

**Medications Associated with Geriatric Syndrome (MAGS) and their Prevalence in Older Hospitalized Adults Discharged to Skilled Nursing Facilities**

**Appendix 1**

“--” = Syndrome not reported as adverse effect in LexiComp or US FDA Drug Inserts for that drug

**Frequency undefined** = Syndrome mentioned as adverse effect in LexiComp but frequency is not reported

All medications included below were approved by the expert panel

**Table A1: Inclusion criteria for list of medications associated with Unintentional Weight and Appetite Loss**

<b>Major Medication Category</b>	<b>Medication name</b>	<b>Literature search</b>	<b>Incidence for Weight Loss/Anorexia/Decreased Appetite in Lexicomp or US FDA Drug Inserts</b>	<b>Present in AGS 2015 Beers List</b>	<b>If “yes” did the rationale in the AGS 2015 Beers List mention the syndrome?</b>
Antidepressants	Fluoxetine	[1, 2]	4 - 17%	Yes	No
	Sertraline	[2]	3 - 11%	Yes	No
	Duloxetine	[2]	6 - 8%	Yes	Yes
Anticonvulsants	Topiramate	[1]	4 - 15%	Yes	No
	Zonisamide	[1]	3%	Yes	No
	Bupropion	[1]	14 - 23%	Yes	No
Antidiabetics	Acarbose	[1]	--	No	n/a
	Exenatide	[1]	1 - 5%	No	n/a
	Liraglutide	[1]	10%	No	n/a
	Metformin	[1, 2]	--	No	n/a
	Miglitol	[1]	--	No	n/a
	Pramlintide	[1]	≤17%	No	n/a
Antimicrobial	Azithromycin	[2]	2 - 10%	No	n/a
	Xifaxan	[2]	2 - 5%	No	n/a
Others	Amantadine	[3]	1 - 10%	No	n/a
	Donepezil	[4]	2 - 8%	Yes	No
	Galantamine	[4]	5 - 9%	Yes	No
	Rivastigmine	[4]	3 - 26%	Yes	No

**TableA2: Inclusion criteria for list of medications associated with Depression**

	Medication name	Literature search*	Incidence for Depression/Emotional disturbances/Mood changes in Lexicomp or US FDA Drug Inserts	Present on the AGS 2015 Beers List	If “Yes” did the rationale in the AGS 2015 Beers List mention the syndrome?
Antipsychotics	Aripiprazole	[5]	<1%	Yes	No
	Quetiapine (fumarate)	[5]	1-3%	Yes	No
Anticonvulsants	Topiramate	[6]	≤9%	Yes	No
	Levetiracetam	[7, 8]	3-5%	Yes	No
	Phenytoin	[9, 10]	Frequency undefined	Yes	No
	Primidone	[11]	Frequency undefined	Yes	No
	Tiagabine	[10]	1-7%	Yes	No
	Vigabatrin	[12]	4-7%	Yes	No
	Phenobarbital	[13]	Frequency undefined	Yes	No
Opioid agonists	Loperamide	[14]	--	Yes	No
	Meperidine	[14]	Frequency undefined	Yes	No
	Pentazocine	[14]	Frequency undefined	Yes	No
	Propoxyphene	[14]	Frequency undefined	Yes	No
	Tramadol	[14]	1-5%	Yes	No
	Acetylmorphine	[14]	--	Yes	No
	Alphaprodine	[14]	--	Yes	No
	Anileridine	[14]	--	Yes	No
	Bromadol	[14]	--	Yes	No
	Buprenorphine	[14]	1-11%	Yes	No
	Carfentanil	[14]	--	Yes	No
	Codeine	[14]	Frequency undefined	Yes	No
	Desomorphine	[14]	--	Yes	No
	Dextropropoxyphene	[14]	Frequency undefined	Yes	No
	Diacetyldihydromorphine	[14]	--	Yes	No
	Diacetylmorphine	[14]	--	Yes	No
	Dibenzoylmorphine	[14]	--	Yes	No
	Dihydrocodeine	[14]	--	Yes	No
	Dihydromorphine	[14]	--	Yes	No
	Diphenoxylate	[14]	Frequency undefined	Yes	No
	Dipropanoylmorphine	[14]	--	Yes	No
	Ethymorphine	[14]	--	Yes	No
	Etonitazene	[14]	--	Yes	No
	Fentanyl	[14]	1-10%	Yes	No
Hydrocodone	[14]	1-10%	Yes	No	
Hydromorphone	[14]	Frequency undefined	Yes	No	

