

Supplementary Online Content

Tinetti ME, Kumar C. The patient who falls: "It's always a trade-off." *JAMA*. 2010; 303(3): 258-266.

eFigure. Clock Draw

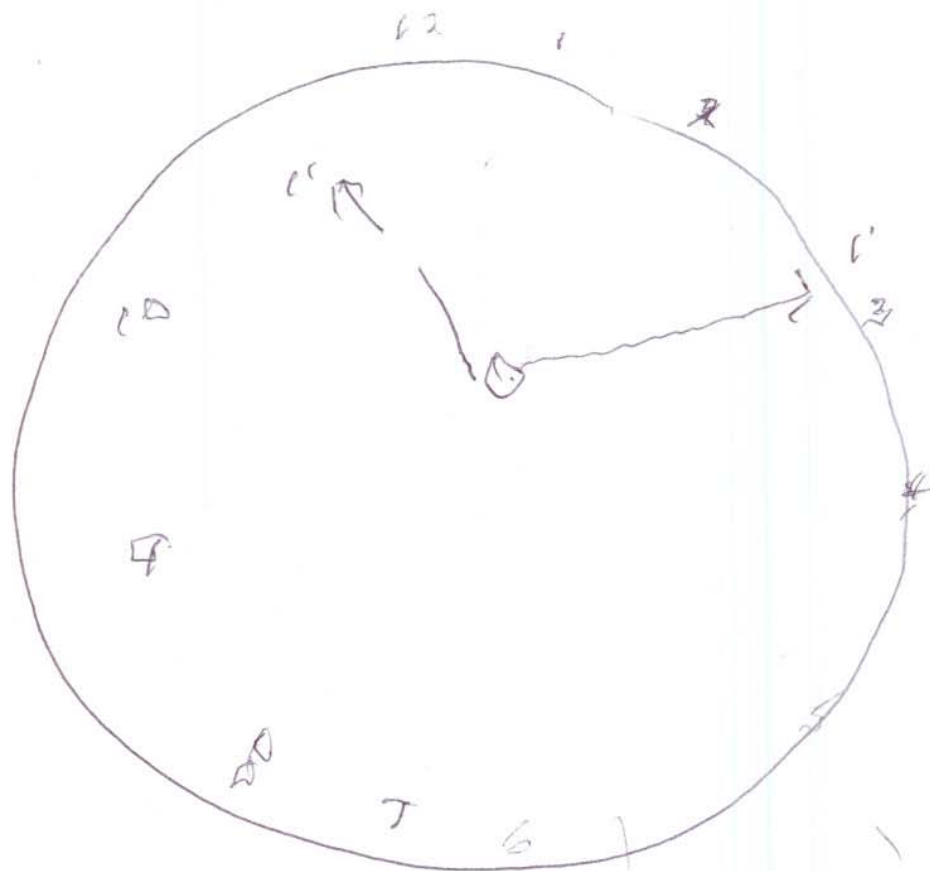
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This supplementary material has been provided by the authors to give readers additional information about their work.

eFigure. Clock Draw



Clock Drawing Task (CDT)² Patient is instructed to “Draw a clock, put in the numbers, and set the hands so it reads 11:10 (or 1:45)”. It is a brief test and is not dependent on educational level. It is useful for assessing visuo-spatial, planning, and organizational deficits; it is a useful test of executive functioning (see text). The clock face should be drawn as a circle with the Arabic numerals 1 through 12 in the correct sequence and placement, and with two hands, of correct relative lengths, anchored in the center and pointing to the requested time. There is variation in scoring and interpretation. It is usually used in combination with other cognitive assessments. (Mr Y placed 1, 2, 3, and 5 outside the circle; he repeated 1; 6 through 12 within the circle but abnormal spacing). For scoring information for the CDT see Wolf-Klein GP, Silverstone FA, Levy AP, Brod MS. Screening for Alzheimer's by clock drawing. *J Am Geriatr Soc.* 1989;37(8):730-734.

