



The GheOP³S-tool

The Ghent Older People's Prescriptions community Pharmacy Screening-tool

List 1: Potentially inappropriate medication for older patients, independent of diagnosis - Part 1: Drug classes

No.	Item	Alternative
1	Any antidepressant ≥1 year	Check if indication is still present, if not: discontinue therapy Check co-medication
2	Any antipsychotic drug >1 month	1 st Consider need for chronic use (≈ Is original indication still present?) 2 nd Consider non-pharmacological approach
3	Any drug for arterial vascular disorders (<i>pentoxifylline, naftidrofuryl, piracetam, co-dergocrine, cinnarizine</i>)	Therapeutic abstention + recommend non-pharmacological approach (compression hosiery, discuss with GP a referral to surgery, physiotherapy...).
4	Any intermediate acting benzodiazepine (<i>alprazolam, bromazepam, brotizolam, clonazepam, lorazepam, lor(met)azepam, oxazepam</i>) or Z-product (<i>zopiclon, zolpidem</i>) at full dose or any dose >30 subsequent days	- For sleeping disorders: Startup: 1 st Consider non-pharmacological approach 2 nd Prefer intermediate acting benzodiazepine (<i>alprazolam, bromazepam, brotizolam, clonazepam, lorazepam, lor(met)azepam, oxazepam</i>) or Z-product (<i>zopiclon, zolpidem</i>) at 1/2 dose of young adults >30 subsequent days: Consider non-pharmacological approach (sleep hygiene), provide GP with withdrawal plan and assure GP of support by pharmacists in withdrawal - For anxiety: consider non-pharmacological approach and switching to SSRI
5	Any short (<i>triazolam</i>) or long-acting benzodiazepine (<i>clobazam, clonazepam, clorazepaat, cloxazolam, diazepam, ethylloflazepaat, flunitrazepam, flurazepam, nitrazepam, nordazepam, prazepam</i>)	- Startup: 1 st Consider non-pharmacological approach 2 nd Prefer intermediate acting benzodiazepine (<i>alprazolam, bromazepam, brotizolam, clonazepam, lorazepam, lor(met)azepam, oxazepam</i>) or Z-product (<i>zopiclon, zolpidem</i>) at 1/2 dose of young adults <30 subsequent days - Chronic: Consider non-pharmacological approach (sleep hygiene), provide GP with withdrawal plan and assure GP of support by pharmacists in withdrawal - As a muscle relaxant: 1 st Consider non-pharmacological approach (physiotherapy) + verify that no Mg ²⁺ and/or vitamin B ₆ -shortages are present 2 nd Prefer intermediate acting benzodiazepine or Z-product at 1/2 dose of young adults <30 subsequent days
6	Any long-acting sulfonylureum derivative (<i>glibenclamide, prolonged release gliclazide, glimepiride</i>)	Metformine or any short-acting sulfonylurea derivative (<i>immediate release gliclazide, glipizide, gliquidon</i>)
7	Any nasal vasoconstrictor >1 month	Hypertonic saline solution or referral to GP
8	Any oral NSAID	1 st Consider need for anti-inflammatory therapy. If possible: paracetamol or stronger non-NSAID is safer choice 2 nd If therapy is necessary, prefer low dose ibuprofen. Avoid NSAIDs with high GI-risk (<i>piroxicam, ketorolac</i>) Prefer ibuprofen/naproxen when CV-risk Prefer NSAIDs with short half-life (<i>ibuprofen, diclofenac</i>) 3 rd Always add gastroprotection (most evidence for PPI in standard dose) 4 th Closely monitor renal function or blood pressure depending on present diagnoses
9	Any PPI at full dose >8 weeks (<i>>20 mg (es)omeprazole, >20mg pantoprazole, >30mg lansoprazole, >20mg rabeprazole</i>)	Consider need for chronic use and reduce dose if possible
10	Any recently marketed drug (black triangles)	Consider using drug with similar indication and more evidence in older patients
11	Any sedating antihistaminic drug (<i>alimemazine, chloorfenamine, dexchlorfeniramine, diphenhydramine, dimenhydrinaat, dimetindeen, hydroxyzine, ketotifen, meclizine, promethazine, rupatadine</i>)	1 st Verify indication 2 nd Switch to non-sedating antihistaminic drug (<i>bilastine (levo)cetirizine, ebastine, (des)loratadine, fexofenadine, mizolastine</i>)

CV-risk: Cardiovascular risk; GI-risk: Gastro-intestinal risk; GP: General Practitioner; NSAID: non steroidal anti-inflammatory drug; PPI: Proton Pump Inhibitor; SSRI: Selective Serotonin Reuptake Inhibitor; NA: not assessed.