	Levorphanol	[14]	Frequency undefined	Yes	No
	Methadone	[14]	--	Yes	No
	Morphine	[14]	1-10%	Yes	No
	Nicomorphine	[14]	--	Yes	No
	Opium	[14]	--	Yes	No
	Oxycodone	[14]	<1%	Yes	No
	Oxymorphone	[14]	<10%	Yes	No
	Papaverine	[14]	Frequency undefined	Yes	No
	Pethidine	[14]	Frequency undefined	Yes	No
	Tapentadol	[14]	1%	Yes	No
	Thebaine	[14]	--	Yes	No
Antihypertensives	Methyldopa	[15]	Frequency undefined	Yes	No
	Clonidine	[16]	1-4%	Yes	No
	Sotalol	[17]	1-4%	No	n/a
	Acebutolol	[17]	2%	No	n/a
	Atenolol	[17]	1-10%	No	n/a
	Betaxolol	[17]	<1%	No	n/a
	Bisoprolol	[17]	<1%	No	n/a
	Bucindolol	[17]	--	No	n/a
	Carteolol	[17]	--	No	n/a
	Carvedilol	[17]	1-10%	No	n/a
	Esmolol	[17]	<1%	No	n/a
	Labetalol	[17]	Frequency undefined	No	n/a
	Metoprolol	[17]	5%	No	n/a
	Nadolol	[17]	1-10%	No	n/a
	Nebivolol	[17]	--	No	n/a
	Penbutolol	[17]	--	No	n/a
	Pindolol	[17]	--	No	n/a
	Propranolol	[18, 19]	<1%	No	n/a
	Timolol	[17]	Frequency undefined	No	n/a
	Reserpine	[20]	Frequency undefined	Yes	No
Hormone Replacement	Beclomethasone	[21-23]	--	Yes	No
	Budesonide	[21-23]	--	Yes	No
	Buserelin	[24, 25]	8%	No	n/a
	Ciclesonide	[21-23]	--	Yes	No
	Cortisone	[21-23]	--	Yes	No
	Deslorelin	[24, 25]	--	No	n/a
	Desogestrel/Ethinyl Estradiol	[26, 27]	--	No	n/a
	Dexamethasone	[21-23]	--	Yes	No
	Dienogest/Estradiol Valerate	[26, 27]	--	No	n/a
	Drospirenone/Ethinyl Estradiol	[26, 27]	--	No	n/a
	Drospirenone/Ethinyl Estradiol/Levomefolate	[26, 27]	--	No	n/a

