

# Assessment of the elderly's functional ability to manage their medication: a systematic literature review

International Journal of Clinical Pharmacy

pp 1–15

**Authors**      **Authors and affiliations**

Ana Margarida Advinha, Manuel José Lopes, Sofia de Oliveira-Martins

Review Article

**First Online:** 10 December 2016

**DOI (Digital Object Identifier):** [10.1007/s11096-016-0409-z](https://doi.org/10.1007/s11096-016-0409-z)

**Cite this article as:**

Advinha, A.M., Lopes, M.J. & de Oliveira-Martins, S. *Int J Clin Pharm* (2016).

doi:10.1007/s11096-016-0409-z

## Abstract

**Background** The evaluation of the elderly's ability to manage medication through the use of a validated tool can be a significant step in identifying inabilities and needs, with the objective of increasing their self-care skills, and promoting successful aging. **Aim of the review** To identify studies assessing the elderly's functional ability to manage their own medication. **Method** For the search strategy, the PICO method was used: P—Population (elderly), I—Instruments (tools for assessing medication management ability), C—Context (community) and O—Outcomes (functional ability to manage medication). The final search query was run in MEDLINE/PubMed, CINAHL Plus, ISI Web of Science and Scopus. The whole process was developed according to the PRISMA statement. **Results** The search retrieved 8051 records. In each screening stage, the selection criteria were applied to eliminate records where at least one of the exclusion criteria was verified. At the end of this selection, we obtained a total of 18 papers (17 studies). The results allow the conclusion to be drawn that studies use several different instruments, most of them not validated. The authors agree that medication management abilities decrease as cognitive impairment increases, even if a lot of studies assess only the physical dimension. DRUGS was the instrument most often used. **Conclusion** Older adults' ability to manage their medication should be assessed using tools specifically built and validate for the purpose. DRUGS (which uses the real regimen taken by the elderly) was the most widely used assessment instrument in the screened studies.

**Keywords**

## References

1. Maddigan SL, Farris KB, Keating N, Wiens CA, Johnson JA. Predictors of older adults' capacity for medication management in a self-medication program: a retrospective chart review. *J Aging Health*. 2003;15:332–52.  
[CrossRef](http://dx.doi.org/10.1177/0898264303251893) (http://dx.doi.org/10.1177/0898264303251893)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12795276) (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\_uids=12795276)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Predictors%20of%20older%20adults%E2%80%99%20medication%20program%3A%20a%20retrospective%20chart%20review&author=SL.%20Maddigan&author=KB.%20Farris%20Johnson&publication_year=2003) (http://scholar.google.com/scholar\_lookup?title=Predictors%20of%20older%20adults%E2%80%99%20medication%20program%3A%20a%20retrospective%20chart%20review&author=SL.%20Maddigan&author=KB.%20Farris%20Johnson&publication\_year=2003)
