

BioDrugs

Potentially Harmful Medication Use and Decline in Health-Related Quality of Life Among Community-Dwelling Older Adults

Kenya Ie, MD, PhD, MPH¹, Eric Chou, Richard D. Boyce, PhD, Steven M. Albert, PhD

1. Department of Family Medicine, University of Pittsburgh, 3518 Fifth Avenue, Pittsburgh, PA 15213;
iekenya0321@gmail.com

Supplement 1. Prescription medications and weights for the calculation of Anticholinergic Cognitive Burden (ACB)

Weight 1 medications	Weight 2 medications	Weight 3 medications
Alimemazine	Amantadine	Amitriptyline
Alverine	Belladonna	Amoxapine
Alprazolam	Carbamazepine	Atropine
Aripiprazole	Cyclobenzaprine	Benzotropine
Asenapine	Cyproheptadine	Brompheniramine
Atenolol	Loxapine	Carbinoxamine
Bupropion	Meperidine	Chlorpheniramine
Captopril	Methotrimeprazine	Chlorpromazine
Cetirizine	Molindone	Clemastine
Chlorthalidone	Nefopam	Clomipramine
Cimetidine	Oxcarbazepine	Clozapine
Clidinium	Pimozide	Darifenacin
Clorazepate	-	Desipramine
Codeine	-	Dicyclomine
Colchicine	-	Dimenhydrinate
Desloratadine	-	Diphenhydramine
Diazepam	-	Doxepin
Digoxin	-	Doxylamine
Dipyridamole	-	Fesoterodine
Disopyramide	-	Flavoxate
Fentanyl	-	Hydroxyzine
Furosemide	-	Hyoscyamine
Fluvoxamine	-	Imipramine
Haloperidol	-	Meclizine
Hydralazine	-	Methocarbamol
Hydrocortisone	-	Nortriptyline
Iloperidone	-	Olanzapine
Isosorbide	-	Orphenadrine
Levocetirizine	-	Oxybutynin
Loperamide	-	Paroxetine
Loratadine	-	Perphenazine
Metoprolol	-	Promethazine
Morphine	-	Propantheline
Nifedipine	-	Propiverine
Paliperidone	-	Quetiapine
Prednisone	-	Scopolamine
Quinidine	-	Solifenacin
Ranitidine	-	Thioridazine
Risperidone	-	Tolterodine
Theophylline	-	Trifluoperazine
Trazodone	-	Trihexyphenidyl
Triamterene	-	Trimipramine
Venlafaxine	-	Trospium
Warfarin	-	-

Supplement 2. Prescription medications and minimum effective dose for the calculation of the sedative component of the Drug Burden Index (DBI-Se)

DBI-Se	Minimum Effective Daily Dose (mg)
alprazolam	0.5
benzonatate	300
buspirone	15
carbamazepine	400
chlordiazepoxide	10
citalopram	20
clonazepam	1
clorazepate	7.5
codeine	100
diazepam	2
diphenoxylate	3.75
escitalopram	10
estazolam	0.5
fentanyl	25
flurazepam	15
gabapentin	900
hydrocodone	20
lamotrigine	100
levetiracetam	3000
lorazepam	0.5
meprobamate	1200
methadone	5
mirtazepine	15
morphine	30
oxazepam	30
oxcarbazepine	300
oxycodone	20
paroxetine	10
phenobarbital	30
phenytoin	300
pramipexole	0.125
primidone	750

risperidone	1
ropinerole	0.25
selegiline	6
sertraline	25
temazepam	7.5
tiagabine	32
tramadol	100
triazolam	0.125
valproic acid	500
venlafaxine	75
zaleplon	5
ziprasidone	20
zolpidem	5

DBI-Se: Drug Burden Index-sedative property

Supplement 3. Prescription medications and minimum effective dose for the calculation of the anticholinergic component of the Drug Burden Index (DBI-Ach)

DBI-Ach	Minimum Daily Dose (mg)
Amitriptyline	50
Belladonna	16.2
Benztropine	0.5
Carisoprodol	1000
Cetirizine	5
Chlorpromazine	50
Chlorzoxazone	750
Clemastine	2.68
Clidinium	5
Clomipramine	50
Clonidine	0.1
Cyclobenzaprine	15
Cyproheptadine	4
Desipramine	25
Dicyclomine	80
Diphenhydramine	50
Disopyramide	400
Doxazosin	0.5
Doxepin	100
Doxylamine	25
Flavoxate	300
Fluoxetine	20
Fluphenazine	1
Guanfacine	1
Haloperidol decanoate	50
Hydroxyzine	75
Imipramine	25
Loratadine	10
Loxapine	20
Meclizine	25
Metaxalone	2400
Methocarbamol	4000

Methscopolamine	10
Methyldopa	500
Nefazodone	100
Nortriptyline	30
Olanzapine	2.5
Orphenadrine	200
Oxybutynin	5
Perphenazine	8
Phenelzine	22.5
Prazosin	2
Prochlorperazine	15
Promethazine	18.75
Propantheline	75
Quetiapine	50
Tamsulosin	0.4
Terazosin	0.5
Thioridazine	300
Tolterodine	2
Tranlycypromine	30
Trazodone	75
Trifluoperazine	2
Trihexyphenidyl	5
Trimethobenzamide	900
Trimipramine	25

DBI-Ach: Drug Burden Index- anticholinergic property

Supplement 4. Potentially Harmful Medications listed on the 2015 American Geriatrics Society 2015 updated beers criteria³⁰

