dependent individuals in nursing homes: utility of a sitting balance scale. *Nurs Home Med.* 1994;2:171–177.
16. Pavol MJ, Owings TM, Foley KT, Grabiner MD. Mechanisms leading to a fall from an induced trip in healthy older adults. *J Gerontol Med Sci.* 2001;56A:M428–M437.
17. Fletcher PC, Hirdes JP. Risk factors for falling among community-based seniors using home care services. *J Gerontol Med Sci.* 2002;57A:M504–M510.
18. Pavol MJ, Runtz EF, Edwards BJ, Pai Y-C. Age influences the outcome of a slipping perturbation during initial but not repeated exposures. *J Gerontol Med Sci.* 2002;57A:M496–M503.
19. Gardner AW, Montgomery PS. Impaired balance and higher prevalence of falls in subjects with intermittent claudication. *J Gerontol Med Sci.* 2001;56A:M454–M458.
20. Covinsky KE, Kahana E, Kahana B, Kercher K, Schumacher JG, Justice AC. History and mobility exam index to identify community-dwelling elderly persons at risk of falling. *J Gerontol Med Sci.* 2001;56A:M253–M259.
21. Medell JL, Alexander NB. A clinical measure of maximal and rapid stepping in older women. *J Gerontol Med Sci.* 2000;55A:M429–M433.
22. Gunter KB, White KN, Hayes WC, Snow CM. Functional mobility discriminates nonfallers from one-time and frequent fallers. *J Gerontol Med Sci.* 2000;55A:M672–M676.
23. Wallmann HW. Comparison of elderly nonfallers and fallers on performance measures of functional reach, sensory organization, and limits of stability. *J Gerontol Med Sci.* 2001;56A:M580–M583.
24. Newton RA. Validity of the multidirectional reach tests: a practical measure for limits of stability in older adults. *J Gerontol Med Sci.* 2001;56A:M248–M252.
25. Rogers MW, Hedman LD, Johnson ME, Cain TD, Hanke TA. Lateral stability during forward-induced stepping for dynamic balance recovery in young and older adults. *J Gerontol Med Sci.* 2001;56A:M589–M594.
26. Lord SR, Fitzpatrick RC. Choice stepping reaction time: a composite measure of falls risk in older people. *J Gerontol Med Sci.* 2001;56A:M627–M632.
27. Woollacott MH. Systems contributing to balance disorders in older adults. *J Gerontol Med Sci.* 2000;55A:M424–M428.
28. Rosenthal MJ, Morley JE, Flood JF, Scarpace PJ. Relationship between behavioral and motor responses of mature and old mice and cerebellar beta-adrenergic receptor density. *Mech Ageing Dev.* 1988;45:231–237.
29. McChesney JW, Woollacott MH. The effect of age-related declines in proprioception and total knee replacement on postural control. *J Gerontol Med Sci.* 2000;55A:M658–M666.
30. Kostka T, Rahmani A, Berthouze SE, Lacour JR, Bonnefoy M. Quadriceps muscle function in relation to habitual physical activity and $\dot{V}O_{2\max}$ in men and women aged more than 65 years. *J Gerontol Biol Sci.* 2000;55A:B481–B488.
31. Foldvari M, Clark M, Laviolette LC, et al. Association of muscle power with functional status in community-dwelling elderly women. *J Gerontol Med Sci.* 2000;55A:M192–M199.
32. Martin JC, Farrar RP, Wagner BM, Spirduso WW. Maximal power across the lifespan. *J Gerontol Med Sci.* 2000;55A:M311–M316.
33. Brauer SG, Woollacott M, Shumway-Cook A. The interacting effects of cognitive demand and recovery of postural stability in balance-impaired elderly persons. *J Gerontol Med Sci.* 2001;56A:M489–M496.
34. Evans WJ. Exercise strategies should be designed to increase muscle power. *J Gerontol Med Sci.* 2000;55A:M309–M310.
35. Yates SM, Dunnagan TA. Evaluating the effectiveness of a home-based fall risk reduction program for rural community-dwelling older adults. *J Gerontol Med Sci.* 2001;56A:M226–M230.
36. Carmeli E, Kessel S, Coleman R, Ayalon M. Effects of a treadmill walking program on muscle strength and balance in elderly people with Down syndrome. *J Gerontol Med Sci.* 2002;57A:M106–M110.
