Supplemental Table 1. Judgement criterion and its influence degree coefficient

Judgement Criteria	Influence Degree on Expert Judgement			
	High	Medium	Low	None
Theoretical analysis	0.3	0.2	0.1	0
Practical experience	0.5	0.4	0.3	0
Knowledge of domestic or international peers	0.15	0.15	0.15	0
Intuition	0.05	0.05	0.05	0.05

Supplemental Table 2. Expert familiarity with the drugs coefficient

Familiarity Level	Grade	Very familiar	Familiar	Moderately familiar	Slightly familiar	Unfamiliar
	Coefficient	1	0.8	0.5	0.2	0

Supplemental Table 3 **.** The results of the first round of expert scoring

Conditions (disease status, concomitant medication, renal function, etc.)	Drug name	Proportion of "agree with reservations"	Mean	⩾ 4 points%	Standard deviation	Coefficient of variation (CV)
Part 1 Medications in the 2017 PIM-China criteria independent of specific conditions						
	*Estazolam	91.30%				
	Alprazolam	91.30%				
	*Zolpidem (> 5mg/ day)	100.00%				
	Diazepam	100.00%				
	Nicergoline	86.96%				
	Lorazepam	100.00%				
	Trihexyphenidyl	100.00%				
	Phenobarbital	100.00%				
	Co-dergoerine Mesylate	86.96%				
	Barbiturates (excluding phenobarbital)	91.30%				
	Phenytoin	86.96%				
	Nitrazepam	91.30%				
	#Pentoxifylline	69.57%				
	#Chlordiazepoxide	73.91%				
	Clonazepam	95.65%				
	Olanzapine	95.65%				
	Risperidone	86.96%				
	Quetiapine	86.96%				
	#Fluoxetine	78.26%				
	*Chlorpromazine	91.30%				
	Haloperidol	95.65%				
	Amitriptyline	95.65%				
	*Clozapine	100.00%				
	Doxepin (> 6mg/d)	91.30%				
	*Sulpiride	91.30%				
	*Perphenazine	95.65%				
	Aripiprazole	91.30%				
	Fluvoxamine	86.96%				
	#Fluphenazine	73.91%				
	#Maprotiline	52.17%				
	Ibuprofen	100.00%				
	Diclofenac	100.00%				
	Indometacin	100.00%				
	Etoricoxib	86.96%				
	Naproxen	86.96%				
	Nabumetone	91.30%				
	Piroxicam	95.65%				
	*Ketoprofen	91.30%				
	#Phenylbutazone	69.57%				

	Amiodarone	100.00%				
	Digoxin (>0.125 mg/d)	100.00%				
	Doxazosin	91.30%				
	Nifedipine (normal release dosage form)	100.00%				
	Reserpine (> 0.1 mg/d, compound hypoensive and compound reserpine tablets, etc.)	82.61%				
	Clonidine	91.30%				
	#Procainamide	39.13%				
	Chlorphenamine	91.30%				
	Promethazine	100.00%				
	Diphenhydramine (oral)	95.65%				
	#Aminoglycosides	69.57%				
	#Clindamycin	69.57%				
	#Vancomycin	78.26%				
	#Gatifloxacin	78.26%				
	Insulin (sliding scale, the dosage of drugs is adjusted according to the blood glucose level of the patient in the case of applying quick acting or short acting insulin without using basic or long-acting insulin at the same time)	91.30%				
	Megestrol	86.96%				
	Glibenclamide	91.30%				
	Growth hormone	86.96%				
	Clopidogrel	82.61%				
	*Warfarin	82.61%				
	#Ticlopidine	60.87%				
	Theophylline	86.96%				
	Hyoscyamines	100.00%				
	Cimetidine	86.96%				
	Belladonna alkaloid	100.00%				
	Tramadol	95.65%				
	Morphine, morphine sustained release tablets	86.96%				
	Pethidine	100.00%				
	*Baclofen	82.61%				
	Chlorzoxazone	91.30%				
	Tolterodine	86.96%				
Part 2 Medications in the 2017 PIM-China criteria with specific conditions						
Epilepsy or seizures	#Antipsychotics	56.52%				
	#Thioridazine,Amfebutamone, maprotiline	43.48%				
Delirium	Benzodiazepines, chlorpromazine, tricyclic antidepressants(TCAs), glucocorticoids, anticholinergics	100.00%				

Dementia or cognitive impairment	Benzodiazepines	100.00%				
Cognitive impairment	Anticholinergics	100.00%				
Insomnia	#Phenylephrine	39.13%				
History of falls or fractures	Benzodiazepines, benzodiazepine receptor agonists (zaleplon, zolpidem, dexzopiclone), antipsychotics, TCAs	100.00%				
Parkinson	Antipsychotics (except quetiapine and clozapine), metoclopramide, promethazine	100.00%				
	Haloperidol	100.00%				
Prevention of stroke	#Dipyridamole	73.91%				
Depressed	#Reserpine	69.57%				
Heart failure	Nonsteroidal Anti-Inflammatory Drug(NSAIDs) and Cyclooxygenase-2(COX-2) Inhibitors,Non-dihydropyridine Calcium Channel Blockers (CCBs) (diltiazem, verapamil), pioglitazone, cilostazol	100.00%				
	#Spironolactone (> 25 mg/ d)	73.91%				
Syncope	Antipsychotics (chlorpromazine, olanzapine); Cholinesterase inhibitor(AChEIs) (donepezil, galantamine, rivastigmine); Nonselective peripheral α 1 receptor blockers (doxazosin, terazosin)	100.00%				
Orthostatic hypotension	chlorpromazine	95.65%				
Hypertension	NSAIDs	82.61%				
Coagulopathy or receiving anticoagulant therapy	#Ticlopidine, clopidogrel, NSAIDs	73.91%				
Peptic ulcer	Glucocorticoid	82.61%				
	Nonselective COX2 inhibitors; Aspirin (> 325mg/d)	95.65%				
Chronic constipation	#Chlorphenamine, clemastine, diphenhydramine, cyproheptadine	78.26%				
	Antipsychotics,TCAS, Propantheline bromide, tolterodine, anticholinergics, oxybutynin (oral), Selective Serotonin Reuptake Inhibitors (SSRIs) (such as paroxetine)	95.65%				
Non steroidal	*Use two or more in	82.61%				

anti-inflammatory drugs	combination					
Chronic obstructive pulmonary disease (History)	#Benzodiazepines	78.26%				
Sleep apnea syndrome	#Benzodiazepines	78.26%				
Renal insufficiency	*NSAIDs	82.61%				
Urinary incontinence	Estrogen (excluding vaginal medication), selective peripheral α 1 receptor blockers (doxazosin, prazosin, terazosin)	95.65%				
Lower urinary tract symptoms, prostatic hyperplasia	Anticholinergic drugs (except anticholinergic for urinary incontinence)	95.65%				
CrCl＜30ml/min	Triamterene	91.30%				
Osteoporosis	#Glucocorticoid	78.26%				
Diabetes	#Glucocorticoids (long-term use)	78.26%				
Gout	Thiazide diuretics	86.96%				
Glaucoma	TCAs	86.96%				
	Anticholinergic drugs	95.65%				
Pain	[a]Pethidine (long term use)	86.96%				
Part 3 New medications proposed for the 2024 update independent of specific conditions						
	Oxazepam		4.43	91.30%	0.66	0.15
	Triazolam		4.70	100.00%	0.47	0.10
	*Flurazepam		4.39	86.96%	0.72	0.16
	#Zopiclone		3.87	86.96%	1.10	0.28
	#Dexzopiclone		3.96	82.61%	1.07	0.27
	Zaleplon		4.09	86.96%	0.90	0.22
	Carbamazepine		4.04	78.26%	0.93	0.23
	#Pregabalin		3.26	43.48%	1.32	0.41
	paroxetine		4.30	86.96%	1.06	0.25
	Clomipramine		4.52	95.65%	0.59	0.13
	[b]Imipramine		4.57	100.00%	0.51	0.11
	Prazosin		4.35	91.30%	0.65	0.15
	#Terazosin		3.91	78.26%	1.08	0.28
	#Methyldopa		4.17	82.61%	1.07	0.26
	*Dronedarone		4.00	78.26%	0.95	0.24
	Dimenhydrinate		4.22	86.96%	0.80	0.19
	Hydroxyzine		4.22	91.30%	0.90	0.21
	Triprolidine		4.09	82.61%	0.95	0.23
	*Clemastine		4.09	82.61%	0.79	0.19
	Cyproheptadine		4.22	86.96%	0.80	0.19
	Proton pump inhibitors		4.22	82.61%	0.95	0.23
	Metoclopramide		4.26	86.96%	0.96	0.23
	Atropine (excluding ophthalmic use)		4.22	82.61%	0.74	0.17