	Ethinodioldiacetate/Ethinyl Estradiol	[26, 27]	--	No	n/a
	Fludrocortisone	[21-23]	Frequency undefined	Yes	No
	Flunisolide	[21-23]	--	Yes	No
	Fluticasone	[21-23]	<1%	Yes	No
	Goserelin	[24, 25]	10-54%	No	n/a
	Histrelin	[24, 25]	<2%	No	n/a
	Hydrocortisone	[21-23]	Frequency undefined	Yes	No
	Leuprorelin	[24, 25]	≤31%	No	n/a
	Levonorgestrel	[26, 27]	--	No	n/a
	Levonorgestrel/Ethinyl Estradiol	[26, 27]	--	No	n/a
	Mestranol/Norethindrone	[26, 27]	Frequency undefined	No	n/a
	Methylprednisolone	[21-23]	Frequency undefined	Yes	No
	Mometasone	[21-23]	10%	Yes	No
	Nafarelin	[24, 25]	3%	No	n/a
	Norethindrone	[26, 27]	Frequency undefined	No	n/a
	Norethindrone/Ethinyl Estradiol	[26, 27]	4-6%	No	n/a
	Norethindrone/Ethinyl Estradiol/Fe	[26, 27]	2%	No	n/a
	Norgestimate/Ethinyl Estradiol	[26, 27]	Frequency undefined	No	n/a
	Norgestrel/Ethinyl Estradiol	[26, 27]	--	No	n/a
	Norgestrel/Ethinyl Estradiol/Fe	[26, 27]	--	No	n/a
	Prednisolone	[21-23]	--	Yes	No
	Prednisone	[21-23, 28]	Frequency undefined	Yes	No
	Propionate	[21-23]	--	Yes	No
	Tamoxifen	[29, 30]	2-18%	No	n/a
	Triamcinolone	[21-23]	Frequency undefined	Yes	No
	Triptorelin	[24, 25]	Frequency undefined	No	n/a
	Ulipristal	[26, 27]	--	No	n/a
Others	Avitriptan	[31]	--	No	n/a
	Almotriptan	[31]	--	No	n/a
	Donitriptan	[31]	--	No	n/a
	Efavirenz	[32]	≤19%	No	n/a
	Eletriptan	[31]	<1%	No	n/a
	Frovatriptan	[31]	<1%	No	n/a
	Interferon - α	[33-38]	>10%	No	n/a
	Interferon - β	[39-41]	<1%	No	n/a
	Isotretinoin	[42-48]	Frequency undefined	No	n/a
	Naratriptan	[31]	<1%	No	n/a
	Rizatriptan	[31]	--	No	n/a

	Sumatriptan	[31]	--	No	n/a
	Varenicline	[49]	4-11%	No	n/a
	Zolmitriptan	[31]	≤1%	No	n/a

\*Drug list and references adapted from Chapter 18: Depression by Sheila Botts and Melody Ryan in [15]

**Table A3: Inclusion criteria for list of medications associated with Urinary Incontinence**

Major Medication Category	Medication name	Literature search	Incidence for Urinary Incontinence in Lexicomp or US FDA Drug Inserts	Present on the AGS 2015 Beers List	If "Yes" did the rationale in the AGS 2015 Beers List mention the syndrome?
Antipsychotics	Aripiprazole	[50]	≤5%	Yes	No
	Quetiapine (fumarate)	[50]	--	Yes	No
	Asenapine	[50]	--	Yes	No
	Chlorpromazine	[50]	1 - 10%	Yes	No
	Clozapine	[50, 51]	1-2%	Yes	No
	Fluphenazine	[50]	--	Yes	No
	Haloperidol	[50]	--	Yes	No
	Iloperidone	[50]	≥1%	Yes	No
	Loxapine	[50]	--	Yes	No
	Lurasidone	[50]	--	Yes	No
	Olanzapine	[50]	≥2%	Yes	No
	Paliperidone	[50]	≤2%	Yes	No
	Perphenazine	[50]	Frequency undefined	Yes	No
	Pimozide	[50]	--	Yes	No
	Promazine	[50]	--	Yes	No
	Risperidone	[50]	<4%	Yes	No
	Thioridazine	[50]	--	Yes	No
	Thiothixene	[50]	--	Yes	No
	Trifluoperazine	[50]	--	Yes	No
	Triflupromazine	[50]	--	Yes	No
Ziprasidone	[50]	<1%	Yes	No	
Antidepressants	Clomipramine	[50]	5%	Yes	No
	Doxepin	[50]	<1%	Yes	No
	Imipramine	[50]	--	Yes	No
Antiepileptics	Gabapentin	[52]	--	Yes	No
	Pregabalin	[52]	≤3%	Yes	No
Antiparkinsonism	Reserpine	[50]	--	Yes	No