Mini-Cog Assessment Instrument³ Combines CDT and 3 word recall after the CDT. Takes about 3 minutes to complete. Recall of 0 words regardless of CDT results or recall of 1 or 2 words with an abnormal CDT indicates positive screen for dementia. (Mr Y's recall of 2 words plus abnormal CDT indicated a positive screen for dementia). For scoring information for the Mini-Cog see Scanlan J, Borson S. The Mini-Cog: receiver operating characteristics with expert and naïve raters. *Int J Geriatr Psychiatry.* 2001;16(2):216-222.

eAppendix. Search Strategy and Resulting References for the Three Systematic Searches

Search 1: Systematic review of prospective cohort studies addressing multiple risk factors for falls and fall injuries in community-living adults at least 65 years of age. The risk factors identified in this systematic review are reported in Table 1 of the article in print.

Strategy for search 1: We searched MEDLINE for January 1, 1985-September 30, 2009 using the terms falls; accidental falls; and risk factors. We limited the search to English language, humans, aged (over 65), and prospective studies. We included only prospective cohort studies that investigated more than 1 risk factor among community-living participants and used multivariate analyses. We excluded publications: 1) that only described development of prediction models but did not provide relative risks or odds ratios for the individual factors or that compared predictive tools; 2) if no fall-related outcome was reported; 3) if community-living persons did not constitute the majority (i.e. at least 50%) of participants; and 4) that included fewer than 80 participants. References for the identified articles were searched for additional studies.

Results for search 1:

1) Explode falls, accidental falls	(10160 articles)
2) Limit 2 to English; humans; aged (65 and over)	(5078 articles)
3) Explode risk factors	(402391 articles)
4) 2 and 3	(1590 articles)
5) Limit 5 to prospective cohort studies	(235 articles)
6) Excluded based on review of the abstract or full manuscript. Manuscripts are counted under the first exclusion criterion met.	(202 articles)
- described model development or compared tools	(29)
- no fall-related outcome	(23)
- No multivariate analysis or did not evaluate multiple risk factors	(43)

- Age not in category (4)
- fewer than 80 participants (5)
- not community-living sample (98)

7) Included in review (33)

References for prospective cohort studies addressing multiple risk factors for falls and fall injuries in community-living older adults (Table 1) [Note: When more than 1 article from the study was available that assessed risk factors for falls in older adults, only the most recent publication from that study that addressed more than 1 risk factor was included in the systematic review.]

1. Bergland A, Wyller TB. Risk factors for serious fall related injuries in elderly women living at home. *Inj Prev*. 2004;10:308-313.
2. Biderman A, J Cwikel J, Fried AV, et al. Depression and falls among community dwelling elderly people: a search for common risk factors. *J Epidemiol Community Health*. 2002; 56:631-636.
3. Brown JS, Vittinghoff E, Wyman JF, et al. For the Study of Osteoporotic Fractures Research Group. Urinary incontinence: does it increase risk for falls and fractures? *J Am Geriatr Soc*. 2000;48:721-725.
4. Campbell AJ, Borrie MJ, Spears GF. Risk factors for falls in a community-based prospective study of people 70 years and older. *J Gerontol*. 1989;44:M112-117.
5. Chu LW, Chi I, Chiu AY. Incidence and predictors of falls in the Chinese elderly. *Ann Acad Med Singapore*. 2005;34:60-72.
6. Close JCT, Hopper R, Glucksman E, et al. Predictors of falls in a high risk population: results from the prevention of falls in the elderly trial (PROFET). *J Emerg Med*. 2003;20:421-425.