	*Propantheline Bromide		4.17	82.61%	0.94	0.22
	#Rivaroxaban		3.30	39.13%	1.36	0.41
	#Dabigatran		3.30	39.13%	1.36	0.41
	#Dipyridamole (oral short acting)		3.83	60.87%	1.11	0.29
	Estrogen ± Progestin		4.13	78.26%	0.97	0.23
	Androgens: methyltestosterone, testosterone		4.17	86.96%	0.78	0.19
	#Powdered Thyroid		3.52	56.52%	1.38	0.39
	*Chlorpropamide		4.39	91.30%	0.94	0.21
	*Glimepiride		4.13	91.30%	0.87	0.21
	Oxybutynin		4.22	82.61%	0.74	0.17
	#Solifenacin		3.91	69.57%	0.95	0.24
	#Propiverine		4.00	73.91%	1.00	0.25
	Desmopressin		4.30	95.65%	0.56	0.13
	Furosemide		4.09	82.61%	0.79	0.19
	Meloxicam		4.22	86.96%	0.80	0.19
	Aspirin > 325mg/d		4.43	95.65%	0.90	0.20
	#Diflunisal		4.04	78.26%	1.07	0.26
	Etodolac		4.09	78.26%	1.00	0.24
	*Fenoprofen		4.13	86.96%	1.01	0.25
	#Mefenamic acid		4.09	73.91%	0.90	0.22
	#Oxaprozin		4.13	73.91%	0.82	0.20
	Sulindac		4.30	86.96%	0.70	0.16
	#Allopurinol		3.87	73.91%	1.29	0.33
	#Rituximab		3.70	69.57%	1.30	0.35
	#Codeine		3.57	52.17%	1.24	0.35
	[b]Methocarbamol		4.04	82.61%	0.88	0.22
	#Propofol		3.35	52.17%	1.27	0.38
	#Nitrofurantoin		3.65	56.52%	1.27	0.35
	#Dolutegravir		3.65	65.22%	1.11	0.30
	#Trimethoprim / sulfamethoxazole		3.61	52.17%	1.31	0.36
Part 4 New medications proposed for the 2024 update with specific conditions						
Delirium	Antipsychotics, H2 receptor antagonists, nonbenzodiazepine benzodiazepine receptor agonist hypnotics("Z-drugs"): zopiclone, zolpidem, zaleplon, opioids		4.39	82.61%	0.78	0.18
Dementia or impaired cognitive function	Antipsychotics (long-term or continuous use on demand), "Z-drugs": zopiclone, zolpidem, zaleplon, etc		4.30	86.96%	0.82	0.19
Dementia	#TCAs		3.83	73.91%	1.15	0.30
Parkinson disease	#Benzodiazepines (such as midazolam, lorazepam, flunitrazepam, estazolam and clonazepam); "Z-drugs" (zopiclone)		3.43	52.17%	1.31	0.38

History of falls or fractures	Antiepileptic drugs		4.26	82.61%	0.86	0.20
	Opioids		4.26	86.96%	0.69	0.16
Any three or more CNS drug combinations	*Antidepressants (TCAS, SSRIs, and SNRIs); Antipsychotics; Antiepileptic drugs; Benzodiazepines; "Z-drugs"; Opioids		4.35	91.30%	0.94	0.22
Benzodiazepines	Opioids		4.00	78.26%	0.91	0.23
Gabapentin, pregabalin	Opioids		4.13	82.61%	0.97	0.23
Anticholinergic drugs	Use two or more in combination		4.26	91.30%	0.73	0.17
Phenytoin sodium	Compound sulfamethoxazole		4.43	100.00%	0.51	0.11
Heart failure	Dronedarone		4.39	86.96%	0.72	0.16
Primary prevention of cardiovascular disease	#Aspirin		3.96	82.61%	0.98	0.25
Syncope	TCAs (amitriptyline, clomipramine, doxepin, imipramine)		4.39	95.65%	0.72	0.16
Warfarin	Amiodarone, ciprofloxacin, macrolides (excluding azithromycin), compound sulfamethoxazole, non steroidal anti-inflammatory drugs SSRI、 Aspirin, carbamazepine		4.35	91.30%	0.89	0.20
Dabigatran, rivaroxaban	[C]Clarithromycin		2.91	34.78%	1.00	0.34
Edoxaban	Verapamil		4.17	82.61%	0.94	0.22
RAAS inhibitors (ACEIs、ARBs)	Potassium sparing diuretics (amiloride, triamterene, spironolactone)		4.30	91.30%	0.88	0.20
ACEI, ARB, ARNI loop diuretics	lithium		4.22	91.30%	0.74	0.17
History of upper gastrointestinal bleeding	Aspirin; SSRI (paroxetine, fluvoxamine, escitalopram, etc.)		4.22	82.61%	0.74	0.17
Chronic constipation	#Opioids		4.04	73.91%	0.88	0.22
Non steroidal anti-inflammatory drugs	Glucocorticoids (oral or parenteral), antiplatelet drugs, vitamin K antagonists, direct thrombin inhibitors or factor Xa inhibitors, acetaminophen, SSRIs		4.04	82.61%	0.98	0.24
Chronic obstructive pulmonary disease (History)	Oral glucocorticoids: prednisolone, methylprednisolone, betamethasone, etc		4.17	82.61%	0.83	0.20
	Theophylline as monotherapy		4.26	86.96%	0.69	0.16
Acute and chronic respiratory failure	Benzodiazepines		4.17	82.61%	0.94	0.22