Opioid agonists	Tramadol	[53]	1 – 5%	Yes	No
	Buprenorphine	[53]	<1%	Yes	No
	Codeine	[53]	--	Yes	No
	Hydrocodone	[53]	--	Yes	No
	Methadone	[53]	--	Yes	No
	Morphine	[53]	1 - 10 %	Yes	No
	Oxycodone	[53]	--	Yes	No
	Oxymorphone	[53]	--	Yes	No
Antihypertensives	Clonidine	[53]	1 – 4%	Yes	No
	Methyldopa	[53]	--	Yes	No
	Guanabenz	[53]	--	Yes	No
	Guanfacine	[53]	2 – 5%	Yes	No
	Spironolactone	[53]	--	Yes	No
	Tizanidine	[53]	--	No	n/a
	Triamterene	[50, 53]	--	Yes	No
	Amiloride	[50, 53]	--	Yes	No
	Bumetanide	[50, 53]	--	No	n/a
	Chlorthalidone	[50, 53]	--	No	n/a
	Eplerenone	[50, 53]	--	No	n/a
	Ethacrynic acid	[50, 53]	--	No	n/a
	Furosemide	[50, 53]	--	No	n/a
	Hydrochlorothiazide	[53]	--	No	n/a
	Torsemide	[50]	--	No	n/a
	Reserpine	[48]	--	Yes	No
	Doxazosin*	[53]	1%	Yes	No
	Prazosin*	[53]	--	Yes	No
	Terazosin*	[53]	<1%	Yes	No
	Alfuzosin*	[53]	--	No	n/a
Silodosin*	[53]	--	No	n/a	
Tamsulosin*	[53]	--	No	n/a	
Anticholinergics and/or Antihistaminics	Benzotropine	[53]	--	Yes	Yes
	Chlorpheniramine	[53]	--	Yes	Yes
	Dicyclomine	[53]	--	Yes	Yes
	Diphenhydramine	[53]	--	Yes	Yes
	Doxylamine	[53]	--	Yes	Yes
	Hydroxyzine	[53]	--	Yes	Yes
	Scopolamine (Hyoscine)	[53]	--	Yes	No
	Trihexyphenidyl	[53]	--	Yes	No
	Glycopyrrolate	[53]	15 %	No	n/a
	Ipratropium	[53]	--	No	n/a
	Tiotropium	[53]	--	No	n/a
Muscle Relaxers	Orphenadrine	[54]	--	Yes	Yes
Others	Mirabegron		--	No	n/a

\*In women only

**Table A4: Inclusion criteria for list of medications associated with Delirium**

Major Medication Category	Medication name	Literature search	Incidence for Delirium or confusion in LexiComp or US FDA Drug Inserts	Present on the AGS 2015 Beers List	If “Yes” did the rationale in the AGS 2015 Beers List mention the syndrome?
Antidepressants [55]	Mirtazapine	[56-60]	<2%	Yes	No
	Clomipramine	[57, 59, 61, 62]	<3%	Yes	Yes
	Doxepin	[57-59, 61, 62]	Frequency undefined	Yes	Yes
	Imipramine	[57, 59-62]	Frequency undefined	Yes	Yes
	Amitriptyline	[56, 57, 59-62]	Frequency undefined	Yes	Yes
	Desipramine	[57, 59-62]	Frequency undefined	Yes	Yes
	Nortriptyline	[57-62]	Frequency undefined	Yes	Yes
	Protriptyline	[59, 62]	Frequency undefined	Yes	Yes
	Trimipramine	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Amozapine	[55]	--	No	n/a
	Butriptyline	[55]	--	No	n/a
	Dosulepin	[59]	--	No	n/a
	Iprindole	[55]	--	No	n/a
	Lofepramine	[55]	--	No	n/a
Opipramol	[59]	--	No	n/a	
Antiepileptics	Oxcarbazepine	[57, 59, 61, 62]	1-10%	No	n/a
	Carbamazepine	[57, 59, 61, 62]	Frequency undefined	Yes	No
	Lithium	[58, 59]	Frequency undefined	Yes	No
Antiparkinsonism	Entacapone	[59, 60]	<1%	No	n/a
	Tolcapone	[55]	10-11%	No	n/a
	Bromocriptine	[59, 62]	Frequency undefined	No	n/a