Label (First-generation antihistamines)

1. Brompheniramine
2. Carbinoxamine
3. Chlorpheniramine
4. Clemastine
5. Cyproheptadine
6. Dexbrompheniramine
7. Dexchlorpheniramine
8. Dimenhydrinate
9. Diphenhydramine
10. Doxylamine
11. Hydroxyzine
12. Meclizine
13. Promethazine
14. Triprolidine

Label (Antiparkinson agents)

1. Benzotropine
2. Trihexyphenidyl

Label (Antispasmodics)

1. Atropine
2. Belladonna alkaloids
3. Clidinium-Chlordiazepoxide
4. Dicyclomine
5. Hyoscyamine
6. Propantheline
7. Scopolamine

Label (Antithrombotics)

1. Dipyridamole
2. Ticlopidine

Label (Peripheral alpha-1 blockers)

1. Doxazosin
2. Prazosin
3. Terazosin

Label (Central alpha blockers)

1. Guanabenz
2. Guanfacine
3. Methyldopa
4. Reserpine

Label (Other cardiovascular drugs)

1. Disopyramide
2. Nifedipine, immediate release

Label (Antidepressants)

1. Amitriptyline
2. Amoxapine
3. Clomipramine
4. Desipramine
5. Imipramine
6. Nortriptyline
7. Paroxetine
8. Protriptyline
9. Trimipramine

Label (Barbiturates)

1. Amobarbital
2. Butobarbital
3. Butalbital
4. Mephobarbital
5. Pentobarbital
6. Phenobarbital
7. Secobarbital

Label (Benzodiazepines)

1. Alprazolam
2. Estazolam
3. Lorazepam
4. Oxazepam
5. Temazepam
6. Triazolam
7. Clorazepate
8. Chlordiazepoxide
9. Clonazepam
10. Diazepam
11. Flurazepam
12. Quazepam

Label (Other central nervous system drugs)

1. Meprobamate
2. Eszopiclone
3. Zolpidem
4. Zaleplon
5. Ergolid mesylates
6. Isoxsuprine

Label (Endocrine)

1. Desiccated thyroid
2. Megestrol

Label (Estrogens)

1. Estradiol
2. Synthetic Conjugated Estrogens
3. Estradiol Acetate
4. Esterified Estrogen
5. Estropipate
6. Conjugated Estrogens
7. Estradiol/Norethindrone Acetate
8. Estradiol/ Drospirenone
9. Norethindrone Acetate/Ethinyl Estradiol
10. Estradiol/Norgestimate
11. Conjugated Estrogen/Medroxyprogesterone
12. Conjugated Estrogen/ Bazedoxifene

Label (Sulfonylureas)

1. Chlorpropamide
2. Glyburide

Label (Gastrointestinal system drugs)

1. Mineral Oil

Label (Pain medications)

1. Meperidine
2. Indomethacin
3. Ketorolac
4. Pentazocine

Label (Skeletal muscle relaxants)

1. Carisoprodol
2. Chlorzoxazone
3. Cyclobenzaprine
4. Metaxalone
5. Methocarbamol
6. Orphenadrine

Supplement 5. Top 10 most prescribed potentially harmful medications among study participants based on Anticholinergic Cognitive Burden (N=426)

Product name	Number of participants	Proportion (%)
Furosemide	57	13.4
Metoprolol tartrate	36	8.5
Prednisone	33	7.7
Atenolol	29	6.8
Warfarin sodium	21	4.9
Alprazolam	18	4.2
Metoprolol succinate	16	3.8
Isosorbide mononitrate	12	2.8
Oxybutynin chloride	10	2.3
Vesicare	10	2.3

Supplement 6. Top 10 most prescribed potentially harmful medications among study participants based on Drug Burden Index-sedative property (N=426)

Product name	Number of participants	Proportion (%)
Lorazepam	22	5.2
Tramadol hydrochloride	21	4.9
Gabapentin	19	4.5
Alprazolam	18	4.2
Sertraline hydrochloride	17	4.0
Citalopram hydrobromide	14	3.3
Zolpidem tartrate	9	2.1
Lexapro	7	1.6
Paroxetine	6	1.4
Atropine sulfate/diphenoxylate hydrochloride	6	1.4

Supplement 7. Top 10 most prescribed potentially harmful medications among study participants based on Drug Burden Index- anticholinergic property (N=426)

Product name	Number of participants	Proportion (%)
Meclizine hydrochloride	13	3.1
Oxybutin chloride	10	2.3
Detrol LA	9	2.1
Tamsulosin hydrichloride	5	1.2
Dicyclomine hydrochloride	5	1.2
Hydroxyzine hydrochloride	5	1.2
Clonidine hydrochloride	4	0.9
Trazodone hydrochloride	4	0.9
Doxazosin mesylate	4	0.9
Fluoxetine	4	0.9

Supplement 8. Top 10 most prescribed potentially harmful medications among study participants based on the American Geriatrics Society Beers criteria (N=426)

Product name	Number of participants	Proportion (%)
Lorazepam	22	5.2
Alprazolam	18	4.2
Paroxetine	10	2.3
Zolpidem tartrate	9	2.1
Glyburide	9	2.1
Meclizine hydrochloride	9	2.1
Temazepam	5	1.2
Dicyclomine hydrochloride	5	1.2
Hydroxyzine hydrochloride	5	1.2
Premarin	4	0.9