(PO2 < 8.0 kPa ± PCO2 > 6.5 kPa)						
Cimetidine, ciprofloxacin	theophylline		4.26	95.65%	0.54	0.13
Loop diuretics	#Peripheral α 1 receptor blockers		3.96	78.26%	0.98	0.25
CrCl＜30ml/min	ciprofloxacin		4.30	91.30%	0.64	0.15
CrCl＜30ml/min	Compound sulfamethoxazole		4.35	95.65%	0.57	0.13
CrCl＜30ml/min	Amiloride		4.30	91.30%	0.64	0.15
CrCl＜25ml/min	*Apixaban		4.04	82.61%	0.88	0.22
CrCl＜30ml/min	*Dabigatran		4.26	91.30%	0.75	0.18
CrCl ＜ 50 or >95ml/min	*Edoxaban		4.22	86.96%	0.90	0.21
CrCl＜30ml/min	Enoxaparin		4.26	86.96%	0.81	0.19
CrCl＜30ml/min	Fondaparinux sodium		4.26	86.96%	0.81	0.19
CrCl＜50ml/min	*Rivaroxaban		4.09	78.26%	0.95	0.23
CrCl＜30ml/min	Duloxetine		4.09	86.96%	1.00	0.24
CrCl＜60ml/min	#Gabapentin		4.04	82.61%	1.11	0.27
CrCl≤80ml/min	#Levetiracetam		4.00	78.26%	1.13	0.28
CrCl＜60ml/min	#Pregabalin		3.96	78.26%	1.11	0.28
CrCl＜30ml/min	Tramadol		4.00	78.26%	1.00	0.25
CrCl＜50ml/min	#Cimetidine, famotidine, nizatidine		4.00	73.91%	0.95	0.24
CrCl＜30ml/min	Colchicine		4.30	86.96%	0.70	0.16
CrCl＜30ml/min	Probenecid		4.17	82.61%	0.83	0.20
CrCl＜30ml/min	#Spironolactone		4.00	78.26%	1.04	0.26
Diabetes	#Beta blockers		3.30	39.13%	1.26	0.38
Gout	#NSAIDs or colchicine (> 3 months)		3.91	73.91%	1.16	0.30
Rheumatoid arthritis	Glucocorticoids (> 3 months)		4.17	82.61%	0.94	0.22
Osteoarthritis	#Glucocorticoids		3.74	60.87%	1.05	0.28
Syndrome of abnormal antidiuretic hormone secretion (SIADH) or hyponatremia	Antidepressants (mirtazapine, SNRIs, SSRIs, TCAS); Antiepileptic drugs (carbamazepine, oxcarbazepine); Antipsychotics; Diuretics; Tramadol		4.22	86.96%	0.80	0.19
Recent or existing upper gastrointestinal diseases (such as dysphagia, esophageal diseases)	#Oral diphosphate (such as alendronate sodium)		3.87	69.57%	1.01	0.26
History of breast cancer or venous thromboembolism	[d]estrogen		4.04	73.91%	1.11	0.27

Part 5 Medications experts suggest						
Sodium-dependent glucose transporters 2 (SGLT2) inhibitors: Canagliflozin Dapagliflozin Empagliflozin Ertugliflozin						

*Medications met the inclusion criteria but modified according to the opinions of the experts; # Medications did not meet the inclusion criteria and included in the second questionnaire; [a]Medications deleted due to repetition with Table 1 "Pethidine"; [b]Medications deleted because of withdrawal; [c]Medications met the exclusion criteria and deleted; [d]Medications deleted due to repetition with Table 3 " Estrogen ± progesterone".

Supplemental Table 4 . The results of the second round of expert scoring

Conditions (disease status, concomitant medication, renal function, etc.)	Drug name	Proportion of "agree with reservations"	Mean	⩾ 4 points%	Standard deviation	Coefficient of variation (CV)
Part 1 Medications in the 2017 PIM-China criteria independent of specific conditions						
	Estazolam	91.67%				
	Zolpidem (> 5mg/ day)	100.00%				
	[a]Pentoxifylline	29.17%				
	Chlordiazepoxide	83.33%				
	[a]Fluoxetine	29.17%				
	Chlorpromazine	100.00%				
	Clozapine	100.00%				
	Sulpiride	100.00%				
	Perphenazine	100.00%				
	[a]Fluphenazine	29.17%				
	[a]Maprotiline	16.67%				
	[b]Ketoprofen	75.00%				
	[a]Phenylbutazone	29.17%				
	[a]Procainamide	12.50%				
	Aminoglycosides	83.33%				
	[b]Clindamycin	50.00%				
	Vancomycin	83.33%				
	Gatifloxacin	83.33%				
	warfarin	100.00%				
	[a]Ticlopidine	29.17%				
	[b]Baclofen	79.17%				
Part 2 Medications in the 2017 PIM-China criteria with specific conditions						
Epilepsy or seizures	[a]Antipsychotics	29.17%				
	[a]Thioridazine,amfebutamone, maprotiline	8.33%				
Insomnia	[a]Phenylephrine	0.00%				
Prevention of stroke	[a]Dipyridamole	29.17%				
Depressed	[a]Reserpine	29.17%				
Heart failure	Spironolactone (> 25 mg/ d)	83.33%				
Coagulopathy or receiving anticoagulant therapy	[a]Ticlopidine, clopidogrel, non steroidal anti-inflammatory drugs	29.17%				
Chronic constipation	[a]Chlorphenamine, clemastine, diphenhydramine, cyproheptadine	29.17%				
Non steroidal anti-inflammatory drugs	[a]Use two or more in combination	29.17%				
Chronic obstructive pulmonary disease (History)	Benzodiazepines	91.67%				

Sleep apnea syndrome	Benzodiazepines	95.83%				
CrCl＜ 30ml/min	Non steroidal anti-inflammatory drugs (NSAIDs)	100.00%				
Osteoporosis	Glucocorticoids	83.33%				
Diabetes	[a]Glucocorticoids (long-term use)	29.17%				
Part 3 New medications proposed for the 2024 update independent of specific conditions						
	Flurazepam		4.00	83.33%	0.86	0.22
	Zopiclone		4.38	100.00%	0.50	0.11
	Dexzopiclone		4.17	95.83%	0.48	0.12
	[a]Pregabalin		2.92	33.33%	1.02	0.35
	Terazosin		4.42	95.83%	0.58	0.13
	Methyldopa		4.00	79.17%	0.75	0.19
	Dronedarone		4.46	95.83%	0.59	0.13
	[a]Clemastine		2.92	45.83%	1.21	0.42
	[a]Propantheline Bromide		2.96	45.83%	1.30	0.44
	Rivaroxaban		4.13	79.17%	0.74	0.18
	Dabigatran		4.08	75.00%	0.78	0.19
	Dipyridamole (oral short acting)		4.00	75.00%	0.81	0.20
	Powdered Thyroid		4.25	83.33%	0.74	0.17
	Sulfonylureas (short and long acting)		4.50	95.83%	0.89	0.20
	Solifenacin		4.00	87.50%	0.75	0.19
	Propiverine		4.08	87.50%	0.72	0.18
	[a]Diflunisal		2.96	58.33%	1.30	0.44
	[b]Fenoprofen		3.79	66.67%	0.93	0.25
	[a]Mefenamic acid		2.96	70.83%	1.23	0.42
	Oxaprozin		4.00	83.33%	0.69	0.17
	Allopurinol		4.00	75.00%	0.91	0.23
	[a]Rituximab		2.96	62.50%	1.27	0.43
	[a]Codeine		2.96	33.33%	1.30	0.44
	[a]Propofol		2.96	37.50%	1.20	0.40
	Nitrofurantoin		4.10	83.33%	0.65	0.16
	[b]Dolutegravir		3.67	62.50%	0.96	0.26
	Trimethoprim / sulfamethoxazole		4.00	87.50%	0.51	0.13
	[c]SGLT-2 inhibitors: canagliflozin,dapagliflozin ,empagliflozin,ertugliflozin		4.00	83.33%	0.59	0.15
Part 4 New medications proposed for the 2024 update with specific conditions						
Dementia	Tricyclic antidepressants (TCAs)		4.00	87.50%	0.66	0.17
Parkinson disease	[a]Benzodiazepines (such as midazolam, lorazepam, flunitrazepam, estazolam and clonazepam); nonbenzodiazepine benzodiazepine receptor agonist hypnotics(“Z-drugs”) (zopiclone)		3.00	33.33%	0.91	0.30
Any three or	Antidepressants (TCAs,		4.50	100.00%	0.51	0.11