2. World Health Organization. Ageing and health technical report. Japan: Kobe; 2004.  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Ageing%20and%20health%20technical%20report&publication_year=2004) (http://scholar.google.com/scholar\_lookup?title=Ageing%20and%20health%20technical%20report&publication\_year=2004)
3. Tordoff J, Simonsen K, Thomson WM, Norris PT. “It’s just routine”. A qualitative study of medicine-taking amongst older people in New Zealand. *Pharm World Sci*. 2010;32:154–61.  
[CrossRef](http://dx.doi.org/10.1007/s11096-009-9361-5) (http://dx.doi.org/10.1007/s11096-009-9361-5)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=20043241) (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\_uids=20043241)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=%E2%80%9CIt%E2%80%99s%20just%20routine%E2%80%99%20amongst%20older%20people%20in%20New%20Zealand&author=J.%20Tordoff&author=K.%20Simonsen&publication_year=2010) (http://scholar.google.com/scholar\_lookup?title=%E2%80%9CIt%E2%80%99s%20just%20routine%E2%80%99%20amongst%20older%20people%20in%20New%20Zealand&author=J.%20Tordoff&author=K.%20Simonsen&publication\_year=2010)
4. MacLaughlin EJ, Raehl CL, Treadway AK, Sterling TL, Zoller DP, Bond CA. Assessing medication adherence in the elderly—which tools to use in clinical practice? *Drugs Aging*. 2005;22(3):231–55.  
[CrossRef](http://dx.doi.org/10.2165/00002512-200522030-00005) (http://dx.doi.org/10.2165/00002512-200522030-00005)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=15813656) (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\_uids=15813656)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Assessing%20medication%20adherence%20in%20the%20elderly%E2%80%99%20which%20tools%20to%20use%20in%20clinical%20practice&publication_year=2005) (http://scholar.google.com/scholar\_lookup?title=Assessing%20medication%20adherence%20in%20the%20elderly%E2%80%99%20which%20tools%20to%20use%20in%20clinical%20practice&publication\_year=2005)
5. Patterson TL, Lacro J, McKibbin CL, Moscona S, Hughs T, Jeste DV. Medication management ability assessment: results from a performance-based measure in older outpatients with schizophrenia. *J Clin Psychopharmacol*. 2002;22(1):11–9.  
[CrossRef](http://dx.doi.org/10.1097/00004714-200202000-00003) (http://dx.doi.org/10.1097/00004714-200202000-00003)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11799337) (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\_uids=11799337)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Medication%20management%20ability%20assessment%20based%20on%20a%20performance%20based%20measure%20in%20older%20outpatients%20with%20schizophrenia&author=TL.%20Patterson&author=J.%20Lacro&publication_year=2002) (http://scholar.google.com/scholar\_lookup?title=Medication%20management%20ability%20assessment%20based%20on%20a%20performance%20based%20measure%20in%20older%20outpatients%20with%20schizophrenia&author=TL.%20Patterson&author=J.%20Lacro&publication\_year=2002)
6. Elliott RA, Marriott JL. Standardised assessment of patients' capacity to manage medications: a systematic review of published instruments. *BMC Geriatr*. 2009;9:27.  
[CrossRef](http://dx.doi.org/10.1186/1471-2318-9-27) (http://dx.doi.org/10.1186/1471-2318-9-27)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=19111111) (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\_uids=19111111)