List 1: Potentially inappropriate medication for older patients, independent of diagnosis - Part 2: Specific molecules

<u>No.</u>	<u>Item</u>	<u>Alternative</u>
12	Alizapride	1 st Non pharmacological approach 2 nd Dose reduction: 3 x 25 mg/day
13	Bisacodyl	Macrogol/lactulose
14	Clonidine	Consider other safer antihypertensive
15	Codeine and derivatives for acute cough	Therapeutic abstention or safer alternative (e.g. honey)
16	Dabigatran	Warfarin/Acetylsalicylic acid/Heparin, depending on indication
17	Digoxin >0,125mg/day	Digoxin ≤0,125mg/day or serum level between 0,5 and 0,8 µg/L
18	Dipyridamol monotherapy (without ASA)	Acetylsalicylic acid in low dose
19	Ginkgo biloba	No evidence. Referral depending on underlying condition.
20	Liquid paraffin	Macrogol/lactulose
21	Methyldopa	Consider other safer antihypertensive
22	Metoclopramide	1 st Non pharmacological approach 2 nd Dose reduction: 3 X 5mg/day
23	Pentazocine	Consider paracetamol/codeine combination or pure morphinomimetic agent, depending on indication
24	Phenobarbital	Verify that GP checked diagnosis with prescribing neurologist
25	Pseudoephedrine oral	Short-term intranasal therapy (nasal vasoconstrictor <7 days or hypertonic saline solution)
26	Rivaroxaban or Apixaban	Warfarin/Acetylsalicylic acid/Heparin, depending on indication
27	Senna glycosides	Macrogol/lactulose
28	Picosulfate	Macrogol/lactulose
29	Theophylline	Reconsider indication, preferably stop theophylline
30	Ticlopidine, new prescription	Verify indication, prefer safer alternative
31	Tramadol, new prescription	Check if step-up approach was used. Paracetamol/Codeine could be more appropriate

GP: General Practitioner.

List 2: Potentially inappropriate medication for older patients, dependent of diagnosis - Part 1: Drug classes

No.	Item	Present disease	Alternative
32	Any antipsychotic other than quetiapine and clozapine	Parkinson's disease	Quetiapine and clozapine are preferred: they appear to be less likely to precipitate worsening of Parkinson's disease
33	Anticholinergics (e.g. Antihistamines, Antidepressants, Antipsychotics, Antispasmodics...) (cfr table 1)	Known dementia/ Cognitive impairment	Consider drug for same indication with less anticholinergic activity (cfr table 1)
34	Anticholinergics (e.g. Antihistamines, Antidepressants, Antipsychotics, Antispasmodics...) (cfr table 1)	Known constipation	1 st Consider drug for same indication with less anticholinergic activity (cfr table 1) 2 nd If therapy is necessary: add osmotic laxative and apply non-pharmacological measures
35	Anticholinergics (e.g. Antihistamines, Antidepressants, Antipsychotics, Antispasmodics...) (cfr table 1)	Known benign prostatic hyperplasia	1 st Consider drug for same indication with less anticholinergic activity (cfr table 1) 2 nd If therapy is necessary: check urinary residue shortly after start with anticholinergic drug. Recheck when suspicion of urine retention.
36	Calcium Channel Blockers	Known Constipation	1 st Prefer class of antihypertensive agent that hasn't constipation as side-effect 2 nd If calcium channel blocker is necessary, prefer dihydropyridines (amlodipine) and/or add osmotic laxative
37	Non-selective beta-blockers	COPD or asthma	Consider cardioselective beta-blocker or other class of antihypertensive drugs
38	Oral corticosteroids >1 week	Diabetes	1 st Closely monitor glycemic control and blood pressure 2 nd Shorten therapy duration as much as possible 3 rd Always warn patient about possible dysregulation
39	Oral corticosteroids >1 week	Hypertension	1 st Closely monitor blood pressure and glycemic control 2 nd Shorten therapy duration as much as possible 3 rd Always warn patient about possible dysregulation
40	Thiazide and loop diuretics	Known Gout	1 st Prefer other class of antihypertensive drugs 2 nd If diuretic is necessary; prefer potassium sparing (cave renal impairment and interactions)

List 2: Potentially inappropriate medication for older patients, dependent of diagnosis - Part 2: Specific molecules