more CNS drug combinations	SSRIs, and SNRIs); Antipsychotics; Antiepileptic drugs; Benzodiazepines; Benzodiazepine receptor agonist hypnotics; Opioids, skeletal muscle relaxants					
Primary prevention of cardiovascular disease	Aspirin		4.40	100.00%	0.50	0.11
Chronic constipation	Opioids		4.00	79.17%	0.93	0.23
Loop diuretics	Peripheral α 1 receptor blockers		4.10	95.83%	0.45	0.11
CrCl＜ 25ml/min	[a]Apixaban		2.96	50.00%	1.37	0.46
CrCl＜ 30ml/min	Dabigatran		4.38	100.00%	0.49	0.11
CrCl＜ 15ml/min	Edoxaban		4.42	100.00%	0.50	0.11
CrCl＜ 50ml/min	Rivaroxaban		4.38	100.00%	0.49	0.11
CrCl＜ 60ml/min	Gabapentin		4.25	91.67%	0.61	0.14
CrCl≤80ml/min	Levetiracetam		4.13	83.33%	0.68	0.16
CrCl＜ 60ml/min	Pregabalin		4.17	95.83%	0.48	0.12
CrCl＜ 50ml/min	Cimetidine, famotidine, nizatidine		4.21	87.50%	0.66	0.16
CrCl＜ 30ml/min	Spironolactone		4.00	83.33%	0.55	0.14
Diabetes	[a]Beta-blockers		3.00	37.50%	1.06	0.35
Gout	NSAIDs or colchicine (> 3 months)		4.00	83.33%	0.55	0.14
Osteoarthritis	Glucocorticoid		4.04	83.33%	0.66	0.16
Recent or existing upper gastrointestinal diseases (such as dysphagia, esophageal diseases)	[a]Oral diphosphate (such as alendronate sodium)		2.96	33.33%	1.12	0.38
History of falls or fractures	[d]Anticholinergics, antidepressants (SNRI, SSRI)		4.21	95.83%	0.83	0.20

[a] Medications met the exclusion criteria and deleted; [b]Medications that did not meet the inclusion criteria were removed following discussion;[c] Medications newly added in accordance with expert recommendations; [d] Medications newly added in accordance with 2023 Beers

Supplemental Table 5. 2024 version for potentially inappropriate medication use in the elderly (PIM-China) independent of specific conditions

Organ system, therapeutic category, drug(s)	Rationale	Recommendation/Alternatives	Quality of evidence	Strength of recommendation
Nervous system				
Benzodiazepines Estazolam* Alprazolam* Oxazepam Diazepam* Lorazepam* Clonazepam* Nitrazepam* Chlordiazepoxide* Triazolam	All drugs: neuropsychiatric adverse reactions (prolonged sedation, somnolence, amnesia, ataxia, cognitive dysfunction, delirium, emotional agitation, irritability, hallucination, confusion, depression); risk of falls, fractures or motor vehicle accidents; respiratory depression. Alprazolam, diazepam, lorazepam, nitrazepam, cloazepam: hypotension. Chlordiazepoxide, diazepam,clonazepam: prolonged half-life in the elderly.	Avoid Alternative treatment: Non-drug treatment; low doses of non-benzodiazepines; sedative antidepressants, such as trazodone, doxepin (3-6mg/d), etc.	Moderate	High
Nonbenzodiazepine benzodiazepine receptor agonist hypnotics (“Z-drugs”) Zolpidem* Zopiclone Dexzopiclone Zaleplon	neuropsychiatric adverse reactions (cognitive dysfunction, agitation, restlessness, hallucinations, confusion, prolonged reaction time); risk of falls, fractures or motor vehicle accidents; sleep latency and sleep duration were less improved.	Avoid, and recommend low dose if must be used (zolpitan ≤5mg/d, zopiclone ≤ 3.75mg/d, dexzopiclone ≤2mg/d, zaleplon ≤5mg/d), generally not more than 4 weeks. Alternative treatment: non-drug treatment; sedative antidepressants, such as trazodone, doxepin (3-6mg/d), etc.	Moderate	Low
Nicergoline*	Uncertain efficacy; the risks of medication outweigh the benefits; orthostatic hypotension; fall down.	Avoid	High	High
Co-dergoerine Mesylate*	Uncertain efficacy; the risks of medication outweigh the benefits; vasoconstriction may cause angina pectoris and hypertension.	Avoid	High	High
Trihexyphenidyl*	Anticholinergic adverse reactions (dry mouth, blurred vision, tachycardia, nausea, vomiting, urinary retention, constipation); long-term use may cause adverse reactions of the nervous and mental system (somnolence, depression, memory loss, hallucinations, confusion, delirium).	Avoid, and it is not recommended to prevent or treat extrapyramidal symptoms caused by antipsychotic drugs. Alternative treatments: other anti-Parkinson drugs (e.g., levodopa).	Moderate	High
Barbiturates Phenobarbital* Secobarbital* Amobarbital*	All drugs: more susceptible to dependence, tolerance and withdrawal reactions than most hypnotics; greater risk of overdose at low dosages; dizziness and ataxia. Phenobarbital: may cause adverse reactions such as respiratory depression, sedation, somnolence, headache, cognitive or memory deficits, lethargy, and emotional changes.	Avoid	High	High
Phenytoin*	The half-life is prolonged in the aged; nervous system adverse reactions (prolonged sedation, somnolence, amnesia, ataxia, cognitive dysfunction, delirium, agitation, irritability, hallucination, confusion, depression); risk of falls, fractures or motor vehicle accidents; hypotension; respiratory depression.	Use with caution, if phenytoin is used, consider a lower dose and monitor blood concentrations frequently.	Moderate	High
Carbamazepine	Increased risk of syndrome of inappropriate secretion of antidiuretic hormone; neuropsychiatric adverse reactions (confusion, agitation); atrioventricular block and bradycardia; falls; delayed skin reaction.	Use with caution, if carbamazepine is used, adjust the dose according to symptoms and blood concentration.	Moderate	Low
Mental system				
Antipsychotic drugs First generation Chlorpromazine* Haloperidol* Sulpiride* Perphenazine * Second generation Clozapine* Olanzapine* Risperidone* Quetiapine* Aripiprazole*	extrapyramidal adverse events, including tartrate dyskinesia, Parkinsonism, dystonia and akathisia (except clozapine and quetiapine); orthostatic hypotension; increase the risk of cardiovascular and cerebrovascular accidents and death in dementia patients; sedation (except aripiprazole). Chlorpromazine, perphenazine, clozapine, olanzapine: anticholinergic effect. Clozapine: agranulocytosis, myocarditis.	Avoid, except in CFDA-approved indications such as antiemetic, schizophrenia, mania or other psychotic disorders, or severe delirium endangering the safety of oneself or others.	Moderate	High