37. Wolf SL, Sattin RW, O'Grady M, et al. A study design to investigate the effect of intense Tai Chi in reducing falls among older adults transitioning to frailty. *Control Clin Trials.* 2001;22:689–704.
38. Snow CM, Shaw JM, Winters KM, Witzke KA. Long-term exercise using weighted vests prevents hip bone loss in postmenopausal women. *J Gerontol Med Sci.* 2000;55A:M489–M491.
39. Shaw JM, Snow CM. Weighted vest exercise improves indices of fall risk in older women. *J Gerontol Med Sci.* 1998;53A:M53–M58.
40. Morley JE. Diabetes mellitus: a major disease of older persons. *J Gerontol Med Sci.* 2000;55A:M255–M256.
41. Miller DK, Lui LY, Perry HM III, Kaiser FE, Morley JE. Reported and measured physical functioning in older inner-city diabetic African Americans. *J Gerontol Med Sci.* 1999;54A:M230–M236.
42. Rodriguez-Saldana J, Morley JE, Reynoso MT, et al. Diabetes mellitus in a subgroup of older Mexicans: prevalence, association with cardiovascular risk factors, functional and cognitive impairment, and mortality. *J Am Geriatr Soc.* 2002;50:111–116.
43. Resnick HE, Vinik AI, Heimovitz HK, Brancati FL, Guralnik JM. Age 85+ years accelerates large-fiber peripheral nerve dysfunction and diabetes contributes even in the oldest-old: The Women's Health and Aging Study. *J Gerontol Med Sci.* 2001;56A:M25–M31.
44. Meneilly GS, Tessier D. Diabetes in elderly adults. [review]. *J Gerontol Med Sci.* 2001;56A:M5–M13.
45. Menz HB, Lord ST. The contribution of foot problems in mobility impairment and falls in community-dwelling older people. *J Am Geriatr Soc.* 2001;59:1651–1656.
46. Morley JE, Baumgartner RN, Roubenoff R, Mayer J, Nair KS. Sarcopenia. *J Lab Clin Med.* 2001;137:231–243.
47. Roubenoff R, Hughes VA. Sarcopenia: current concepts. *J Gerontol Med Sci.* 2000;55A:M716–M724.
48. Visser M, Harris TB, Fox KM, et al. Change in muscle mass and muscle strength after a hip fracture: relationship to mobility recovery. *J Gerontol Med Sci.* 2000;55A:M434–M440.
49. Schlicht J, Camaione DN, Owen SV. Effect of intense strength training on standing balance, walking speed, and sit-to-stand performance in older adults. *J Gerontol Med Sci.* 2001;56A:M281–M286.
50. Fiatarone-Singh MF. Exercise comes of age: rationale and recommendations for a geriatric exercise prescription. *J Gerontol Med Sci.* 2002;57A:M262–M282.
51. Morley JE. Andropause: is it time for the geriatrician to treat it? *J Gerontol Med Sci.* 2001;56A:M263–M265.
52. Sih R, Morley JE, Kaiser FE, Perry HM III, Patrick P, Ross C. Testosterone replacement in older hypogonadal men: a 12-month randomized controlled trial. *J Clin Endocrinol Metab.* 1997;82:1661–1667.
53. Morley JE, Perry HM III, Kaiser FE, et al. Effects of testosterone replacement therapy in old hypogonadal males: a preliminary study. *J Am Geriatr Soc.* 1993;41:149–152.
54. Kenny AM, Prestwood KM, Gruman CA, Marcello KM, Raisz LG. Effects of transdermal testosterone on bone and muscle in older men with low bioavailable testosterone levels. *J Gerontol Med Sci.* 2001;56A:M266–M272.
55. Matsumoto AM. Andropause: clinical implications of the decline in serum testosterone levels with aging in men. *J Gerontol Med Sci.* 2002;57A:M76–M99.
56. Kenny AM, Prestwood KM, Marcello KM, Raisz LG. Determinants of bone density in healthy older men with low testosterone levels. *J Gerontol Med Sci.* 2000;55A:M492–M497.
57. Perry HM III, Miller DK, Patrick P, Morley JE. Testosterone and leptin in older African-American men: relationship to age, strength, function, and season. *Metabolism.* 2000;59:1085–1091.