Benzodiazapines [63]	Alprazolam	[57, 59, 61]	1-10%	Yes	Yes
	Chlordiazepoxide	[57, 59, 62]	Frequency undefined	Yes	Yes
	Clonazepam	[57, 59, 62]	Frequency undefined	Yes	Yes
	Clorazepate	[57, 59, 61]	Frequency undefined	Yes	Yes
	Diazepam	[57-59, 61, 62]	Frequency undefined	Yes	Yes
	Estazolam	[57, 59]	2%	Yes	Yes
	Flurazepam	[57, 59]	Frequency undefined	Yes	Yes
	Halazepam	[63]	--	Yes	Yes
	Lorazepam	[57, 59]	Frequency undefined	Yes	Yes
	Oxazepam	[56, 57, 59]	Frequency undefined	Yes	Yes
	Quazepam	[63]	Frequency undefined	Yes	Yes
	Temazepam	[56-59, 62]	1-10%	Yes	Yes
	Triazolam	[57, 59, 62]	<1%	Yes	Yes
	Bretazenil	[63]	--	Yes	Yes
	Bromazepam	[63]	Frequency undefined	Yes	Yes
	Camazepam	[63]	--	Yes	Yes
	Cinolazepam	[63]	--	Yes	Yes
	Clobazam	[63]	Frequency undefined	Yes	Yes
	Clotiazepam	[63]	--	Yes	Yes
	Cloxazolam	[63]	--	Yes	Yes
	Delorazepam	[63]	--	Yes	Yes
	Diclazepam	[63]	--	Yes	Yes
	Ethyl carfluzepate	[63]	--	Yes	Yes
	Ethyl loflazepate	[63]	--	Yes	Yes
	Etizolam	[63]	--	Yes	Yes
	Flubromazepam	[63]	--	Yes	Yes
	Flunitrazepam	[63]	--	Yes	Yes
	Flutoprazepam	[63]	--	Yes	Yes
	Ketazolam	[63]	--	Yes	Yes
	Loprazolam	[63]	--	Yes	Yes
Lormetazepam	[63]	--	Yes	Yes	
Medazepam	[63]	--	Yes	Yes	
Midazolam	[59]	<1%	Yes	Yes	



	Nimetzepam	[63]	--	Yes	Yes
		[63]	Frequency undefined	Yes	Yes
	Nitrazepam				
	Nordazepam	[63]	--	Yes	Yes
	Phenazepam	[63]	--	Yes	Yes
	Pinazepam	[63]	--	Yes	Yes
	Prazepam	[63]	--	Yes	Yes
	Premazepam	[63]	--	Yes	Yes
	Pyrazolam	[63]	--	Yes	Yes
	Tetrazepam	[63]	--	Yes	Yes
Clidinium-Chlordiazepoxide	[63]	--	Yes	Yes	
Non-Benzodiazepine Hypnotics [55]	Amobarbital	[55]	--	Yes	Yes
	Butobarbital	[55]	<1%	Yes	Yes
	Butalbital	[57]	--	Yes	Yes
	Mephobarbital	[55]	--	Yes	Yes
		[55]	Frequency undefined	Yes	Yes
	Pentobarbital				
	Secobarbital	[55]	<1%	Yes	Yes
	Aprobarbital	[55]	--	Yes	Yes
	Hexobarbital	[57]	--	Yes	Yes
	Benzazepam	[55]	--	Yes	Yes
	Brotizolam	[55]	--	Yes	Yes
	Deschloroetizolam	[55]	--	Yes	Yes
	Zaleplon	[57]	≤1%	Yes	Yes
	Zolpidem	[56, 57]	1-10%	Yes	Yes
	Baclofen	[59, 60]	1-11%	Yes	Yes
		[55]	Frequency undefined	Yes	Yes
	Chloral Hydrate				
	Glutethimide	[55]	--	Yes	Yes
	Paraldehyde	[55]	--	Yes	Yes
	[56]	Frequency undefined	Yes	Yes	
Zopiclone					
Eszopiclone	[55]	≤3%	Yes	Yes	
Meprobamate	[57]	--	Yes	Yes	
	[57, 59]	Frequency undefined	Yes	Yes	
Phenobarbital					
Opioid agonists [63]	Opium	[57]	--	Yes	Yes
		[56, 57, 59, 62]	1-5%	Yes	Yes
	Tramadol				
		[56, 57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Codeine				
Hydrocodone	[57-59]	<1%	Yes	Yes	
	[57, 59]	Frequency undefined	Yes	Yes	
Methadone					