Organ system, therapeutic category, drug(s)	Rationale	Recommendation/Alternatives	Quality of evidence	Strength of recommendation
Tricyclic Antidepressants Doxepin > 6mg/d* Amitriptyline* Clomipramine	Strong anticholinergic effect (constipation, dry mouth, urinary retention, glaucoma, arrhythmia); neuropsychiatric adverse reactions (prolonged sedation, somnolence, confusion, cognitive impairment, delirium); excessive cardiac toxicity; orthostatic hypotension; falls or fractures; risks outweigh benefits.	Avoid Alternative treatment: non-drug treatment; other antidepressants: doxepin (3-6mg/d), other SSRIs, SNRIs.	High	High
SSRIs Paroxetine Fluvoxamine*	All drugs: gastrointestinal reactions; drowsiness, dizziness and sedation; orthostatic hypotension; falls and fractures. Paroxetine: mild anticholinergic side effects.		paroxetine: High; fluvoxamine: Low	Low
Antipyretic, analgesic, anti-inflammatory and antirheumatic drugs				
NSAIDs Ibuprofen* Diclofenac* Indomethacin* Naproxen* Nabumetone* Etoricoxib* Piroxicam* Meloxicam Aspirin > 325mg Sulindac Oxaprozin Etodolac	All drugs: the incidence of gastrointestinal bleeding and ulcer increased with time; liver injury; renal injury; hypertension. Indomethacin: most adverse reactions, and nervous system adverse reactions were higher, such as delirium. Etoricoxib: cardiovascular contraindications.	Etoricoxib should be used with caution, indomethacin should be avoided, and other drugs should be avoided long-term used. Antacid or gastric mucosal protective agents (proton-pump inhibitors or misoprostol) can be taken. Alternative treatments: acetaminophen; selective COX2 inhibitors, such as celecoxib; weak opioids.	Moderate	Low
Allopurinol	Severe rash; leukopenia; thrombocytopenia.	Use with caution in the elderly, especially in those with HLA-B*5801 positive. Alternative treatment: febuxostat.	Moderate	High
Cardiovascular system				
Amiodarone*	Have greater toxicities than other antiarrhythmics used in atrial fibrillation, such as severe arrhythmia (QT prolongation and torsades de pointes), acute liver injury, thyroid and pulmonary toxicity.	Avoid first-line therapy for atrial fibrillation, avoid long-term use, except heart failure or severe left ventricular hypertrophy.	High	High
Dronedarone	Worse outcomes in people who have permanent atrial fibrillation or severe or recently decompensated heart failure. In some circumstances, worse outcomes have also been reported in people with HFrEF (e.g., left ventricular ejection fraction ≤ 35%) who have milder symptoms (NYHA class I or II).	Avoid in individuals with permanent atrial fibrillation or severe or recently decompensated heart failure. Use caution in patients with HFrEF with less severe symptoms (NYHA class I or II).	High	High
Digoxin(>0.125 mg/d)*	Safer and more effective alternatives are available for AF and HF patients; Decreased creatinine clearance may lead to increased toxicity, such as severe arrhythmias (QT prolongation and torsades de pointes)	Avoid first-line therapy for atrial fibrillation or heart failure. Alternative treatments: atrial fibrillation：β-blockers, non-dihydropyridine calcium antagonists; heart failure: diuretics, ACEI, β-blockers, etc.	Moderate	High
Nifedipine(immediate release)*	Potential for hypotension; risk of precipitating myocardial ischemia or stroke.	Avoid Alternative treatment: other antihypertensive drugs (ACEI, ARB, long-acting CCB,	High	High
Central antihypertensive drugs Reserpine*(>0.1mg/d. compound hypoensive) Clonidine* Methyldopa	Orthostatic hypotension; bradycardia; adverse reactions of nervous system (syncope, sedation).	Avoid as a routine treatment for hypertension Alternative treatment: Other antihypertensive drugs (ACEI, ARB, long-acting CCB, etc).	Low	High
Selective α1 receptor antagonists Prazosin Terazosin Doxazosin*	Orthostatic hypotension; urinary incontinence (menopausal women); adverse reactions of nervous system (vertigo, slight dizziness, drowsiness).	Avoid as a routine treatment for hypertension Alternative treatment: Other antihypertensive drugs (ACEI, ARB, long-acting CCB, etc).	Moderate	High
Antiallergic drugs				
First generation antihistamines Chlorpheniramine* Diphenhydramine (oral)* Hydroxyzine Promethazine* Dimenhydrinate Triprolidine Cyproheptadine	All drugs: Highly anticholinergic (constipation, dry mouth, urinary retention); nervous system adverse reactions (prolonged sedation, somnolence, disturbance of consciousness, delirium, dementia). Chlorpheniramine, diphenhydramine (oral), hydroxyzine: ECG changes (QT interval prolongation)	Avoid, except diphenhydramine for the acute treatment of severe allergic reactions. Alternative treatments: non-anticholinergic antihistamines (e.g.cetirizine, loratadine, desloratadine, etc).	Moderate	High
Anti-infective drugs				
Aminoglycoside antibiotics*	Renal injury; ototoxicity.	Use with caution, low dose and careful monitoring.	Low	High

Organ system, therapeutic category, drug(s)	Rationale	Recommendation/Alternatives	Quality of evidence	Strength of recommendation
Vancomycin*	Skin reactions (Stevens-Johnson syndrome, toxic epidermal necrotizing syndrome, exfoliative dermatitis); liver injury; renal injury; shock and anaphylactoid symptoms.	Use with caution and the dosage should be reduced in the elderly.	Low	Low
Gatifloxacin*	Blood glucose disorders (hyperglycemia and hypoglycemia); adverse reactions of nervous system (dizziness, spasm, convulsion, syncope, confusion, coma, epilepsy, mental abnormality); adverse cardiac reactions (palpitation, bradycardia, QT interval prolongation).	Avoid	Low	High
Nitrofurantoin	Pulmonary toxicity; liver toxicity; peripheral neuropathy; safer alternatives available.	Use with caution; Ccr 30-45ml/min: Short-term use (3-7 days) ; Ccr < 30ml/min:	Low	Low
Trimethoprim/sulfamethoxazole	Increased risk of hyperkalemia when used concurrently with an ACEI, ARB, or ARNI in presence of decreased CrCl; severe rash, Stevens-Johnson syndrome/toxic epidermal necrolysis; bone marrow suppression, leukopenia and thrombocytopenia; neuropsychiatric adverse reactions.	Use with caution in patients on ACEI, ARB, or ARNI and decreased CrCl; Ccr <30ml/min: adjust the dose.	Low	Low
Endocrine system				
Insulin, sliding scale *(insulin regimens containing only short- or rapid-acting insulin dosed according to current blood glucose levels without concurrent use of basal or long-acting insulin)	Higher risk of hypoglycemia without improvement in hyperglycemia management.	Avoid insulin regimens that include only short- or rapid- acting insulin dosed according to current blood glucose levels without concurrent use of basal or long-acting insulin, except for acute cases such as hyperglycemic coma.	Moderate	High
Sulfonylureas (all, including short and longer-acting) Gliclazide Glimepiride Glipizide Glyburide	Sulfonylureas have a higher risk of cardiovascular events, all-cause mortality, and hypoglycemia than alternative agents. Sulfonylureas may increase the risk of cardiovascular death and ischemic stroke. Among sulfonylureas, long-acting agents (e.g., glyburide, glimepiride) confer a higher risk of prolonged hypoglycemia than short-acting agents (e.g., glipizide).	Avoided sulfonylureas as first or second line monotherapy or combination therapy unless there are substantial barriers to the use of safer and more effective agents. If used, short-acting drugs (e.g., glipizide) are preferred over long-acting drugs (e.g., glibenclamide, glimepiride). Alternative treatment: metformin, DPP-4 and other hypoglycemic drugs.	Hypoglycemia: High CV events and all-cause mortality: Moderate CV death and ischemic stroke: Low	High
Sodium-dependent glucose transporters 2(SGLT2) inhibitors Canagliflozin Dapagliflozin Empagliflozin Ertugliflozin	Older adults may be at increased risk of urogenital infections, particularly women in the first month of treatment. An increased risk of euglycemic diabetic ketoacidosis has also been seen in older adults.	Use with caution and monitor patients for urogenital infections and ketoacidosis.	Moderate	Low
Estrogens with or without progestins (includes natural and synthetic estrogen preparations)	Potential carcinogenicity (breast and endometrium); lack of cardioprotective effect and cognitive protection in older women. For older women, the risks of HRT are greater than the benefits due to higher risk of heart disease, stroke, blood clots, and dementia.	Oral tablets or transdermal patches：Avoid Vaginal cream or vaginal tablets: low-dose intravaginal estrogen for the management of dyspareunia, recurrent lower urinary tract infections, and other vaginal symptoms.	Oral and patch: High; Vaginal cream or vaginal tablets: Moderate	High
Methyltestosterone Testosterone	Potential risk of prostate cancer; potential for cardiac problems.	Avoid unless indicated for confirmed hypogonadism with clinical symptoms.	Moderate	High
Powdered Thyroid	T3, T4 content ratio is not constant, and T3 content is too high， concerns about cardiac effects; safer alternatives available.	Avoid Alternative treatments: Levothyroxine	Low	High
Megestrol	Minimal effect on weight; increases the risk of thrombotic events and possibly death in older adults.	Avoid	Moderate	High
Growth hormone*	Fluid retention (edema, arthralgia, carpal tunnel syndrome); feminization of male breasts; impaired fasting glucose.	Avoid except for Growth hormone deficiency.	High	High
Blood system				
Warfarin*	There are great individual differences in patients taking warfarin, the protein binding rate is high, and overdose is easy to cause massive bleeding; the elderly take more drugs and their physiological state changes, which increases the risk of adverse reactions caused by drug interactions and single drug; acute kidney injury; compared with DOACs, warfarin has higher risks of major bleeding (particularly intracranial bleeding) and similar or lower effectiveness for the treatment of nonvalvular atrial fibrillation and VTE.	Avoid starting warfarin as initial therapy for the treatment of nonvalvular atrial fibrillation or VTE unless alternative options (i.e., DOACs) are contraindicated or there are substantial barriers to their use. For older adults who have been using warfarin long-term, it may be reasonable to continue this medication, particularly among those with well-controlled INRs (i.e., >70% time in the therapeutic range) and no adverse effects.	High	High
Rivaroxaban	When long-term treatment of VTE or nonvalvular atrial fibrillation, rivaroxaban appears to have a higher risk of major bleeding and GI bleeding in older adults than other DOACs, particularly apixaban.	Avoid for long-term treatment of atrial fibrillation or VTE in favor of safer anticoagulant alternatives. Alternative treatments: other DOACs.	Moderate	Low
Dabigatran	Increased risk of GI bleeding compared with warfarin and of GI bleeding and major bleeding compared with apixaban in older adults when used for long-term treatment of nonvalvular atrial fibrillation or VTE.	Use caution for long-term treatment of nonvalvular atrial fibrillation or VTE.	Moderate	Low
Clopidogrel*	Hematological adverse reactions (thrombocytopenia, neutropenia, gastrointestinal bleeding, purpura, ocular hemorrhage, epistaxis, hematuria, intracranial hemorrhage, etc); nervous system adverse reactions (headache, dizziness, confusion, hallucinations).	Use with caution and monitor bleeding.	Low	Low