cmd=Retrieve&db=PubMed&dopt=Abstract&list\_uids=19594913)

[PubMedCentral](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2719637) (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2719637)

[Google Scholar](http://scholar.google.com/scholar_lookup?) (http://scholar.google.com/scholar\_lookup?

title=Standardised%20assessment%20of%20patients%E2%80%99%20capacity%20to%20manage%20medications%3A9

7. Farris KB, Phillips BB. Instruments assessing capacity to manage medications. *Ann Pharmacother.* 2008;42:1026–36.  
[CrossRef](http://dx.doi.org/10.1345/aph.1G502) (http://dx.doi.org/10.1345/aph.1G502)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?) (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?  
cmd=Retrieve&db=PubMed&dopt=Abstract&list\_uids=18594054)  
[Google Scholar](http://scholar.google.com/scholar_lookup?) (http://scholar.google.com/scholar\_lookup?  
title=Instruments%20assessing%20capacity%20to%20manage%20medications&author=KB.%20Farris&author=BB.%201036&publication\_year=2008)
8. Kucukarslan SN, Hagan AM, Shimp LA, Gaither CA, Lewis NJ. Integrating medication therapy management in the primary care medical home: a review of randomized controlled trials. *Am J Health Syst Pharm.* 2011;68(328):335–45.  
[CrossRef](http://dx.doi.org/10.2146/ajhp100405) (http://dx.doi.org/10.2146/ajhp100405)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?) (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?  
cmd=Retrieve&db=PubMed&dopt=Abstract&list\_uids=21289329)  
[Google Scholar](http://scholar.google.com/scholar_lookup?) (http://scholar.google.com/scholar\_lookup?  
title=Integrating%20medication%20therapy%20management%20in%20the%20primary%20care%20medical%20home%20345&publication\_year=2011)
9. Irvine-Meek J, Gould ON, Wheaton H, Todd LE. Acceptability and face validity of a geriatric self-medication assessment tool. *Can J Hosp Pharm.* 2010;63(3):225–32.  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?) (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?  
cmd=Retrieve&db=PubMed&dopt=Abstract&list\_uids=22478982)  
[PubMedCentral](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2901782) (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2901782)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Acceptability%20and%20face%20validity%20of%20a%20medication%20assessment%20tool&author=J.%20Irvine-Meek&author=ON.%20Gould&author=H.%20Wheaton&author=LE.%20Todd&journal=Can%20J%20Hosp%20Pharm&232&publication_year=2010) (http://scholar.google.com/scholar\_lookup?title=Acceptability%20and%20face%20validity%20of%20a%20medication%20assessment%20tool&author=J.%20Irvine-Meek&author=ON.%20Gould&author=H.%20Wheaton&author=LE.%20Todd&journal=Can%20J%20Hosp%20Pharm&232&publication\_year=2010)
10. Irvine-Meek JM, Gould ON. Psychometric evaluation of a self-medication assessment tool in an elderly population. *Can J Hosp Pharm.* 2011;64(1):16–24.  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?) (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?  
cmd=Retrieve&db=PubMed&dopt=Abstract&list\_uids=22479024)  
[PubMedCentral](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3053188) (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3053188)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Psychometric%20evaluation%20of%20a%20self-medication%20assessment%20tool%20in%20an%20elderly%20population&author=JM.%20Irvine-Meek&author=ON.%20Gould&journal=Can%20J%20Hosp%20Pharm&volume=64&issue=1&pages=16-24&publication_year=2011) (http://scholar.google.com/scholar\_lookup?  
title=Psychometric%20evaluation%20of%20a%20self-medication%20assessment%20tool%20in%20an%20elderly%20population&author=JM.%20Irvine-Meek&author=ON.%20Gould&journal=Can%20J%20Hosp%20Pharm&volume=64&issue=1&pages=16-24&publication\_year=2011)
11. Orwig D, Brandt N, Gruber-Baldini AL. Medication management assessment for older adults in the community. *Gerontologist.* 2006;46:661–8.  
[CrossRef](http://dx.doi.org/10.1093/geront/46.5.661) (http://dx.doi.org/10.1093/geront/46.5.661)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?) (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?  
cmd=Retrieve&db=PubMed&dopt=Abstract&list\_uids=17050757)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Medication%20management%20assessment%20for%20older%20adults%20in%20the%20community&author=D.%20Baldini&journal=Gerontologist&volume=46&pages=661-668&publication_year=2006) (http://scholar.google.com/scholar\_lookup?  
title=Medication%20management%20assessment%20for%20older%20adults%20in%20the%20community&author=D.%20Baldini&journal=Gerontologist&volume=46&pages=661-668&publication\_year=2006)
12. Carlson MC, Fried LP, Xue QL, Tekwe C, Brandt J. Validation of the Hopkins Medication Schedule to identify difficulties in taking medications. *J Gerontol A Biol*



observed performance test of medication management ability in HIV: relation to neuropsychological status and medication adherence outcomes. *AIDS Behav.* 1999;3(2):121–8.

[CrossRef](http://dx.doi.org/10.1023/A%3A1025483806464) (<http://dx.doi.org/10.1023/A%3A1025483806464>).

[Google Scholar](http://scholar.google.com/scholar_lookup?title=An%20observed%20performance%20test%20of%20medication%20management%20ability%20in%20HIV%3A%2128&publication_year=1999) ([http://scholar.google.com/scholar\\_lookup?](http://scholar.google.com/scholar_lookup?title=An%20observed%20performance%20test%20of%20medication%20management%20ability%20in%20HIV%3A%2128&publication_year=1999)

[title=An%20observed%20performance%20test%20of%20medication%20management%20ability%20in%20HIV%3A%2128&publication\\_year=1999](http://scholar.google.com/scholar_lookup?title=An%20observed%20performance%20test%20of%20medication%20management%20ability%20in%20HIV%3A%2128&publication_year=1999))