7. Covinsky KE, Kahana E, Kahana B, et al. History and mobility exam index to identify community-dwelling elderly persons at risk of falling. *J Gerontol A Biol Sci Med Sci*. 2001;56:M253-M259.
8. Dargent-Molina P, Favier F, Grandjean H, et al. Fall-related factors and risk of hip fracture: the EPIDOS prospective study. *Lancet*. 1996;348:145-149.
9. Davis JW, Ross PD, Nevitt MC, et al. Risk factors for falls and for serious injuries among older Japanese women in Hawaii. *J Am Geriatr Soc*. 1999;47:792-798.
10. Graafmans WC, Ooms ME, Hofstee HM, Bezemer PD, Bouter LM, Lips P. Falls in the elderly: a prospective study of risk factors and risk profiles. *Am J Epidemiol*. 1996;143(11):1129-36.
11. Iinattiniemi S, Jokelainen J, Luukinen H. Falls risk among a very old home-dwelling population. *Scandinavian J Primary Health Care*. 2009;27:25-30.
12. Jung YM, Shin DS, Chung KS, et al. Health status and fall related factors among older Korean women. *J Gerontol Nurs*. 2007;33:12-20.
13. Kelsey JL, Browner WS, Seeley DG, et al. Risk factors for fractures of the distal forearm and proximal humerus. *Am J Epidemiol*. 1992;135:477-489.
14. Leveille SG, Bean J, Bandeen-Roche K, et al. Musculoskeletal pain and risk for falls in older disabled women living in the community. *J Am Geriatr Soc*. 2002;50:671-678.
15. Lord SR, Dayhew J. Visual risk factors for falls in older people. *J Am Geriatr Soc*. 2001;49:508-515.
16. Lord SR, Ward JA, Williams P, Anstey KJ. Physiological factors associated with falls in older community-dwelling women. *J Am Geriatr Soc*. 1994; 42(10):1110-1117.
17. Luukinen H, Koski K, Laippala P, et al. Predictors for recurrent falls among the home-dwelling elderly. *Scandinavian J Prim Health Care*. 1995;13:294-299.
18. Nevitt MC, Cummings SR, Hudes ES. Risk factors for injurious falls: a prospective study. *J Gerontol*. 1991;46:M164-170.

19. Nevitt MC, Cummings SR, Kidd S, et al. Risk factors for recurrent nonsyncopal falls. A prospective study. *JAMA*. 1989;261:2663-2668.
20. O'Loughlin JL, Robitaille Y, Boivin JF, et al. Incidence of and risk factors for falls and injurious falls among the community-dwelling elderly. *Am J Epidemiol*. 1993;137:342-354.
21. Pluijm SM, Smit JH, Tromp EA, et al. A risk profile for identifying community-dwelling elderly with a high risk of recurrent falling: results of a 3-year prospective study. *Osteoporosis International*. 2006; 17(3):417-25.
22. Schwartz AV, Hillier TA, Sellmeyer DE, et al. Older women with diabetes have a higher risk of falls: a prospective study. *Diabetes Care*. 2002; 25: 1749-1754.
23. Schwartz AV, Villa ML, Prill M, et al. Falls in older Mexican-American women. *J Am Geriatr Soc*. 1999; 47:1371-1378.
24. Sohng KY, Moon JS, Song HH, et al. Risk factors for falls among the community dwelling elderly in Korea. *Daehan Ganho Haghoeji*. 2004;34:1483-1490.
25. Stalenhoef PA, Diederiks JP, Knottnerus JA, et al. A risk model for the prediction of recurrent falls in community-dwelling elderly: a prospective cohort study. *J Clin Epidemiol*. 2002;55:1088-1094.
26. Sturnieks DL, Tiedemann A, Chapman K, et al. Physiological risk factors for falls in older people with lower limb arthritis. *J Rheumatol*. 2004;31:2272-2279.
27. Tinetti ME, Doucette JT, Claus EB. The contribution of predisposing and situational risk factors to serious fall injuries. *J Am Geriatr Soc*. 1995;43: 1207-1213.
28. 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.
29. Tromp AM, Pluijm SM, Smit JH et al. Fall-risk screening test: a prospective study on predictors for falls in community-dwelling elderly. *J Clin Epidemiol*. 2001;54:837-844.

30. van Hensbroek PB, van Dijk N, van Breda GF, et al. The CAREFALL Triage instrument identifying risk factors for recurrent falls in elderly patients. *Am J Emerg Med.* 2009;27:023-36.
31. Vellas BJ, Wayne SJ, Garry PJ, Baumgartner RN. A two-year longitudinal study of falls in 482 community-dwelling elderly adults. *J Gerontol A Biol Sci Med Sci.* 1998;53:M264-M274.
32. Whooley MA, Kip KE, Cauley JA, et al. Depression, falls, and risk of fracture in older women. *Arch Intern Med.* 1999;159:484-490.
33. Ziere G, Dieleman JP, van der Cammen TJ, et al. Selective serotonin reuptake inhibiting antidepressants are associated with an increased risk of nonvertebral fractures. *J Clin Psychopharmacol.* 2008;28:411-417.

Search 2: Systematic review of randomized controlled trials (RCTs) of physical therapy and/or exercise for fall prevention in community-living persons at least 65 years of age. The findings from this systematic review are reported in the text of the article in print.