No.	Item	Present disease	Alternative
41	Alizapride	Parkinson's disease	1 st Always apply non-drug and diet therapy 2 nd If anti-emetic therapy is necessary, prefer domperidone in low dose only if no cardiac risk factors are present and no other QT-prolonging drugs are used
42	Metoclopramide	Parkinson's disease	1 st Always apply non-drug and diet therapy 2 nd If anti-emetic therapy is necessary, prefer domperidone in low dose only if no cardiac risk factors are present and no other QT-prolonging drugs are used

List 3: Potential prescribing omissions for older patients

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No.	Item
43	Was there a check for osteoporosis in patients taking \geq an equivalent of 7,5 mg of oral prednisone \geq 3months and/or was Calcium/Vitamin D suppletion <u>and</u> bisphosphonates started if needed?
44	Was bowel regimen (preferably macrogol or lactulose) offered in any patient on narcotic analgesics?
45	Was Calcium/Vitamin D suppletion in patients with known or elevated risk for osteoporosis offered? (determined via FRAX-tool)
46	Was Calcium/Vitamin D suppletion offered in patients taking oral corticosteroids >1m.
47	Was \geq 65 year old patients reminded and proposed to undergo yearly influenza vaccination?
48	Was folic acid suppletion offered in treatment with methotrexate?

List 4: Drug-Drug interactions of specific relevance in older patients

No	Item	Alternative
49	VKA + oral NSAIDs	<p>1st Consider need for NSAID. If possible: paracetamol or stronger non-NSAID is safer choice</p> <p>2nd If NSAID is unavoidable, prefer low dose ibuprofen</p> <p>3rd Always add gastroprotection (most evidence for PPI in standard dose)</p> <p>4th Also keep in mind to closely monitor renal function or blood pressure depending on present diagnoses</p>
50	RAAS-inhibitor + potassium sparing diuretic/potassium supplements/potassium containing drugs ¹	<p>1st Preferably change to non-potassium sparing diuretic/switch to non-potassium containing drug equivalent</p> <p>2nd If combination is unavoidable: monitor renal function and serum potassium</p> <p>3rd Always inform patient about symptoms of hyperkalaemia</p>
51	VKA + Antiplatelet drugs (esp. ASA), not prescribed by cardiologist	<p>1st Check if combination is appropriate (artificial valve, up to 3 months after acute coronary syndrome and for rheumatic mitral valve stenosis)</p> <p>2nd When combination is not appropriate: stop ASA and monitor INR</p>
52	VKA + TMP/SMX	<p>1st Preferably switch to other antibiotic based on indication</p> <p>2nd If combination is unavoidable: monitor INR</p>
53	Oral NSAID + Oral Corticosteroids	<p>1st Consider need for NSAID. If possible: paracetamol or stronger non-NSAID is safer choice</p> <p>2nd If NSAID is unavoidable, prefer low dose ibuprofen</p> <p>3rd Always add gastroprotection (most evidence for PPI in standard dose)</p> <p>4th Also keep in mind to closely monitor renal function or blood pressure depending on present diagnoses</p>
54	Oral NSAID + Diuretic	<p>1st Consider need for NSAID. If possible: paracetamol or stronger non-NSAID is safer choice</p> <p>2nd If NSAID is unavoidable: monitor renal function, blood pressure and serum potassium</p>
55	Digoxin + Macrolide antibiotics	<p>1st Preferably switch to other antibiotic based on indication</p> <p>2nd If combination is unavoidable: monitor serum digoxin levels</p> <p>3rd Always inform patient about signs of digoxin toxicity</p>
56	Digoxin + Verapamil/Diltiazem	<p>1st Starting digoxin: use lowest possible dose</p> <p>2nd Starting diltiazem: check serum digoxin levels for 1 to 2 weeks</p> <p>3rd Starting verapamil: lower digoxin dose to 50-70% of usual dose + check serum digoxin levels for 1 to 2 weeks</p> <p>4th Altering dose of verapamil/diltiazem: alter digoxin dose using serum digoxin levels</p> <p>5th Always inform patient about signs of digoxin toxicity</p>
57	Lithium + RAAS-inhibitors	<p>1st Consider need for RAAS-inhibitor</p> <p>2nd If combination is unavoidable: monitor lithium levels within 3-5 days after starting RAAS-inhibitor</p> <p>3rd Always inform patient about signs of lithium toxicity</p>
58	Lithium + Oral NSAID	<p>1st Consider need for NSAID. If possible: paracetamol or stronger non-NSAID is safer choice</p> <p>2nd If combination is unavoidable: determine lithium levels before starting NSAID, give NSAID with strict schedule, check lithium levels after 3 days and modify intake dosage. Act similarly when NSAID is stopped</p> <p>3rd Always inform patient about signs of lithium toxicity</p>
59	Lithium + Diuretics	<p>1st Consider need for diuretic. If possible: replace with appropriate alternative.</p> <p>2nd If combination is unavoidable: determine lithium levels before starting diuretic, avoid 'on demand' use of diuretic, determine lithium levels after 3 days and modify intake dosage. Act similarly when diuretic is stopped.</p> <p>3rd Always inform patient about signs of lithium toxicity</p>