19. Gurland BJ, Cross P, Chen JM, Wilder DE, Pine ZM, Lantigua RA, et al. A new performance-test of adaptive cognitive-functioning—the Medication Management (MM) Test. *Int J Geriatr Psychiatry.* 1994;9(11):875–85.  
[CrossRef](http://dx.doi.org/10.1002/gps.930091104) (<http://dx.doi.org/10.1002/gps.930091104>)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=A%20new%20performance-test%20of%20adaptive%20functioning%20of%20the%20Medication%20Management%20%28MM%29%20Test&author=BJ.%20Gurland&authc885&publication_year=1994) ([http://scholar.google.com/scholar\\_lookup?title=A%20new%20performance-test%20of%20adaptive%20functioning%20of%20the%20Medication%20Management%20%28MM%29%20Test&author=BJ.%20Gurland&authc885&publication\\_year=1994](http://scholar.google.com/scholar_lookup?title=A%20new%20performance-test%20of%20adaptive%20functioning%20of%20the%20Medication%20Management%20%28MM%29%20Test&author=BJ.%20Gurland&authc885&publication_year=1994))
20. Isaac LM, Tamblin RM. Compliance and cognitive function: a methodological approach to measuring unintentional errors in medication compliance in the elderly. McGill-Calgary Drug Research Team. *Gerontologist.* 1993;33(6):772–81.  
[CrossRef](http://dx.doi.org/10.1093/geront/33.6.772) (<http://dx.doi.org/10.1093/geront/33.6.772>)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=8314104) ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=8314104](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=8314104))  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Compliance%20and%20cognitive%20function%3A%20a%20methodological%20approach%20to%20measuring%20Calgary%20Drug%20Research%20Team&author=LM.%20Isaac&author=RM.%20Tamblin&journal=Gerontologist&vol) ([http://scholar.google.com/scholar\\_lookup?title=Compliance%20and%20cognitive%20function%3A%20a%20methodological%20approach%20to%20measuring%20Calgary%20Drug%20Research%20Team&author=LM.%20Isaac&author=RM.%20Tamblin&journal=Gerontologist&vol](http://scholar.google.com/scholar_lookup?title=Compliance%20and%20cognitive%20function%3A%20a%20methodological%20approach%20to%20measuring%20Calgary%20Drug%20Research%20Team&author=LM.%20Isaac&author=RM.%20Tamblin&journal=Gerontologist&vol)
21. Romonko L, Pereles L. An evaluation of pharmacy assessment for geriatric patients. *Can J Hosp Pharm.* 1992;45(1):15–20.  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=10117358) ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=10117358](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=10117358))  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=An%20evaluation%20of%20pharmacy%20assessment%20for%20geriatric%20patients&author=L.%20Romonko&publication_year=1992) ([http://scholar.google.com/scholar\\_lookup?title=An%20evaluation%20of%20pharmacy%20assessment%20for%20geriatric%20patients&author=L.%20Romonko&publication\\_year=1992](http://scholar.google.com/scholar_lookup?title=An%20evaluation%20of%20pharmacy%20assessment%20for%20geriatric%20patients&author=L.%20Romonko&publication_year=1992))
22. Meyer ME, Schuna AA. Assessment of geriatric patients' functional ability to take medication. *DICP.* 1989;23:171–4.  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=2728508) ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=2728508](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=2728508))  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Assessment%20of%20geriatric%20patients%20functional%20ability%20to%20take%20medication&174&publication_year=1989) ([http://scholar.google.com/scholar\\_lookup?title=Assessment%20of%20geriatric%20patients%20functional%20ability%20to%20take%20medication&174&publication\\_year=1989](http://scholar.google.com/scholar_lookup?title=Assessment%20of%20geriatric%20patients%20functional%20ability%20to%20take%20medication&174&publication_year=1989))
23. Murray MD, Darnell J, Weinberger M, Martz BL. Factors contributing to medication noncompliance in elderly public housing tenants. *DICP.* 1986;20(2):146–52.  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Factors%20contributing%20to%20medication%20noncompliance%20in%20elderly%20public%20housing%20tenants&publication_year=1986) ([http://scholar.google.com/scholar\\_lookup?title=Factors%20contributing%20to%20medication%20noncompliance%20in%20elderly%20public%20housing%20tenants&publication\\_year=1986](http://scholar.google.com/scholar_lookup?title=Factors%20contributing%20to%20medication%20noncompliance%20in%20elderly%20public%20housing%20tenants&publication_year=1986))
24. Holly C, Salmond SW, Saimbert MK. Comprehensive systematic review for advanced nursing practice. Berlin: Springer; 2011.  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Comprehensive%20systematic%20review%20for%20advanced%20nursing%20practice&author=C.%20Holly&auth) ([http://scholar.google.com/scholar\\_lookup?title=Comprehensive%20systematic%20review%20for%20advanced%20nursing%20practice&author=C.%20Holly&auth](http://scholar.google.com/scholar_lookup?title=Comprehensive%20systematic%20review%20for%20advanced%20nursing%20practice&author=C.%20Holly&auth)
25. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JPA, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *Ann Intern*

Med. 2009;151:W65–94.