Strategy for Search 2: We searched MEDLINE for January 1, 1985-September 30, 2009 using the terms falls and accidental falls; physical therapy, exercise, or Tai Chi. We limited the search to English language, humans, and aged (over 65), and RCTs. We included trials that reported fall rate or number of falls or percentage of participants who fell. We excluded publications: 1) that only described the protocols without outcome data or reported subsequent analyses of trials already included; 2) if no fall-related outcome was reported; 3) if physical therapy (PT) or exercise, or Tai Chi was not the only intervention (ie, multifactorial interventions); 4) that included fewer than 80 participants; or 5) if community-living persons did not constitute the majority (ie, at least 50%) of participants. References for the identified articles were searched for additional trials.

Results for search 2:

- | | |
|---|-------------------|
| 1) Explode falls, accidental falls | (22,598 articles) |
| 2) Limit 1 to humans | (19,487 articles) |
| 3) Limit 2 to English | (17,242 articles) |
| 4) Explode exercise | (49,618 articles) |
| 5) Physical therapy | (26,827 articles) |
| 6) Tai Chi or Tai Ji | (457 articles) |
| 7) 4 or 5 or 6 | (76,429 articles) |
| 8) 3 and 7 | (715 articles) |
| 9) Limit 8 to randomized controlled trials | (131 articles) |
| 10) Excluded based on review of the abstract or full manuscript. Manuscripts are counted under the first exclusion criterion met. | (107 articles) |
| - described protocols or reported subsequent analyses | (26) |
| - no fall-related outcome | (36) |
| - PT, exercise, or Tai Chi not sole intervention | (18) |
| - fewer than 80 participants | (10) |
| - not community-living sample | (16) |
| 11) Included in review | (25) |

References for systematic review of RCTs of physical therapy or exercise for fall prevention in community-living persons

1. Ashburn A, Fazakarley L, Ballinger C, Pickering R, McLellan LD, Fitton C. A randomised controlled trial of a home based exercise programme to reduce the risk of falling among people with Parkinson's disease. *J Neurol Neurosurg Psychiatr.* 2007; 78:678-84.
2. Barnett A, Smith B, Lord SR, et al. Community-based group exercise improves balance and reduces falls in at-risk older people: a randomised controlled trial. *Age Ageing.* 2003;32:407-414.

3. Buchner DM, Cress ME, de Lateur BJ, et al. The effect of strength and endurance training on gait, balance, fall risk, and health services use in community-living older adults. *J Gerontol A Biol Sci Med Sci*. 1997;52:M218-M224.
4. Campbell AJ, Robertson MC, Gardner MM, et al. Psychotropic medication withdrawal and a home-based exercise program to prevent falls: a randomized, controlled trial. *J Am Geriatr Soc*. 1999;47:850-853.
5. Campbell AJ, Robertson MC, Gardner MM, et al. Randomised controlled trial of a general practice programme of home based exercise to prevent falls in elderly women. *BMJ*. 1997;315:1065-1069.
6. Campbell AJ, Robertson MC, La Grow SJ, et al. Randomised controlled trial of prevention of falls in people aged > or =75 with severe visual impairment: the VIP trial. *BMJ*. 2005;331:817.
7. Ebrahim S, Thompson PW, Baskaran V, Evans K. Randomized placebo-controlled trial of brisk walking in the prevention of postmenopausal osteoporosis. *Age Aging*. 1997; 26:253-260.
8. Freiburger E, Menz HB, Abu-Omar K, et al. Preventing falls in physically active community-dwelling older people: a comparison of two intervention techniques. *Gerontology*. 2007;53:298-305.
9. Latham NK, Anderson CS, Lee A, Bennett DA, Moseley A, Cameron ID. A randomized, controlled trial of quadriceps resistance exercise and vitamin D in frail older people: the Frailty Interventions Trial in Elderly Subjects (FITNESS). *J Am Geriatr Soc*. 2003; 51:291-299.
10. Li F, Harmer P, Fisher KJ, et al. Tai Chi and fall reductions in older adults: a randomized controlled trial. *J Gerontol A -Biol Sci Med Sci*. 2005;60:187-194.