VKA: Vitamin K Antagonist; NSAID: non-steroidal anti-inflammatory drug; TMP/SMX: Trimetoprim/Sulfamethoxazol; CCB: Calcium Channel Blocker; RAAS-inhibitor: Renin-Angiotensin-Aldosterone System Inhibitors; SSRI: Selective Serotonin Reuptake Inhibitor; ASA: Acetylsalicylic acid

¹Some drugs contain considerable potassium amounts: Glucosamine in potassium salt (up to 300mg/tablet), macrogol + electrolytes (≈25mg potassium/sachet), oral nutritional supplements (e.g. Fortime!) (up to 200mg/unit)....
(Recommended Daily Dose: 3000mg/day for ≥60 year old patients)

No	Item	Alternative
60	Theophyllin + Quinolones/Macrolides	1 st Consider switching to other antibiotic based on indication 2 nd If combination is unavoidable: monitor theophylline levels 3 rd Always consider stopping theophylline
61	RAAS-inhibitor + Oral NSAID	1 st Consider need for NSAID. If possible: paracetamol or stronger non-NSAID is safer choice. 2 nd If NSAID is unavoidable: monitor renal function, blood pressure and serum potassium
62	Oral NSAID + SSRI/SNRI	1 st Consider need for NSAID. If possible: paracetamol or stronger non-NSAID is safer choice 2 nd If NSAID is unavoidable, prefer low dose ibuprofen 3 rd Always add gastroprotection (most evidence for PPI in standard dose) 4 th Also keep in mind to closely monitor renal function or blood pressure depending on present diagnoses
63	RAAS-inhibitor + TMP/SMX	1 st Preferably switch to other antibiotic based on indication 2 nd If combination is unavoidable: monitor renal function and potassium level
64	Oral antidiabetics/insuline + non-selective beta-blocker	1 st Always change to cardioselective beta-blocker (also relevant for eye drops) 2 nd Inform patient about possible changes in awareness of hypoglycaemia
65	Oral antidiabetics/insuline + cardioselective beta-blocker	1 st Consider need for beta-blocker + check glycemic control 2 nd Inform patient about possible changes in awareness of hypoglycaemia
66	Alprazolam/Midazolam/Triazolam/Zolpidem/ Zopiclon + Strong CYP3A4 inhibitor	1 st Stop benzodiazepine use during treatment with CYP3A4 inhibitor 2 nd Switch to equivalent drug with less or without CYP3A4 inhibiting activity
67	CCB + Strong CYP3A4 inhibitor	Preferably switch to equivalent drug with less or without CYP3A4 inhibiting activity
68	Oral NSAID + Antiplatelet drugs	1 st Consider need for NSAID. If possible: paracetamol or stronger non-NSAID is safer choice 2 nd If NSAID is unavoidable, prefer low dose ibuprofen 3 rd Always add gastroprotection (most evidence for PPI in standard dose) 4 th Also keep in mind to closely monitor renal function or blood pressure depending on present diagnoses
69	Phenytoin + TMP/SMX	1 st Preferably switch to other antibiotic based on indication 2 nd If combination is unavoidable: monitor phenytoin levels
70	First dose RAAS-inhibitor at full dosage + pre-treatment with diuretic	1 st Start RAAS-inhibitor in lowest possible dose for 3 days 2 nd Always give RAAS-inhibitor first 3 days at night and diuretic in the morning 3 rd Always inform patient about possible orthostatic effect
71	Tamoxifen + strong CYP2D6 inhibitors (paroxetine/fluoxetine)	Prefer equivalent drug with less or without CYP2D6 inhibiting activity (e.g. for antidepressant: fluvoxamine or (es)citalopram)
72	Ca ²⁺ + Quinolones/Tetracyclines	1 st Use Ca ²⁺ min 2h after quinolone/tetracycline or take quinolone/tetracycline 6h after intake of Ca ²⁺ 2 nd If not possible: Stop calcium
73	Ca ²⁺ + Stontiumranelate	1 st Use Ca ²⁺ min 2h after strontiumranelate or take strontiumranelate 6h after intake of Ca ²⁺ 2 nd If not possible: Stop calcium
74	Ca ²⁺ + Levothyroxine	1 st Use Ca ²⁺ min 2h after levothyroxine drug or take levothyroxine 6h after intake of Ca ²⁺ 2 nd If not possible: Stop calcium
75	Bisphosphonate + Ca ²⁺ , Mg ²⁺ , Zn ²⁺ , Fe ²⁺ , Al ³⁺	1 st Use complexing agent min 2h after bisphosphonate 2 nd If not possible: Switch to equivalent drug without complexing activity
76	VKA + Vitamin K containing drugs/supplements ²	1 st Switch to equivalent drug/supplement without Vitamin K 2 nd If not possible: Monitor INR
77	Any combination of anticholinergic drug	1 st Replace 1 or more of the drugs by an equivalent with less or without anticholinergic activity 2 nd Always advise patients to report anticholinergic side-effects