CrossRef (<http://dx.doi.org/10.7326/0003-4819-151-4-200908180-00136>)

PubMed ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=19622512](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=19622512))

Google Scholar ([http://scholar.google.com/scholar\\_lookup?title=The%20PRISMA%20statement%20for%20reporting%20analyses%20of%20studies%20that%20evaluate%20health%20care%20interventions%3A%20an%20explanation%20and%20elaboration&publication\\_year=2009](http://scholar.google.com/scholar_lookup?title=The%20PRISMA%20statement%20for%20reporting%20analyses%20of%20studies%20that%20evaluate%20health%20care%20interventions%3A%20an%20explanation%20and%20elaboration&publication_year=2009))

26. World Health Organization. Definition of an older or elderly person. 2015. <http://www.who.int/healthinfo/survey/ageingdefnolder/en/> (<http://www.who.int/healthinfo/survey/ageingdefnolder/en/>). Accessed 1 Oct 2015.
27. Edelberg HK, Shallenberger E, Hausdorff JM, Wei JY. One-year follow-up of medication management capacity in highly functioning older adults. *J Gerontol A Biol Sci Med Sci.* 2000;55:M550–3. CrossRef (<http://dx.doi.org/10.1093/gerona/55.10.M550>) PubMed ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=11034226](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11034226)) Google Scholar ([http://scholar.google.com/scholar\\_lookup?title=One-year%20follow-up%20of%20medication%20management%20capacity%20in%20highly%20functioning%20older%20adults&author=Hilary+Edelberg&publication\\_year=2000](http://scholar.google.com/scholar_lookup?title=One-year%20follow-up%20of%20medication%20management%20capacity%20in%20highly%20functioning%20older%20adults&author=Hilary+Edelberg&publication_year=2000))
28. Beckman A, Bernsten C, Parker MG, Thorslund M, Fastbom J. The difficulty of opening medicine containers in old age: a population-based study. *Pharm World Sci.* 2005;27:393–8. CrossRef (<http://dx.doi.org/10.1007/s11096-005-7903-z>) PubMed ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=16341746](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=16341746)) Google Scholar ([http://scholar.google.com/scholar\\_lookup?title=The%20difficulty%20of%20opening%20medicine%20containers%20in%20old%20age%20a%20population-based%20study&author=A.+Beckman&author=C.+Bernsten&author=M.G.+Parker&author=M.+Thorslund&author=J.+Fastbom&publication\\_year=2005](http://scholar.google.com/scholar_lookup?title=The%20difficulty%20of%20opening%20medicine%20containers%20in%20old%20age%20a%20population-based%20study&author=A.+Beckman&author=C.+Bernsten&author=M.G.+Parker&author=M.+Thorslund&author=J.+Fastbom&publication_year=2005))
29. Ruscin JM, Semla TP. Assessment of medication management skills in older outpatients. *Ann Pharmacother.* 1996;30:1083–8. PubMed ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=8893112](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=8893112)) Google Scholar ([http://scholar.google.com/scholar\\_lookup?title=Assessment%20of%20medication%20management%20skills%20in%20older%20outpatients&author=J.M.+Ruscin&author=T.P.+Semla&publication\\_year=1996](http://scholar.google.com/scholar_lookup?title=Assessment%20of%20medication%20management%20skills%20in%20older%20outpatients&author=J.M.+Ruscin&author=T.P.+Semla&publication_year=1996))
30. Hutchison LC, Jones SK, West DS, Wei JY. Assessment of medication management by community-living elderly persons with two standardized assessment tools: a cross-sectional study. *Am J Geriatr Pharmacother.* 2006;4:144–53. CrossRef (<http://dx.doi.org/10.1016/j.amjopharm.2006.06.009>) PubMed ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=16860261](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=16860261)) Google Scholar ([http://scholar.google.com/scholar\\_lookup?title=Assessment%20of%20medication%20management%20by%20community-living%20elderly%20persons%20with%20two%20standardized%20assessment%20tools%3A%20a%20cross-sectional%20study&author=L.C.+Hutchison&author=S.K.+Jones&author=D.S.+West&author=J.Y.+Wei&author=J.Y.+Wei&publication\\_year=2006](http://scholar.google.com/scholar_lookup?title=Assessment%20of%20medication%20management%20by%20community-living%20elderly%20persons%20with%20two%20standardized%20assessment%20tools%3A%20a%20cross-sectional%20study&author=L.C.+Hutchison&author=S.K.+Jones&author=D.S.+West&author=J.Y.+Wei&author=J.Y.+Wei&publication_year=2006))
31. Cotrell V, Wild K, Bader T. Medication management and adherence among cognitively impaired older adults. *J Gerontol Soc Work.* 2006;47:31–46. CrossRef ([http://dx.doi.org/10.1300/J083v47n03\\_03](http://dx.doi.org/10.1300/J083v47n03_03)) PubMed ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=16860261](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=16860261))

cmd=Retrieve&db=PubMed&dopt=Abstract&list\_uids=17062521)

