

Supplementary Table S1. MEDLINE search strategy

Source	Search strategy: keyword/MeSH
MEDLINE (Ovid) 1990 to August 2021	<ol style="list-style-type: none"> 1. Anticholinergic.mp. or exp Cholinergic Antagonists/ (90034) 2. anticholinergic*.mp. (12552) 3. antimuscarinic#.mp. (773) 4. Anticholinergic prescrib*.mp. (8) 5. Muscarinic Antagonists.mp. or exp Muscarinic Antagonists/ (55192) 6. Cholinergic Antagonists.mp. or exp Cholinergic Antagonists/ (84271) 7. Parasympatholytics.mp. or exp Parasympatholytics/ (44696) 8. cholinolytic*.mp. (598) 9. Antimuscarinic prescrib*.mp. (2) 10 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (102500) 11 intervention.mp. or exp Early Intervention, Educational/ or exp Early Medical Intervention/ (662546) 12 Collaboration.mp. (80214) 13 exp "Drug Utilization Review"/ or exp Medication Therapy Management/ or exp "Drug-Related Side Effects and Adverse Reactions"/ or Medication review.mp. or exp Medication Reconciliation/ (128503) 14 exp Medical History Taking/ or exp Medication Errors/ or Medication history.mp. (40748) 15 Integrated medicine management.mp. (2) 16 Outreach Visi*.mp. (303) 17 detailing.mp. (7444) 18 Partnered.mp. (3137) 19 Charting.mp. (3347) 20 Adverse drug event.mp. (1109) 21 ADE.mp. (2684) 22 Medication safety.mp. (2533) 23 drug safety.mp. (5581) 24 Medication appropriateness.mp. (243) 25 Inappropriate medi#.mp. (10) 26 Inappropriate drug.mp. (527) 27 Prescribing.mp. (50108)

28	11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (953366)
29	Aged.mp. or exp "Aged, 80 and over"/ or exp Aged/ (5533046)
30	older people.mp. (31764)
31	elderly.mp. (267270)
32	older adul#.mp. (8550)
33	geriatric*.mp. (107308)
34	29 or 30 or 31 or 32 or 33 (5620543)
35	10 and 28 and 34 (1450)
38	limit 35 to (english language and humans and yr="1990 -Current") (677)

Supplementary Table S2. The Newcastle-Ottawa scale risk of bias assessment for included cohort studies

Author, Year, Country	Study design	Selection	Comparability	Outcome
Riordan et al., 2019, Ireland (46)	A single group (pre- and post-comparison) feasibility study	★ ★ ★	★ ★	★ ★
Ailabouni et al., 2019, New Zealand (47)	Convergent parallel mixed methods design (before and after)	★ ★ ★	★ ★	★ ★
Hernandez et al., 2020, Spain (49)	Prospective pre-post interventional study	★ ★ ★	★ ★	★ ★
Lenander et al., 2018, Sweden (50)	Cross-sectional	★ ★ ★ ★	★ ★	★ ★ ★
Weichert et al., 2018, Finland (42)	Multi-centre observational study	★ ★ ★ ★	★ ★	★ ★ ★
Lenander et al., 2017, Sweden (28)	Interventional pilot study	★ ★ ★ ★	★ ★	★ ★ ★
Lagrange et al., 2017, France (51)	Retrospective study	★ ★ ★	★ ★	★ ★ ★

Carnahan et al., 2017, US (37)	Quasi- experimental study design	★ ★ ★ ★	★ ★	★ ★ ★
Hanus et al., 2016, US (38)	Observational Pilot study	★ ★	★ ★	★ ★
McLarin et al, 2016, Australia (41)	Retrospective study	★ ★ ★ ★	★ ★	★
Kersten et al.,2015, Norway (44)	Retrospective study	★ ★ ★ ★	★ ★	★ ★ ★
Ghibelli et al., 2013, Italy (52)	Pre, post study	★ ★ ★	★ ★	★ ★
Yeh et al., 2013, Taiwan (53)	Prospective case–control study	★ ★	★ ★	★ ★ ★
Castelino et al , 2010, Australia (20)	Retrospective study	★ ★ ★ ★	★ ★	★
Nishtala et al.,2009, Australia (40)	Retrospective study	★ ★ ★ ★	★ ★	★ ★ ★
Starner et al., 2009, USA (36)	Retrospective study	★ ★ ★ ★	★ ★	★ ★ ★

Note: A study can be given a maximum of one star for each numbered item within the *Selection* (maximum of 4 stars)) and *Outcome* categories (maximum of 3 stars). A maximum of two stars can be given for *Comparability*.

Thresholds for converting the Newcastle-Ottawa scale to Agency for Healthcare Research and Quality (AHRQ) standards (good, fair, and poor):

Good quality: 3 or 4 stars in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome/exposure domain

Fair quality: 2 stars in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome/exposure domain

Poor quality: 0 or 1 star in selection domain OR 0 stars in comparability domain OR 0 or 1 stars in outcome/exposure domain.

Supplementary Table S3. The Cochrane Risk of Bias tool results for included RCTs

Study	Study design	Randomisation sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding outcome assessors	Loss to follow up (incomplete data)	Selective reporting
Kersten et al.,2013, Norway (45)	RCT, single- blinded	✓	X	X	?	X	✓
van Eijk et al, 2001, Netherlands (54)	RCT	X	✓	X	X	?	✓
Boustani et al.,2012, US (39)	RCT	✓	?	X	X	✓	✓
Juola et al., 2015, Finland (43)	Cluster RCT	✓	?	X	X	✓	✓
Toivo et al., 2019, Belgium (48)	Two-arm, parallel, cluster RCT	?	?	X	X	✓	✓
Moga et al., 2017, USA (27)	Parallel arm RCT	✓	✓	X	X	✓	✓
Gnjidic et al., 2010, Australia (21)	Cluster RCT	✓	✓	X	X	✓	✓

X = inadequate; ✓ = adequate; ? = unclear

RCT = Randomised controlled trial