Organ system, therapeutic category, drug(s)	Rationale	Recommendation/Alternatives	Quality of evidence	Strength of recommendation
Dipyridamole, oral short-acting (does not apply to extended-release combination with aspirin	May cause orthostatic hypotension; more effective alternatives available	Avoid Alternative treatments: aspirin, clopidogrel.	Moderate	High
Respiratory system				
Theophylline*	Adverse cardiac reactions (atrial fibrillation, atrial flutter, tachycardia, etc.); nervous system adverse reactions (epilepsy, insomnia, irritability); nausea and diarrhea (dose-dependent).	Use with caution in the elderly, and monitor the blood concentration of theophylline. Alternative treatments: inhaled drugs, such as glucocorticoids, β2 agonists, etc.	Moderate	High
Digestive system				
Metoclopramide	Anticholinergic effect; parkinson's symptoms; extrapyramidal adverse reactions (tardive dyskinesia).	Avoid, unless for gastroparesis with a duration of use not to exceed 12 weeks except in rare cases.	Moderate	High
Strong anticholinergic GI antispasmodics Atropine (excludes ophthalmic) Belladonna* Scopolamine* Anisodamine*	Strong anticholinergic effect(orthostatic hypotension, constipation, urinary retention, etc), uncertain effectiveness.	Avoid, unless used in palliative care to reduce oral secretions	Moderate	High
Cimetidine*	Nervous system adverse reactions (disturbance of consciousness, delirium, cognitive dysfunction); more interactions than other H2 receptor blockers.	Avoid Alternative treatment: short-term use of proton pump inhibitors and other H2 antagonists.	Guideline	High
Proton Pump Inhibitors Dexlansoprazole Esomeprazole Lansoprazole Omeprazole Pantoprazole Rabeprazole	Risk of C. difficile infection, pneumonia, GI malignancies, bone loss, and fractures.	Avoid scheduled use for >8 weeks unless for high-risk patients (e.g., oral corticosteroids or chronic NSAID use), erosive esophagitis, Barrett's esophagitis, pathologic hypersecretory condition, or demonstrated need for maintenance treatment (e.g., because of failure of drug discontinuation trial or H2-receptor antagonists).	C. difficile, bone loss, and fractures: High Pneumonia and GI malignancies: Moderate	Low
Anesthetics and anesthetic auxiliaries				
Tramadol*	Nervous system adverse reactions (disturbance of consciousness, seizures, delirium, vertigo); nausea and vomiting; constipation; falls; may aggravate or lead to hyponatremia.	Use with caution	Moderate	Low
Morphine, morphine sustained-release tablets*	Excessive use is prone to respiratory depression; once respiratory depression occurred, it lasted for a long time; constipation; fall.	Use with caution	Moderate	Low
Meperidine*	Neurological adverse reactions; respiratory depression; falls; constipation.	Avoid Alternative treatment: other opioids.	Moderate	High
Chlorzoxazone*	Muscle relaxants typically used to treat musculoskeletal complaints are poorly tolerated by older adults due to anticholinergic adverse effects, sedation, and increased risk of fractures; effectiveness at dosages tolerated by older adults is questionable.	Avoid, except for the skeletal muscle relaxants typically used for the management of spasticity (i.e., baclofen and tizanidine) .	Moderate	High
Urinary system				
M cholinergic receptor blockers Tolterodine* Oxybutynin Solifenacin Propiverine	Anticholinergic adverse reactions (constipation, dry mouth, aggravation of glaucoma and urinary retention); nervous system adverse reactions (delirium, cognitive dysfunction); ECG changes (prolonged QT).	Use with caution Alternative treatment: non-drug treatment; other anti-prostatic hyperplasia drugs or drugs to improve lower urinary tract symptoms.	High	Low
Desmopressin	High risk of hyponatremia; safer alternative treatments for nocturia.	Avoid for treatment of nocturia or nocturnal polyuria.	Moderate	Low
Furosemide	Electrolyte imbalance, such as hyponatremia and hypokalemia; orthostatic hypotension; renal injury; fall-related fractures.	Use with caution	Moderate	Low

*Identical medications listed in the 2017 version of PIM-China criteria.

ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin-receptor blocker; ARNI, angiotensin receptor-neprilysin inhibitor; CNS, Central nervous system; DOACs: direct oral anticoagulants; GI, gastrointestinal; NSAID, nonsteroidal anti-inflammatory drug; PIM, potentially inappropriate medication; SSRI, selective serotonin reuptake inhibitor; SNRI, serotonin-norepinephrine reuptake inhibitor; TCA, tricyclic antidepressant; VTE, venous thromboembolism

Supplemental Table 6. 2024 version for potentially inappropriate medication use in the elderly (PIM-China) with specific conditions

Condition(diseases, concomitant medications, renal function)	Drugs	Rationale	Recommendation/Alternatives	Quality of evidence	Strength of recommendation
Nervous system					
Delirium	Benzodiazepines* Nonbenzodiazepine benzodiazepine receptor agonist hypnotics(“Z-drugs”) Chlorpromazine* Tricyclic antidepressants* Corticosteroids (oral and parenteral)* Anticholinergics* Antipsychotics H2-receptor antagonists Opioids	Potential of inducing or worsening delirium.	Avoid except other treatments have failed, if needed, use the lowest possible dose for the shortest duration and monitor for delirium.	H2-receptor antagonists：Low. others：Moderate.	High
Dementia or cognitive impairment	Antipsychotics(chronic or persistent as-needed use) Benzodiazepines Nonbenzodiazepine benzodiazepine receptor agonist hypnotics(“Z-drugs”) Anticholinergics* Tricyclic antidepressants	CNS adverse effects. Antipsychotics: increased risk of stroke and greater rate of cognitive decline and mortality in people with dementia.	Avoid except for failure of nonpharmacologic treatment or potential harm to self and other people. Tricyclic antidepressants:use with caution Alternative treatments: Non-pharmacological treatments(e.g., such as behavioral interventions).	Moderate	High
History of falls or fractures	Benzodiazepines* Nonbenzodiazepine benzodiazepine receptor agonist hypnotics (“Z-drugs”) Antipsychotics* Anticholinergics Antidepressant drugs(SNRIs, SSRIs, TCAs*) Antiepileptic drugs Opioids	May cause ataxia, impaired psychomotor function, syncope, or additional falls.	Avoid use unless no safe alternatives are available. Antiepileptic drugs: Avoid except for seizures and mood disorders. Opioids: Avoid except for severe acute pain.	Antidepressants, opioids: Moderate . Others: High.	High
Parkinson disease	Antipsychotic drugs* (except quetiapine,clozapine) Metoclopramide* Promethazine*	Potential to worsen parkinsonian symptoms.	Avoid.	Moderate	High
Any combination of ≥3 CNS-active drugs	Antidepressant drugs(SNRIs, SSRIs, TCAs) Antipsychotic drugs Antiepileptic drugs Benzodiazepines Nonbenzodiazepine benzodiazepine receptor agonist hypnotics (“Z-drugs”) Opioids	Increased risk of falls and fractures.	Avoid concurrent use of ≥ 3 CNS-active drugs; minimize the number of CNS-active drugs.	High	High
Benzodiazepines	Opioids	Increased risk of overdose.	Avoid concurrent use.	Moderate	High
Gabapentin, Pregabalin	Opioids	Increased risk of severe sedation-related adverse events, including respiratory depression and death.	Avoid concurrent use; exceptions are when transitioning from opioid therapy to gabapentin or pregabalin, or when using gabapentinoids to reduce opioid dose.	Moderate	High
Anticholinergics	Any combination of ≥2 anticholinergics	Increases the risk of cognitive decline, delirium, and falls or fractures.	Avoid; minimize the number of anticholinergic drugs.	Moderate	High
Phenytoin sodium	Trimethoprim - sulfamethoxazole	Increased risk of phenytoin toxicity.	Avoid concurrent use.	Moderate	High

Condition(diseases, concomitant medications, renal function)	Drugs	Rationale	Recommendation/Alternatives	Quality of evidence	Strength of recommendation
Cardiovascular system					
Heart failure	NSAIDs* COX-2 inhibitors Nondihydropyridine calcium channel blockers (Diltiazem Verapamil) Pioglitazone* Cilostazol* Dronedarone Spironolactone (>25mg/d)	NSAIDs, COX-2 inhibitors, non-dihydropyridine CCBs, pioglitazone: potential to promote fluid retention and/or exacerbate heart failure. Cilostazol, dronedarone: potential to increase mortality in older adults with heart failure. Spironolactone: potential to increase risk of hyperkalemia.	Cilostazol, Spironolactone: Avoid. Nondihydropyridine calcium channel blockers (CCBs) Diltiazem Verapamil: Avoid in heart failure with reduced ejection fraction. Dronedarone, NSAIDs and COX-2 inhibitors, Pioglitazone: Use with caution in patients with heart failure who are asymptomatic, avoid in patients with symptomatic heart failure.	Cilostazol, COX-2 inhibitors: Low. Non-dihydropyridine CCBs, NSAIDs, Spironolactone: Moderate. Dronedarone, Pioglitazone: High.	High
Syncope	Antipsychotic drugs*(except haloperidol and aripiprazole) Cholinesterase inhibitors *(donepezil, galantamine, rivastigmine) Selective peripheral α1-blockers (doxazosin*, terazosin*) Tricyclic antidepressants (amitriptyline, clomipramine, doxepin)	Cholinesterase inhibitors: Risk for bradycardia. Other Drugs: Risk for orthostatic hypotension.	Avoid.	High	High
Orthostatic hypotension	Chlorpromazine*	Increased risk of orthostatic hypotension and falls.	Avoid. Alternative treatment: e.g., aripiprazole, haloperidol.	High	High
Hypertension	NSAIDs*	Potential to promote fluid retention and exacerbate hypertension.	Avoid. Alternative treatment: Use acetaminophen or switch to CCB antihypertensive medication, and monitor blood pressure closely.	Very low	Low
Primary prevention of cardiovascular disease	Aspirin	Risk of major bleeding from aspirin increases markedly in the elderly; lack of net benefit and potential for net harm when initiated for primary prevention in older adults; aspirin is generally indicated for secondary prevention in the elderly with established cardiovascular disease.	Avoid.	Moderate	High
Warfarin	Amiodarone Ciprofloxacin Macrolides Trimethoprim- sulfamethoxazole NSAIDs SSRIs Aspirin Carbamazepine	Increased risk of bleeding.	Avoid concurrent use. If used simultaneously, INR should be closely monitored.	Carbamazepine: Low. Others: Moderate.	High
Edoxaban	Verapamil	In patients treated for deep vein thrombosis or pulmonary embolism, increased risk of bleeding.	In patients treated for deep vein thrombosis or pulmonary embolism, reduce the edoxaban dose to 30 mg daily when combined with verapamil. No dose adjustment is recommended for patients treated for atrial fibrillation. Monitor patients for increased edoxaban effects and toxicities (ie, bleeding) when these agents are combined.	Moderate	High
RAS inhibitors (ACEIs, ARBs, ARNIs) or potassium-sparing diuretics (amiloride, triamterene, Spironolactone)	Another RAS inhibitor or a potassium- sparing diuretic	Increased risk of hyperkalemia.	Avoid routinely using 2 or more RAS inhibitors, or a RAS inhibitor and potassium-sparing diuretic, concurrently in those with chronic kidney disease Stage 3a or higher.	Moderate	High
ACEI, ARB, ARNI, loop diuretics	Lithium	Increased risk of lithium poisoning.	When combined, consider starting treatment with lithium carbonate at a low dose and adjusting the dose slowly, with frequent monitoring of serum lithium concentrations and signs of lithium toxicity.	Moderate	High