58. Bartke A, Coschigano K, Kopchick J, et al. Genes that prolong life: relationships of growth hormone and growth to aging and life span [review]. *J Gerontol Biol Sci.* 2001;56A:B340–B349.
59. Morley JE, Unterman TG. Hormonal fountains of youth [review]. *J Lab Clin Med.* 2000;135:364–366.

60. Christmas C, O'Connor KG, Harman SM, et al. Growth hormone and sex steroid effects on bone metabolism and bone mineral density in healthy aged women and men. *J Gerontol Med Sci.* 2002;57A:M12–M18.
61. Munzer T, Harman SM, Hees P, et al. Effects of GH and/or sex steroid administration on abdominal subcutaneous and visceral fat in healthy aged women and men. *J Clin Endocrinol Metab.* 2001;86:3604–3610.
62. Davis SR, McCloud P, Strauss BJ, Burger H. Testosterone enhances estradiol's effects on postmenopausal bone density and sexuality. *Maturitas.* 1995;21:227–236.
63. Morley JE. Testosterone replacement in older men and women. *J Gender-Specific Med.* 2001;4:49–53.
64. Morley JE. Anorexia, sarcopenia, and aging [review]. *Nutrition.* 2001;17:660–663.
65. Morley JE. Decreased food intake with aging [review]. *J Gerontol Biol Sci Med Sci.* 2001;56A(Special Issue I):81–88.
66. Vellas B, Baumgartner RN, Wayne SJ, et al. Relationship between malnutrition and falls in the elderly. *Nutrition.* 1992;8:105–108.
67. Chapuy MC, Arlot ME, Delmas PD, Meunier PJ. Effect of calcium and cholecalciferol treatment for three years on hip fractures in elderly women. *BMJ.* 1994;308:1081–1082.
68. Flaherty JH, Perry HM, Lynchard GS, Morley JE. Polypharmacy and hospitalization among older home care patients. *J Gerontol Med Sci.* 2000;55A:M554–M559.
69. Beers MH. The medication list—a portrait of a patient's health. *J Gerontol Med Sci.* 2000;55A:M549.
70. Liu B, Anderson G, Mittmann N, To T, Axcell T, Shear N. Use of selective serotonin-reuptake inhibitors or tricyclic antidepressants and risk of hip fractures in elderly people. *Lancet.* 1998;351:1303–1307.
71. Kirby D, Ames D. Hyponatraemia and selective serotonin re-uptake inhibitors in elderly patients. *Int J Geriatr Psychiatry.* 2001;16:484–493.
72. Draganich LF, Zacny J, Klawns J, Karrison T. The effects of antidepressants on obstructed and unobstructed gait in healthy elderly people. *J Gerontol Med Sci.* 2001;56A:M36–M41.
73. Flaherty JH, McBride M, Marzouk S, et al. Decreasing hospitalization rates for older home care patients with symptoms of depression. *J Am Geriatr Soc.* 1998;46:31–38.
74. Ho SC, Woo J, Chang SSG, Yuen YK, Sham A. Risk factors for falls in the Chinese elderly population. *J Gerontol Med Sci.* 1996;51A:M195–M198.
75. Allcock LM, O'Shea D. Diagnostic yield and development of a neurocardiovascular investigation unit for older adults in a district hospital. *J Gerontol Med Sci.* 2000;55A:M458–M462.
76. Vloet LCM, Mehagnoul-Schipper DJ, Hoefnagels WHL, Jansen RWMM. The influence of low-, normal-, and high-carbohydrate meals on blood pressure in elderly patients with postprandial hypotension. *J Gerontol Med Sci.* 2001;56A:M744–M748.
77. Morley JE. Postprandial hypotension—the ultimate Big Mac attack [editorial]. *J Gerontol Med Sci.* 2001;56A:M741–M743.
78. Edwards BJ, Perry HM III, Kaiser FE, et al. Relationship of age and calcitonin gene-related peptide to postprandial hypotension. *Mech Ageing Dev.* 1996;87:61–73.
79. Puisieux F, Bulckaen H, Fauchais AL, Drumez S, Salomez-Granier F, Dewailly P. Ambulatory blood pressure monitoring and postprandial hypotension in elderly persons with falls or syncope. *J Gerontol Med Sci.* 2000;55A:M535–M540.