11. Logghe IH, Zeeuwe PE, Verhagen AP, et al. Lack of effect of Tai Chi Chuan in preventing falls in elderly people living at home: a randomized clinical trial. *J Am Geriatr Soc.* 2009;57:70-75.
12. Lord SR, Tiedemann A, Chapman K, Munro B. The effect of an individualized fall prevention program on fall risk and falls in older people: a randomized, controlled trial. *J Am Geriatr Soc.* 2005; 53:1296-304.
13. Lord SR, Castell S, Corcoran J, et al. The effect of group exercise on physical functioning and falls in frail older people living in retirement villages: a randomized, controlled trial. *J Am Geriatr Soc.* 2003;51:1685-1692.
14. Lord SR, Ward JA, Williams P, Strudwick M. The effect of a 12-month exercise trial on balance, strength, and falls in older women: a randomized controlled trial. *J Am Geriatr Soc.* 1995; 43:1198-1206.
15. Luukinen H, Lehtola S, Jokelainen J, et al. Pragmatic exercise-oriented prevention of falls among the elderly: a population-based, randomized, controlled trial. *Prev Med.* 2007;44:265-271.
16. McMurdo ME, Mole PA, Paterson CR. Controlled trial of weight bearing exercise in older women in relation to bone density and falls. *BMJ.* 1997;314:569.
17. Means KM, Rodell DE, O'Sullivan PS. Balance, mobility, and falls among community-dwelling elderly persons: effects of a rehabilitation exercise program. *Am J Phys Med Rehabil.* 2005;84:238-250.
18. Morgan RO, Virnig BA, Duque M, Abdel-Moty E, Devito CA. Low-intensity exercise and reduction of the risk for falls among at-risk elders. *J Gerontol.* 2004; 59A:1062-1067.
19. Robertson MC, Devlin N, Gardner MM, et al. Effectiveness and economic evaluation of a nurse delivered home exercise programme to prevent falls. 1: Randomised controlled trial. *BMJ.* 2001;322:697-701.

20. Robertson MC, Gardner MM, Devlin N, et al. Effectiveness and economic evaluation of a nurse delivered home exercise programme to prevent falls. 2: Controlled trial in multiple centres. *BMJ*. 2001;322:701-704.
21. Skelton D, Dinan S, Campbell M, et al. Tailored group exercise (Falls Management Exercise -- FaME) reduces falls in community-dwelling older frequent fallers (an RCT). *Age Ageing*. 2005;34:636-639.
22. Voukelatos A, Cumming RG, Lord SR, et al. A randomized, controlled trial of tai chi for the prevention of falls: the Central Sydney tai chi trial. *J Am Geriatr Soc*. 2007;55:1185-1191.
23. Wolf SL, Barnhart HX, Kutner NG, et al. Reducing frailty and falls in older persons: an investigation of *tai chi* and computerized balance training. Atlanta FICSIT Group. Frailty and Injuries: Cooperative Studies of Intervention Techniques. *J Am Geriatr Soc*. 1996;44:489-497.
24. Wolf SL, Sattin RW, Kutner M, et al. Intense *tai chi* exercise training and fall occurrences in older, transitionally frail adults: a randomized, controlled trial. *J Am Geriatr Soc*. 2003;51:1693-1701.
25. Woo J, Hong A, Lau E, et al. A randomised controlled trial of Tai Chi and resistance exercise on bone health, muscle strength and balance in community-living elderly people. *Age Ageing*. 2007;36:262-268.

Search 3: Systematic review of randomized controlled trials (RCTs) RCTs addressing multifactorial fall prevention for fall prevention in community-living persons at least 65 years of age. Findings from this systematic review are reported in Table 2 of the article in print and in the eTable.

Strategy for search 3: We searched MEDLINE for January 1, 1985-September 30, 2009 using the term accidental falls. We limited the search to English language, humans, and aged (over 65), and RCTs. We included trials that reported fall rate or number of falls or percentage of

participants who fell. We excluded publications: 1) that only described the protocols without outcome data or reported subsequent analyses of trials already included; 2) if no fall-related outcome was reported; 3) if it did not report on multiple intervention components (ie, multifactorial interventions) that addressed at least 3 risk factors identified in the first search; 4) that included fewer than 80 participants; or 5) if community-living persons did not constitute the majority (ie, at least 50%) of participants or only studied cognitively impaired community-living persons. References for the identified articles were searched for additional trials.