[Google Scholar](http://scholar.google.com/scholar_lookup?title=Medication%20management%20and%20adherence%20among%20cognitively%20impaired%20older%20adults&46&publication_year=2006) ([http://scholar.google.com/scholar\\_lookup?](http://scholar.google.com/scholar_lookup?title=Medication%20management%20and%20adherence%20among%20cognitively%20impaired%20older%20adults&46&publication_year=2006)

[title=Medication%20management%20and%20adherence%20among%20cognitively%20impaired%20older%20adults&46&publication\\_year=2006](http://scholar.google.com/scholar_lookup?title=Medication%20management%20and%20adherence%20among%20cognitively%20impaired%20older%20adults&46&publication_year=2006))

32. Farris KD, Kelly MW, Tryon J. Clock drawing test and medication complexity index as indicators of medication management capacity: a pilot study. *J Am Pharm Assoc.* 2003;43:78–81.  
[CrossRef](http://dx.doi.org/10.1331/10865800360467097) (<http://dx.doi.org/10.1331/10865800360467097>)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Clock%20drawing%20test%20and%20medication%20complexity%20index%20as%20indicators%20of%20medica81&publication_year=2003) ([http://scholar.google.com/scholar\\_lookup?](http://scholar.google.com/scholar_lookup?title=Clock%20drawing%20test%20and%20medication%20complexity%20index%20as%20indicators%20of%20medica81&publication_year=2003)  
[title=Clock%20drawing%20test%20and%20medication%20complexity%20index%20as%20indicators%20of%20medica81&publication\\_year=2003](http://scholar.google.com/scholar_lookup?title=Clock%20drawing%20test%20and%20medication%20complexity%20index%20as%20indicators%20of%20medica81&publication_year=2003))
33. Kripalani S, Henderson LE, Chiu EY, Robertson R, Kolm P, Jacobson TA. Predictors of medication self-management skill in a low-literacy population. *J Gen Intern Med.* 2006;21:852–6.  
[CrossRef](http://dx.doi.org/10.1111/j.1525-1497.2006.00536.x) (<http://dx.doi.org/10.1111/j.1525-1497.2006.00536.x>)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=16881946) ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=16881946)  
[cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=16881946](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=16881946))  
[PubMedCentral](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1831567) (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1831567>)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Predictors%20of%20medication%20self-management%20literacy%20population&author=S.%20Kripalani&author=LE.%20Henderson&author=EY.%20Chiu&author=R.%20Robe856&publication_year=2006) ([http://scholar.google.com/scholar\\_lookup?title=Predictors%20of%20medication%20self-management%20literacy%20population&author=S.%20Kripalani&author=LE.%20Henderson&author=EY.%20Chiu&author=R.%20Robe856&publication\\_year=2006](http://scholar.google.com/scholar_lookup?title=Predictors%20of%20medication%20self-management%20literacy%20population&author=S.%20Kripalani&author=LE.%20Henderson&author=EY.%20Chiu&author=R.%20Robe856&publication_year=2006))
34. Lakey SL, Gray SL, Borson S. Assessment of older adults' knowledge of and preferences for medication management tools and support systems. *Ann Pharmacother.* 2009;43:1011–9.  
[CrossRef](http://dx.doi.org/10.1345/aph.1L704) (<http://dx.doi.org/10.1345/aph.1L704>)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=19470855) ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=19470855)  
[cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=19470855](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=19470855))  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Assessment%20of%20older%20adults%E2%80%99%20knowledge%20of%20and%20preferences%20for%20medi1019&publication_year=2009) ([http://scholar.google.com/scholar\\_lookup?](http://scholar.google.com/scholar_lookup?title=Assessment%20of%20older%20adults%E2%80%99%20knowledge%20of%20and%20preferences%20for%20medi1019&publication_year=2009)  
[title=Assessment%20of%20older%20adults%E2%80%99%20knowledge%20of%20and%20preferences%20for%20medi1019&publication\\_year=2009](http://scholar.google.com/scholar_lookup?title=Assessment%20of%20older%20adults%E2%80%99%20knowledge%20of%20and%20preferences%20for%20medi1019&publication_year=2009))
35. Lubinga SJ, Millar I, Babigumira JB. Pilot evaluation of the psychometric properties of a self-medication Risk Assessment Tool among elderly patients in a community setting. *BMC Res Notes.* 2011;4:398.  
[CrossRef](http://dx.doi.org/10.1186/1756-0500-4-398) (<http://dx.doi.org/10.1186/1756-0500-4-398>)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=21989334) ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=21989334)  
[cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=21989334](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=21989334))  
[PubMedCentral](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3199267) (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3199267>)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Pilot%20evaluation%20of%20the%20psychometric%20medication%20Risk%20Assessment%20Tool%20among%20elderly%20patients%20in%20a%20community%20setting&) ([http://scholar.google.com/scholar\\_lookup?title=Pilot%20evaluation%20of%20the%20psychometric%20medication%20Risk%20Assessment%20Tool%20among%20elderly%20patients%20in%20a%20community%20setting&](http://scholar.google.com/scholar_lookup?title=Pilot%20evaluation%20of%20the%20psychometric%20medication%20Risk%20Assessment%20Tool%20among%20elderly%20patients%20in%20a%20community%20setting&)
36. McDougall GJ, Becker H, Vaughan PW, Acee TW, Delville CL. The revised direct assessment of functional status for independent older adults. *Gerontologist.* 2010;50:363–70.  
[CrossRef](http://dx.doi.org/10.1093/geront/gnp139) (<http://dx.doi.org/10.1093/geront/gnp139>)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=19808842) ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=19808842)  
[cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=19808842](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=19808842))  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=The%20revised%20direct%20assessment%20of%20functional%20status%20for%20independent%20older%20adu370&publication_year=2010) ([http://scholar.google.com/scholar\\_lookup?](http://scholar.google.com/scholar_lookup?title=The%20revised%20direct%20assessment%20of%20functional%20status%20for%20independent%20older%20adu370&publication_year=2010)  
[title=The%20revised%20direct%20assessment%20of%20functional%20status%20for%20independent%20older%20adu370&publication\\_year=2010](http://scholar.google.com/scholar_lookup?title=The%20revised%20direct%20assessment%20of%20functional%20status%20for%20independent%20older%20adu370&publication_year=2010))
37. Robnett RH, Dionne C, Jacques R, LaChance A, Mailhot M. The ManageMed Screening: an interdisciplinary tool for quickly assessing medication management skills. *Clin Gerontol.* 2007;30:1–23.