80. Mehagnoul-Schipper DJ, Boerman RH, Hoefnagels WH, Jansen RW. Effect of levodopa on orthostatic and postprandial hypotension in elderly Parkinsonian patients. *J Gerontol Med Sci.* 2001;56A:M749–M755.
81. Kawaguchi T, Uyama O, Konishi M, Nishiyama T, Iida T. Orthostatic hypotension in elderly persons during passive standing: a comparison with young persons. *J Gerontol Med Sci.* 2001;56A:M273–M280.
82. Brassington GS, King AC, Bliwise DL. Sleep problems as a risk factor for falls in a sample of community-dwelling adults aged 64–99 years. *J Am Geriatr Soc.* 2000;48:1234–1240.
83. Lord SR, Dayhew J. Visual risk factors for falls in older people. *J Am Geriatr Soc.* 2001;59:508–515.
84. Gunter KB, White KN, Hayes WC, Snow CM. Functional mobility discriminates nonfallers from one-time and frequent fallers. *J Gerontol Med Sci.* 2000;55A:M672–M676.
85. Dolan MM, Hawkes WG, Zimmerman SI, et al. Delirium on hospital admission in age hip fracture patients: prediction of mortality and 2-year functional outcomes. *J Gerontol Med Sci.* 2000;55A:M527–M534.
86. Lazarus A. Physical restraints, thromboembolism, and death in 2 patients. *J Clin Psychiatry.* 2001;62:207–208.
87. Capezuti E, Evans L, Strumpf N, Maislin G. Physical restraint use and falls in nursing home residents. *J Am Geriatr Soc.* 1996;44:627–633.
88. Miller DK, Coe RM, Morley JE, Gettman J. Total quality management and geriatric care. *Australian J Ageing.* 1998;17(1 suppl S):60–65.
89. Miller DK, Coe RM, Romeis JC, Morley JE. Improving quality of geriatric health care in four delivery sites: suggestions from practitioners and experts. *J Am Geriatr Soc.* 1995;43:60–65.
90. Neufeld RR, Libow LS, Foley WJ, Dunbar JM, Cohen C, Breuer B. Restraint reduction reduces serious injuries among nursing home residents. *J Am Geriatr Soc.* 1999;47:1202–1207.
91. Makowski TR, Maggard W, Morley JE. The Life Care Center of St. Louis experience with subacute care. *Clin Geriatr Med.* 2000;16:701–724.
92. Capezuti E, Maislin G, Strumpf N, Evans LK. Side rail use and bed-related fall outcomes among nursing home residents. *J Am Geriatr Soc.* 2002;50:90–96.
93. Perell KL, Nelson A, Goldman RL, Luther SL, Prieto-Lewis N, Rubenstein LZ. Fall risk assessment measures: an analytic review. *J Gerontol Med Sci.* 2001;56A:M761–M766.
94. Yates SM, Dunnagan TA. Evaluating the effectiveness of a home-based fall risk reduction program for rural community-dwelling older adults. *J Gerontol Med Sci.* 2001;56A:M226–M230.
95. Stevens M, Holman CDJ, Bennett N, de Klerk N. Preventing falls in older people: Outcome evaluation of a randomized controlled trial. *J Am Geriatr Soc.* 2001;59:1448–1455.
96. Nowalk MP, Prendergast JM, Bayles CM, D'Amico FJ, Colvin GC. A randomized trial of exercise programs among older individuals living in two long-term care facilities: the Falls FREE Program. *J Am Geriatr Soc.* 2001;49:859–865.
97. Hauer K, Rost B, Rutschle K, et al. Exercise training for rehabilitation and secondary prevention of falls in geriatric patients with a history of injurious falls. *J Am Geriatr Soc.* 2001;59:10–20.
98. Meyer RM, Kraenzle DK, Gettman J, Morley JE. The effect of reduction in restraint use on falls and injuries in two nursing homes. *Nurs Home Med.* 1994;2:24–26.
99. Lundebjerg N, Rubenstein LZ, Kenny RA, et al. Guideline for the prevention of falls in older persons. *J Am Geriatr Soc.* 2001;59:664–672.
100. Kamel HK, Perry HM III, Morley JE. Hormone replacement therapy and fractures in older adults [review]. *J Am Geriatr Soc.* 2001;49:179–187.