Results for search 3:

- | | |
|--|------------------|
| 1) Explode accidental falls | (10241 articles) |
| 2) Limit 1 to humans | (10192 articles) |
| 3) Limit 2 to English | (8932 articles) |
| 4) Limit to aged (65 and over) | (5119 articles) |
| 5) Limit 4 to randomized controlled trials | (372 articles) |
| 6) Excluded based on review of the abstract or the full manuscript. Manuscripts are counted under the first exclusion criterion met. | (352 articles) |
| a. described protocols or reported subsequent analyses | (147) |
| b. no fall-related outcome | (87) |
| c. Not multifactorial; no multicomponent intervention | (83) |
| d. fewer than 80 participants | (0) |
| e. not community-living sample | (35) |
| 7) Included in review | (25)* |

*Five trials were identified through search of references for the included trials.

References for systematic review of RCTs addressing multifactorial fall prevention strategies in community-living persons at least 65 years of age

a. Trials in which investigators carried out or ensured completion of at least one component

1. Clemson L, Cumming RG, Kendig H, et al. The effectiveness of a community-based program for reducing the incidence of falls in the elderly: a randomized trial. *J Am Geriatr Soc.* 2004;52:1487-1494.
2. Close J, Ellis M, Hooper R, et al. Prevention of falls in the elderly trial (PROFET): a randomised controlled trial. *Lancet.* 199;353:93-97.
3. Davison J, Bond J, Dawson P, et al. Patients with recurrent falls attending Accident & Emergency benefit from multifactorial intervention--a randomised controlled trial. *Age Ageing.* 2005;34:162-168.
4. Day L, Fildes B, Gordon I, et al. Randomised factorial trial of falls prevention among older people living in their own homes. *BMJ.* 2002;325:128.
5. Hogan DB, MacDonald FA, Betts J, et al. A randomized controlled trial of a community-based consultation service to prevent falls. *Canad Med Assoc J.* 2001;165: 537-543.
6. Shumway-Cook A, Silver IF, LeMier M, et al. Effectiveness of a community-based multifactorial intervention on falls and fall risk factors in community-living older adults: a randomized, controlled trial. *J Geront A Biol Sci Med Sci.* 2007;62:1420-7.
7. Spice CL, Morotti W, George S, et al. The Winchester falls project: a randomised controlled trial of secondary prevention of falls in older people. *Age Ageing.* 38:33-40, 2009.
8. Steinberg M, Cartwright C, Peel N et al. A sustainable programme to prevent falls and near falls in community dwelling older people: results of a randomised trial. *J Epidemiol Community Health.* 2000;54:227-232.
9. Tinetti ME, Baker DI, McAvay G, et al. A multifactorial intervention to reduce the risk of falling among elderly people living in the community. *N Engl J Med.* 1994;331:821-827.

10. Vind AB, Andersen HE, Pedersen KD, Jorgensen T, Schwarz P. An outpatient multifactorial falls prevention intervention does not reduce falls in high-risk elderly Danes. *J Am Geriatr Soc.* 2009; 57:971-977.
11. Wagner EH, LaCroix AZ, Grothaus L, et al. Preventing disability and falls in older adults: a population-based randomized trial. *Am J Pub Health.* 1994;84:1800-1806.

b. Trials in which participants given advice and referred to community or health-cared based providers without direct intervention or assurance of completion of recommended interventions

12. Coleman EA, Grothaus LC, Sandhu N, et al. Chronic care clinics: a randomized controlled trial of a new model of primary care for frail older adults. *J Am Geriatr Soc.* 1999;47:775-783.
13. Elley CR, Robertson MC, Garrett S, et al. Effectiveness of a falls-and-fracture nurse coordinator to reduce falls: a randomized, controlled trial of at-risk older adults. *J Am Geriatr Soc.* 2008;56:1383-1389.
14. Gallagher EM, Brunt H. Head over heels. Impact of a health promotion program to reduce falls in the elderly. *Canad J Aging.* 1996;15:84-96.
15. Hendriks MR, Bleijlevens MH, van Haastregt JC, et al. Lack of effectiveness of a multidisciplinary fall-prevention program in elderly people at risk: a randomized controlled trial. *J Am Geriatr Soc.* 2008; 56:1390-1397.
16. Huang TT, Acton GJ. Effectiveness of home visit falls prevention strategy for Taiwanese community-dwelling elders: randomized trial. *Public Health Nurs.* 2004;21:247-256.
17. Jitapunkul S. A randomised controlled trial of regular surveillance in Thai elderly using a simple questionnaire administered by non-professional personnel. *J Med Assoc Thai.* 1998;81:352-356.
18. Lightbody E, Watkins C, Leathley M, et al. Evaluation of a nurse-led falls prevention programme versus usual care: a randomized controlled trial. *Age Ageing.* 2002;31:203-210.