	Morphine	[57, 59, 61, 62]	>10%	Yes	Yes
	Oxycodone	[57, 59, 62]	1-5%	Yes	Yes
	Oxymorphone	[63]	3%	Yes	Yes
	Loperamide	[57, 59, 60, 62]	Frequency undefined	Yes	Yes
	Meperidine	[59, 61, 62]	Frequency undefined	Yes	Yes
	Propoxyphene	[57-59]	--	Yes	Yes
	Acetylmorphine	[63]	--	Yes	Yes
	Alphaprodine	[63]	--	Yes	Yes
	Anileridine	[63]	--	Yes	Yes
	Bromadol	[63]	--	Yes	Yes
	Carfentanil	[63]	--	Yes	Yes
	Desomorphine	[63]	--	Yes	Yes
	Dextropropoxyphene	[63]	--	Yes	Yes
	Diacetyldihydromorphine	[63]	--	Yes	Yes
	Diacetylmorphine	[63]	--	Yes	Yes
	Dibenzoylmorphine	[63]	--	Yes	Yes
	Dihydrocodeine	[63]	--	Yes	Yes
	Dihydromorphine	[63]	--	Yes	Yes
	Diphenoxylate	[57]	Frequency undefined	Yes	Yes
	Dipropoanoylmorphine	[63]	--	Yes	Yes
	Ethymorphine	[63]	--	Yes	Yes
	Etonitazene	[63]	--	Yes	Yes
	Fentanyl	[57-59, 61, 62]	>10%	Yes	Yes
	Hydromorphone	[63]	Frequency undefined	Yes	Yes
	Levorphanol	[63]	Frequency undefined	Yes	Yes
	Nicomorphine	[63]	--	Yes	Yes
	Pethidine	[61]	Frequency undefined	Yes	Yes
	Tapentadol	[63]	1%	Yes	Yes
	Thebaine	[63]	--	Yes	Yes
	Papaverine	[57]	Frequency undefined	Yes	Yes
	Buprenorphine	[63]	Frequency undefined	Yes	Yes
	Pentazocine	[57]	Frequency undefined	Yes	Yes
Antihypertensives	Tizanidine	[59, 60]	Frequency undefined	No	n/a

Antiarrhythmic	Disopyramide	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Digoxin	[59, 61]	Frequency undefined	Yes	No
Anticholinergics and/or Antihistaminics [55]	Dicyclomine	[57-62]	Frequency undefined	Yes	Yes
	Scopolamine (Hyoscine)	[59, 61, 62]	Frequency undefined	Yes	Yes
	Trihexyphenidyl	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Glycopyrrolate	[55]	Frequency undefined	No	n/a
	Ipratropium	[56, 59]	--	No	n/a
	Tiotropium	[56]	--	No	n/a
	Hyoscyamine	[57-62]	Frequency undefined	Yes	Yes
	Propantheline	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Clidinium	[57, 59]	--	Yes	Yes
	Emepronium	[59]	--	No	n/a
	Methscopolamine	[57]	Frequency undefined	No	n/a
	Procyclidine	[59, 61, 62]	Frequency undefined	No	n/a
	Propiverine	[59]	--	No	n/a
	Tropatepine	[59]	--	No	n/a
	Benztropine	[57, 59-62]	Frequency undefined	Yes	Yes
	Clemastine	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Atropine	[58-62]	Frequency undefined	Yes	Yes
	Belladonna alkaloids	[57, 59, 61]	--	Yes	Yes
	Doxylamine	[57, 59]	Frequency undefined	Yes	Yes
	Hydroxyzine	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Brompheniramine	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Dimenhydrinate	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Loratadine	[57, 59, 60]	<2%	No	n/a
	Tripelennamine	[57]	--	No	n/a
	Alimemazine	[59, 61]	--	No	n/a