Condition(diseases, concomitant medications, renal function)	Drugs	Rationale	Recommendation/Alternatives	Quality of evidence	Strength of recommendation
digestive system					
Peptic ulcer	Glucocorticoids*	May exacerbate existing ulcers or cause new/additional ulcers.	Use with caution.	Moderate	High
	Aspirin(＞325mg/d) Non-COX-2 selective NSAIDs*		Avoid unless other alternatives are not effective and the patient can take a gastroprotective agent (i.e., proton-pump inhibitor or misoprostol).	Moderate	High
Chronic constipation	Antipsychotics* Tricyclic antidepressants* Tolterodine* Anticholinergic drugs* Oxybutynin (oral)* Paroxetine Opioids	Aggravated constipation.	Avoid use unless no other medications are available. Opioids: Short-term use.	Low	Opioids: Low; Others: High
A history of upper gastrointestinal bleeding	Aspirin SSRIs	Increases the risk of gastrointestinal ulcer and upper gastrointestinal bleeding.	Selective serotonin reuptake inhibitors: use with caution. Aspirin: Avoid. Alternative treatment: use of other antiplatelet drugs (such as clopidogrel), use of proton pump inhibitors, antacids such as misoprostol, or gastric mucosal protective drugs.	High	High
NSAIDs	Glucocorticoids (oral or parenteral) Antiplatelet agents Vitamin K antagonists Direct thrombin inhibitors or factor Xa inhibitors Acetaminophen SSRIs	Increases the risk of gastrointestinal ulcer and upper gastrointestinal bleeding.	Combined with caution, pay attention to monitoring, or combined with antacid or gastric mucosal protective agents.	Glucocorticoid,anticoagulant, antiplatelet, acetaminophen: Moderate. Others: Low.	High
Respiratory system					
Chronic obstructive pulmonary disease (history)	Benzodiazepines*	Risk of Respiratory depression.	Use with caution.	Very low	Low
	Corticosteroids(oral)	Risk of respiratory muscle weakness and respiratory failure.	Avoid (long-term) use. Alternative treatments: inhaled glucocorticoids.	High	Low
	Theophylline was used as a monotherapy	Safer and effective alternatives are available; narrow therapeutic window can easily lead to adverse reactions.	Avoid (long-term) use. Alternative treatments: inhaled anticholinergic agents and β 2 agonists.	Guideline	High
Sleep apnea syndrome	Benzodiazepines*	Risk of Respiratory depression.	Avoid.	FDA	High
Acute and chronic respiratory failure(pO2 < 8.0 kPa ± pCO2 > 6.5 kPa)	Benzodiazepines	Aggravated respiratory failure.	Use with caution.	FDA	High
Cimetidine and ciprofloxacin	Theophylline was used as a monotherapy	Increased risk of theophylline toxicity.	Avoid concurrent use.	Moderate	High
Urinary system					
Urinary incontinence	Estrogen (except vaginal)* selective peripheral α1-receptor blockers (doxazosin*, prazosin*, terazosin*)	Selective peripheral α1-receptor blockers: worsening urinary incontinence. Estrogen (except vaginal): lack of efficacy.	Avoid use in women.	Estrogen: High. peripheral α1-receptor blockers: Moderate.	High
Lower urinary tract symptoms, prostatic hyperplasia	Anticholinergic agents*(except those for urinary incontinence)	May decrease urinary flow and cause urinary retention.	Avoid use in men.	Moderate	High
CrCl＜30ml/min	NSAIDs(non-selective, COX-2 selective, oral and parenteral)	May increase the risk of acute kidney injury and a further decline in kidney function.	Avoid	Moderate	High
CrCl＜30ml/min	Triamterene*	Kidney injury, hyperkalemia and hyponatremia.	Avoid	Moderate	High
CrCl＜30ml/min	Ciprofloxacin	Increased risk of CNS effects (e.g., seizures, confusion) and tendon rupture.	Dose reduction if Ccr＜30ml/min.	Moderate	High
CrCl＜15ml/min	Trimethoprim - sulfamethoxazole	Increased risk of worsening of kidney function and hyperkalemia; risk of hyperkalemia.	Avoid	Moderate	High

Condition(diseases, concomitant medications, renal function)	Drugs	Rationale	Recommendation/Alternatives	Quality of evidence	Strength of recommendation
CrCl＜30ml/min	Amiloride	Hyperkalemia and hyponatremia.	Avoid	Moderate	High
CrCl＜15ml/min	Rivaroxaban	Lack of efficacy or safety evidence in people with CrCl <15 mL/min.	Avoid	Moderate	High
CrCl＜30ml/min	Dabigatran	Lack of evidence for efficacy and safety in individuals with a CrCl<30 mL/min.	Avoid	Moderate	High
CrCl＜15 ml/min	Edoxaban	Lack of evidence of efficacy or safety in patients with CrCl <15 mL/min.	Avoid	Moderate	High
CrCl＜15ml/min	Enoxaparin	Increased risk of bleeding.	Reduce dose	Moderate	Low
CrCl＜20ml/min	Fondaparinux	Increased risk of bleeding.	Avoid	Moderate	High
CrCl＜30ml/min	Duloxetine	Increased GI adverse effects (nausea, diarrhea).	Avoid	Moderate	High
CrCl＜60ml/min	Gabapentin	CNS adverse effects.	Reduce dose	Moderate	Low
CrCl≤80ml/min	Levetiracetam	CNS adverse effects.	Reduce dose	Moderate	Low
CrCl＜60ml/min	Pregabalin	CNS adverse effects.	Reduce dose	Moderate	Low
CrCl＜30ml/min	Tramadol	CNS adverse effects.	Immediate release: reduce dose. Extended-release: avoid.	Moderate	Low
CrCl＜50ml/min	Cimetidine, famotidine, Nizatidine	Mental status changes.	Reduce dose	Moderate	Low
CrCl＜30ml/min	Colchicine	GI, neuromuscular, and bone marrow toxicity.	Reduce dose	Moderate	High
CrCl＜30ml/min	Probenecid	Loss of effectiveness.	Avoid	Moderate	High
CrCl＜30ml/min	Spironolactone	Hyperkalemia.	Avoid	Moderate	High
loop diuretics	Peripheral alpha-1 blockers	Urinary incontinence in older women.	Avoid in older women, unless conditions warrant both drugs.	Moderate	Low
Endocrine system					
Osteoporosis	Glucocorticoids	Accelerated bone loss.	Use with caution	Low	Low
Gout	Thiazide diuretics	Risk of aggravating gout.	Switch to other blood pressure medications.	guideline	Low
	NSAIDs or colchicine (> 3 months)	Safer and effective alternatives are available.	Avoid except that there are contraindications to xanthine oxidase inhibitors.	guideline	Low
Rheumatoid arthritis	Glucocorticoids (> 3 months)	Safer and effective alternatives are available.	Avoid monotherapy or long-term high-dose glucocorticoid use, RA patients with moderate or high disease activity can be treated with conventional synthetic DMARDs combined with low-dose glucocorticoids for a short period of time.	High	High
Osteoarthritis	Glucocorticoids	Risk of adverse reactions to systemic use of glucocorticoids.	Avoid, except for regular intra-articular injections for simple joint pain.	Guideline	Low
Syndrome of abnormal antidiuretic hormone secretion or hyponatremia	Antidepressants (mirtazapine, SNRIs, SSris, TCAs) Antiepileptic drugs (carbamazepine, oxcarbazepine) Antipsychotic drugs Diuretics Tramadol	Increased hyponatremia.	Use with caution. Close monitoring of sodium levels is needed when initiating medications or changing doses in elderly patients.	Moderate	Low
other					
Glaucoma	Anticholinergic drugs* tricyclic antidepressants*	Exacerbating glaucoma.	Use with caution. Alternative treatment: SSRIs.	Guideline	High

*Identical medications listed in the 2017 version of PIM-China criteria.

ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin-receptor blocker; ARNI, angiotensin receptor-neprilysin inhibitor; CNS, Central nervous system; DOACs: direct oral anticoagulants; GI, gastrointestinal; NSAID, nonsteroidal anti-inflammatory drug; PIM, potentially inappropriate medication; SSRI, selective serotonin reuptake inhibitor; SNRI, serotonin-norepinephrine reuptake inhibitor; TCA, tricyclic antidepressant; VTE, venous thromboembolism