19. Mahoney JE, Shea TA, Przybelski R, et al. Kenosha County falls prevention study: a randomized, controlled trial of an intermediate-intensity, community-based multifactorial falls intervention. *J Am Geriatr Soc.* 2007;55:489-498.
20. Newbury JW, Marley JE, Beilby JJ. A randomised controlled trial of the outcome of health assessment of people aged 75 years and over. *Med J Aust.* 2001;175:104-107.
21. Pardessus V, Puisieux F, Di Pompeo C, et al. Benefits of home visits for falls and autonomy in the elderly: a randomized trial study. *Am J Phys Med Rehabil.* 2002;81:247-252.
22. Salminen MJ, Vahlberg TJ, Salonoja MT, Aarnio PT, Kivela SL. Effect of a risk-based multifactorial fall prevention program on the incidence of falls. *J Am Geriatr Soc.* 2009;57:612-9, 2009.
23. van Haastregt JC, Diederiks JP, van Rossum E, et al. Effects of a programme of multifactorial home visits on falls and mobility impairments in elderly people at risk: randomised controlled trial. *BMJ.* 2000;321:994-998.
24. Vetter NJ, Lewis PA, Ford D. Can health visitors prevent fractures in elderly people? *BMJ.* 1992; 304:888-890.
25. Whitehead C, Wundke R, Crotty M, Finucane P. Evidence-based clinical practice in falls prevention: a randomised controlled trial of a falls prevention service. *Australian Health Review.* 2003; 26 (3):88-97.

eTable. Components of the Interventions Evaluated in Randomized Controlled Trials of Multifactorial (at Least 3) Fall Prevention Strategies in Community-Living Older Adults Without Known Cognitive Impairment^a

Source ^b	Intervention Components ^c									
	Multiple Risk Assessment	Balance/Gait Training	Strength Training	Vision Intervention	Environmental Adaptations and Home Modification	Cardiovascular Intervention ^d	Reduce Psychoactive Medications	Reduce Other Medications	Other Interventions ^e	Referral to Participant's Own MD for Medical Interventions
Investigators Carried Out or Ensured Completion of at Least 1 Component										
Clemson, 2004	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Close, 1999 ^d	Yes	No	No	No	Yes	PH, CH	No	No	OT	Yes
Davison, 2005	Yes	Yes	No	Yes	Yes	PH, CH	Yes	Yes	OT	Yes
Day, 2002	No	Yes	Yes	Yes	Yes	No	No	No	No	No
Hogan, 2001	Yes	No	Yes	No	No	No	No	No	Yes	Yes
Shumway-Cook, 2007	Yes	Yes	Yes	No	No	No	No	No	No	Yes
Spice, 2009 ^d	Yes								Yes	
Steinberg, 2000	Yes	Yes	No	No	Yes	No	No	No	Advice on medical risk factors	
Tinetti, 1994 ^d	Yes	Yes	Yes	Yes	Yes	OH	Yes	Yes	Yes	No
Vind, 2009	Yes	Yes	Yes					Yes	Yes	
Wagner, 1994	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Encouraged to get hearing and vision test; alcohol treatment	Yes
Participants Given Advice and Referred Without Direct Intervention or Assurance of Completion^f										
Coleman, 1999	Yes	No	No	No	No	No	No	No	No	Yes
Elley, 2008	Yes	No	Yes	No	No	No	No	No	No	Yes
Gallagher, 1996	Yes	No	No	No	No	No	No	No	No	No
Hendriks, 2008	Yes	No	No	No	Yes	No	No	No	No	Yes
Huang, 2004	Yes	No	No	Yes	No	No	No	No	No	No
Jitapunkal, 1998	Yes	No	No	No	No	No	Yes	No	No	Yes
Lightbody, 2002	Yes	No	No	No	Yes	No	No	No	Referral to community services	Yes
Mahoney, 2007		Referred to PT	Yes	No	Yes	No	No	No	11 monthly telephone calls	Yes
Newbury, 2001	Yes	No	No	No	No	No	No	No	No	
Pardessus, 2001	Yes	No	No	No	Home assessment	No		No	No	Yes
Salminen, 2009	Yes	Yes, every 2 weeks	Yes, every 2 weeks	No	Home assessment only; no direct intervention	No	No	No	Referral to ophthalmology; Vitamin D;	Yes