	Phenyltoloxamine	[57]	--	No	n/a
	Pyrilamine	[59, 61, 62]	--	No	n/a
	Cyproheptadine	[57, 60-62]	Frequency undefined	Yes	Yes
	Dexbrompheniramine	[57]	--	Yes	Yes
	Dexchlorpheniramine	[57, 59]	Frequency undefined	Yes	Yes
	Triprolidine	[57]	--	Yes	Yes
	Azatadine	[57]	--	No	n/a
	Pheniramine	[57]	--	No	n/a
	Fesoterodine	[59]	Frequency undefined	Yes	Yes
	Benzhexol	[55]	Frequency undefined	No	n/a
	Darifenacin	[59, 61, 62]	Frequency undefined	Yes	Yes
	Flavoxate	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Homatropine	[59]	Frequency undefined	Yes	Yes
	Oxybutynin	[56-62]	1-5%	Yes	Yes
	Solifenacin	[59]	<1%	Yes	Yes
	Tolterodine	[56-62]	<1%	Yes	Yes
	Trospium	[59]	<1%	Yes	Yes
	Diphenhydramine	[57, 58, 60-62]	Frequency undefined	Yes	Yes
	Carbinoxamine	[59, 61, 62]	Frequency undefined	Yes	Yes
	Desloratadine	[59]	--	No	n/a
	Fexofenadine	[59]	--	No	n/a
	Levocetirizine	[59]	--	No	n/a
	Cetirizine	[57, 59, 60]	<2%	No	n/a
	Chlorpheniramine	[57, 59-62]	Frequency undefined	Yes	Yes
	Cimetidine	[59-62]	Frequency undefined	Yes	Yes
	Famotidine	[59]	<1%	Yes	Yes
	Nizatidine	[59]	<1%	Yes	Yes
	Ranitidine	[58-60, 62]	Frequency undefined	Yes	Yes
	Astemizole	[57]	--	No	n/a
	Ketotifen	[59]	--	No	n/a
Antiemetic [55]	Meclizine	[57, 59-62]	Frequency undefined	Yes	Yes

	Levomepromazine	[59, 60, 62]	--	No	n/a
	Droperidol	[55]	Frequency undefined	No	n/a
	Domperidone	[59]	--	No	n/a
Muscle Relaxers [55]	Orphenadrine	[57, 61, 62]	Frequency undefined	Yes	Yes
	Carisoprodol	[57, 59, 60]	Frequency undefined	Yes	Yes
	Chlorzoxazone	[57]	--	Yes	Yes
	Cyclobenzaprine	[57, 59-62]	1-3%	Yes	Yes
	Metaxalone	[57]	--	Yes	Yes
	Methocarbamol	[57, 59, 60]	Frequency undefined	Yes	Yes
	Alverine	[59, 61]	--	No	n/a
	Camsoprodol	[55]	--	No	n/a
	Chlorphenasin	[55]	--	No	n/a
	Dantrolene	[55]	Frequency undefined	No	n/a
Other	Amantadine	[59-62]	1-10%	No	n/a
	Theophylline	[59, 61, 62]	--	Yes	Yes

**Table A5: Inclusion criteria for list of medications associated with Cognitive Impairment**

Major Medication Category	Medication Name	Literature Search	Incidence for memory/cognitive impairment/dysfunction, mental deficiency, decreased mental acuity/amnesia in Lexicomp or US FDA Drug Inserts	Present on the AGS 2015 Beers List	If "Yes" did the rationale in the AGS 2015 Beers List mention the syndrome?
Antipsychotics	Thiopropazine		--	Yes	Yes
	Timiperone		--	Yes	Yes
	Aripiprazole	[59]	<1%	Yes	Yes
	Quetiapine (fumarate)	[57-61, 64, 65]	--	Yes	Yes
	Asenapine	[59]	--	Yes	Yes