ASA: Acetylsalicylic acid; **NSAID:** non-steroidal anti-inflammatory drug; **TMP/SMX:** Trimetoprim/Sulfamethoxazol; **CCB:** Calcium Channel Blocker; **RAAS-inhibitor:** Renin-Angiotensin-Aldosteron System Inhibitors; **SSRI:** Selective Serotonin Reuptake Inhibitor; **VKA:** Vitamin K Antagonist

² Some supplements contain considerable Vitamin K amounts: oral nutritional supplements (e.g. Fortimel) (up to 13µg/unit)...(Recommended Daily Dose: 50-70µg/day for ≥60 year old patients)

List 5: General care-related items for older patients to be addressed in the pharmacy

No.	Item
78	Was dispensation of over-the-counter medication (NSAID, ASA...) added in the electronic patient record?
79	Were contra-indications that can be derived from patient's medication added to the electronic patient record?
80	Was availability of assistance in medication/health issues (by nurse, neighbour, children) checked and discussed in frail older patients or older patients with reduced cognition, especially when taking drugs needing strict intake scheme.
81	Was the patient asked which aspect of pharmaceutical care could be improved for him/her (Translated into practical questions for the specific patient: e.g. correct inhaler use, splitting tablets...) <ul style="list-style-type: none">- Does the patient use his/her drugs correctly (e.g. correct inhalation technique, patch application, eye drops instillation...)?- Does the patient need to split or crush tablets?- Is the route of administration the most easy and efficient for the patient?- Is the drug formulation the most easy and efficient for the patient?- Is it possible to ease the use of drugs for this patient:<ul style="list-style-type: none">• Is it possible to lower dosage frequency?• Are there devices that make drug use easier (e.g. adding a spacer, tablet splitter...)?
82	Was adherence for all chronic medication checked and discussed in the past year? (refill rate) Was adherence for all new medication at first refill checked and discussed in the past year?
83	Were polypharmacy patients questioned about whether a <u>clear</u> medication scheme was available to him/her.

Table 1: Drugs with high risk for anticholinergic side-effects (uit: Duran et al (2013) - Systematic review of anticholinergic risk scales in older adults, complemented with information from BCFI)

High-potency anticholinergics		Low-potency anticholinergics	
Amitriptyline	Imipramine	Alimemazine	Lithium
Atropine	Levomepromazine	Baclofen	Loperamide*
Belladonna alkaloiden (o.a. butylhyoscinebromide*)	Meclozine*	Bromocriptine	Loratadine*
Clomipramine	Nortriptyline	Carbamazepine	Meperidine (=Pethidine)
Clozapine	Oxybutynine	Cetirizine*	Methadon
Darifenacine	Procyclidine	Cimetidine	Mirtazapine
(Dex)chlorpheniramine*	Promethazine*	Citalopram	Morfine
Dimenhydrinaat*	Pyrilamine (in Nortussine®)	Clonazepam	Olanzapine
Diphenhydramine*	Scopolamine	Codeine	Oxcarbazepine
Doxepine	Tizanidine	Diazepam	Oxycodone
Flavoxaat	Tolterodine	Disopyramide	Paroxetine
Hydroxyzine	Trihexyphenidyl	Domperidone	Phenelzine
Hyoscyamine		Dosulepine	Pimozide
		Entacapon	Quetiapine
Mentioned by BCFI:		Fentanyl	Ranitidine*
Biperideen		Fexofenadine*	Risperidon
Fesoterodine		Fluoxetine	Theophylline
Maprotiline		Fluvoxamine	Tramadol
Nefopam		Haloperidol	Trazodon
Propiverine		Hydrocodone	Triazolam
Prothipendyl		Ketorolac	
Solifenacine			

Remark: Tiotropium en ipratropium not included because of low risk for systemic side-effects after inhalation.

*: also available over the counter