[CrossRef](http://dx.doi.org/10.1111/j.1365-2702.2016.04811.x) (<http://dx.doi.org/10.1111/j.1365-2702.2016.04811.x>)

[Google Scholar](http://scholar.google.com/scholar_lookup?title=The%20ManageMed%20Screening%3A%20an%20interdisciplinary%20tool%20for%20quickly%20assessing%20m23&publication_year=2007) ([http://scholar.google.com/scholar\\_lookup?](http://scholar.google.com/scholar_lookup?title=The%20ManageMed%20Screening%3A%20an%20interdisciplinary%20tool%20for%20quickly%20assessing%20m23&publication_year=2007)

[title=The%20ManageMed%20Screening%3A%20an%20interdisciplinary%20tool%20for%20quickly%20assessing%20m23&publication\\_year=2007](http://scholar.google.com/scholar_lookup?title=The%20ManageMed%20Screening%3A%20an%20interdisciplinary%20tool%20for%20quickly%20assessing%20m23&publication_year=2007))

38. Rostgaard T. Caring for children and older people in Europe—a comparison of European policies and practice. *Policy Stud.* 2002;23:51–68.  
[CrossRef](http://dx.doi.org/10.1080/0144287022000000082) (<http://dx.doi.org/10.1080/0144287022000000082>)  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Caring%20for%20children%20and%20older%20people%20in%20Europe%E2%80%94a%20comparison%20of%2068&publication_year=2002) ([http://scholar.google.com/scholar\\_lookup?](http://scholar.google.com/scholar_lookup?title=Caring%20for%20children%20and%20older%20people%20in%20Europe%E2%80%94a%20comparison%20of%2068&publication_year=2002)  
[title=Caring%20for%20children%20and%20older%20people%20in%20Europe%E2%80%94a%20comparison%20of%2068&publication\\_year=2002](http://scholar.google.com/scholar_lookup?title=Caring%20for%20children%20and%20older%20people%20in%20Europe%E2%80%94a%20comparison%20of%2068&publication_year=2002))
39. Stauffer Y, Spichiger E, Mischke C. Complex drug regimen in multimorbid elderly patients after hospital discharge—a qualitative study. *Pflege.* 2015;28:7–18.  
[CrossRef](http://dx.doi.org/10.1024/1012-5302/a000400) (<http://dx.doi.org/10.1024/1012-5302/a000400>)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=25631955) ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=25631955)  
[cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=25631955](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=25631955))  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Complex%20drug%20regimen%20in%20multimorbid%20elderly%20patients%20after%20hospital%20discharge%18&publication_year=2015) ([http://scholar.google.com/scholar\\_lookup?](http://scholar.google.com/scholar_lookup?title=Complex%20drug%20regimen%20in%20multimorbid%20elderly%20patients%20after%20hospital%20discharge%18&publication_year=2015)  
[title=Complex%20drug%20regimen%20in%20multimorbid%20elderly%20patients%20after%20hospital%20discharge%18&publication\\_year=2015](http://scholar.google.com/scholar_lookup?title=Complex%20drug%20regimen%20in%20multimorbid%20elderly%20patients%20after%20hospital%20discharge%18&publication_year=2015))
40. Atkin PA, Finnegan TP, Ogle SJ, Shenfield GM. Functional ability of patients to manage medication packaging: a survey of geriatric inpatients. *Age Ageing.* 1994;23:113–6.  
[CrossRef](http://dx.doi.org/10.1093/ageing/23.2.113) (<http://dx.doi.org/10.1093/ageing/23.2.113>)  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=8023717) ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=8023717)  
[cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=8023717](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=8023717))  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Functional%20ability%20of%20patients%20to%20manage%20medication%20packaging%3A%20a%20survey%20116&publication_year=1994) ([http://scholar.google.com/scholar\\_lookup?](http://scholar.google.com/scholar_lookup?title=Functional%20ability%20of%20patients%20to%20manage%20medication%20packaging%3A%20a%20survey%20116&publication_year=1994)  
[title=Functional%20ability%20of%20patients%20to%20manage%20medication%20packaging%3A%20a%20survey%20116&publication\\_year=1994](http://scholar.google.com/scholar_lookup?title=Functional%20ability%20of%20patients%20to%20manage%20medication%20packaging%3A%20a%20survey%20116&publication_year=1994))
41. Bevil CW. Medication management in an elderly, community-based population: a pilot project. *J N Y State Nurses Assoc.* 1981;12:19–29.  
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=6943306) ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=6943306)  
[cmd=Retrieve&db=PubMed&dopt=Abstract&list\\_uids=6943306](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=6943306))  
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Medication%20management%20in%20an%20elderly%20community-based%20population%3A%20a%20pilot%20project&author=CW.%20Bevil&journal=J%20N%20Y%20State%20Nurses%20Assoc.%201981;12:19-29&publication_year=1981) ([http://scholar.google.com/scholar\\_lookup?title=Medication%20management%20in%20an%20elderly%20community-based%20population%3A%20a%20pilot%20project&author=CW.%20Bevil&journal=J%20N%20Y%20State%20Nurses%20Assoc.%201981;12:19-29&publication\\_year=1981](http://scholar.google.com/scholar_lookup?title=Medication%20management%20in%20an%20elderly%20community-based%20population%3A%20a%20pilot%20project&author=CW.%20Bevil&journal=J%20N%20Y%20State%20Nurses%20Assoc.%201981;12:19-29&publication_year=1981))

## Copyright information

© Springer International Publishing 2016

## About this article



Check for updates

**Print ISSN**

2210-7703

**Online ISSN**

2210-7711

**Publisher Name**

Springer International Publishing

[About this journal](#)

[Reprints and Permissions](#)

---

**SPRINGER NATURE**

© 2016 Springer International Publishing AG. Part of Springer Nature.

Not logged in · Not affiliated · 95.93.104.252