Van Haastregt, 2001	Yes	No	No	No	No	No	No	No	Referral to community services	Yes
Vetter, 1992	Yes	No	No	No	No	No	No	No	Referral to community services	Yes
Whitehead, 2003	Yes	No	No	No	No	No	No	No	No	Yes

Abbreviations: MD, medical doctor; OT, occupational therapy; PT, physical therapy.

^a Includes only trials that evaluated at least 3 risk factors identified in the first search (Table 1) and that enrolled only community-living participants without known cognitive impairment. Follow-up was 12 months unless stated otherwise.

^b References are included in appendix on *JAMA* Web site.

^c Most of the trials also included various combinations of education, advice, and self-management.

^d Cardiovascular interventions differed between studies: postural hypotension = PH; carotid hypersensitivity =CH.

^e Hogan, 2001; Spice, 2009; Tinetti, 1994; and Vind, 2009 also included interventions tailored to risk factors.

^f Community sites and MDs may not have had the training or ability to complete the interventions; there was no assurance that participant or physician followed up on recommendations.

eBox. Osteoporosis and Fracture Prevention in Men⁴⁰

Diagnosis

- The clinical diagnosis of osteoporosis is made by occurrence of a low trauma (fragility) fracture or by a bone mineral density (BMD) greater than 2.5 SDs below that of a young, healthy population as measured by DEXA (World Health Organization criteria).⁴⁰

Risk factors⁴¹

- The most important risk factors for osteoporosis in men are age (>70 years); body mass index <25 kg/m²; weight loss >10% of usual adult weight or weight loss in recent years; no regular physical activity [walking, climbing stairs, carrying weights, housework, or gardening]; oral corticosteroids, and previous low trauma fracture.
- Alcohol use increases probability of fracture but has not been associated with decreased BMD.
- Androgen deprivation therapy (pharmacologic and orchiectomy) is a strong predictor of both osteoporosis and fracture.
- Cigarette smoking and low dietary intake of calcium are moderate predictors of an increased risk for low bone mass.

Recommendations for screening

- American College of Physicians⁴⁰
 - Periodically assess for above risk factors for osteoporosis (Grade: strong recommendation; moderate-quality evidence).

- Obtain DXA for men who are at increased risk for osteoporosis and are candidates for drug therapy (Grade: strong recommendation; moderate-quality evidence).
- National Osteoporosis Foundation (NOF)⁴²
 - BMD testing for all men older than 70 years; men 50 to 70 years should be evaluated clinically for osteoporosis risk in order to determine the need for BMD screening.

Evidence for treatments of osteoporosis or fracture prevention

- **Bisphosphonates** The role of bisphosphonates in older men remains unclear. One of 9 randomized controlled trials (RCTs) that included men demonstrated a reduced hip fracture risk with risedronate.⁴³
- **Hip protectors** Pooled data from 3 trials involving 5135 community-dwelling participants revealed no reduction in hip fracture incidence with hip protectors [relative risk (RR) 1.16, 95% CI, 0.85 -1.59].⁴⁴ Poor adherence may explain some of the lack of effectiveness.
- **Vitamin D** In a meta-analysis, the pooled RR for higher dose vitamin D (usually 800 international units daily) in 9 trials (33,265 participants) was 0.80 (95% CI, 0.72-0.89).⁴⁵ In the 5 trials of vitamin D without calcium (7130 participants), the RR was 0.79 (95% CI 0.63-0.99), suggesting that the calcium offered no additional benefit. The effect of vitamin D was the same for men and women. The Cochrane review also reported a reduction in fall rate with vitamin D in participants with low vitamin D levels [RR 0.57; (95% CI 0.37-0.89); 260 participants, 2 trials].²⁷ The evidence is compelling for the use of 800

international units of Vitamin D in older men with osteoporosis or fracture risk or low Vitamin D.

References cited appear in the reference list of the article in print.