	Clozapine	[58, 60-62, 65]	--	Yes	Yes
	Iloperidone	[59]	--	Yes	Yes
	Lurasidone	[55]	--	Yes	Yes
	Olanzapine	[57-62, 64, 65]	--	Yes	Yes
	Paliperidone	[59]	--	Yes	Yes
	Risperidone	[56, 57, 59-61, 64, 66]	--	Yes	Yes
	Ziprasidone	[57, 59]	Frequency undefined	Yes	Yes
	Molindone	[59, 61, 62]	--	Yes	Yes
	Amisulpride		--	Yes	Yes
	Blonanserin		--	Yes	Yes
	Clotapine		--	Yes	Yes
	Melperone	[56]	--	Yes	Yes
	Nemonapride		--	Yes	Yes
	Remoxipride		--	Yes	Yes
	Sertindole		--	Yes	Yes
	Zotepine		--	Yes	Yes
	Fluspirilene		--	Yes	Yes
	Chlorpromazine	[57-62, 64, 66]	--	Yes	Yes
	Fluphenazine	[57, 59, 60, 62]	--	Yes	Yes
	Perphenazine	[57, 59-61, 64]	--	Yes	Yes
	Promazine	[59, 61, 65]	--	Yes	Yes
	Thioridazine	[56-62, 64, 65]	--	Yes	Yes
	Trifluoperazine	[57, 59, 61, 64]	--	Yes	Yes
	Triflupromazine	[57]	--	Yes	Yes
	Mesoridazine		--	Yes	Yes
	Prochlorperazine	[57, 59, 60, 62, 64, 66]	--	Yes	Yes
	Promethazine	[57, 59-62]	--	Yes	Yes
	Acepromazine	[59, 67]	--	Yes	Yes
	Aceprometazine	[59, 67]	--	Yes	Yes
	Dixyrazine		--	Yes	Yes
	Pipotiazine		--	Yes	Yes
	Prothipendyl		--	Yes	Yes

	Perphenazine-amitriptyline	[60]	--	Yes	Yes
	Haloperidol	[57, 59-61, 66]	--	Yes	Yes
	Loxapine	[57, 59, 61, 62]	--	Yes	Yes
	Pimozide	[59, 61, 62]	--	Yes	Yes
	Thiothixene	[59, 60, 62]	--	Yes	Yes
	Benperidol		--	Yes	Yes
	Chlorprothixene	[57]	--	Yes	Yes
	Clopentixol		--	Yes	Yes
	Cyamemazine		--	Yes	Yes
	Flupentixol		--	Yes	Yes
	Penfluridol		--	Yes	Yes
	Perazine		--	Yes	Yes
	Pericyazine	[56]	--	Yes	Yes
	Zuclopenthixol		--	Yes	Yes
Antidepressants	Mirtazapine	[56, 57, 59, 60]	--	No	n/a
	Clomipramine	[57, 59, 61, 62, 67]	7-9%	Yes	Yes
	Doxepin	[57-59, 61, 62, 64, 65]	--	Yes	Yes
	Imipramine	[57, 59, 61, 62, 64, 66, 67]	--	Yes	Yes
	Amitriptyline	[56-62, 64-67]	Frequency undefined	Yes	Yes
	Desipramine	[57, 59-62, 64]	--	Yes	Yes
	Nortriptyline	[57-62, 64, 65]	--	Yes	Yes
	Protriptyline	[59, 62, 66]	--	Yes	Yes
	Trimipramine	[57, 59, 61, 62, 67]	--	Yes	Yes
	Amozapine		--	No	n/a
	Butriptyline		--	No	n/a
	Dosulepin	[59, 66]	--	No	n/a
	Iprindole	[55]	--	No	n/a
	Lofepramine		--	No	n/a
	Opipramol	[59]	--	No	n/a
Amoxapine	[59, 61]	--	Yes	Yes	

Antiepileptics	Oxcarbazepine	[57, 59, 61, 62]	Frequency undefined	Yes	No
	Carbamazepine	[57, 59, 61, 62, 64]	--	Yes	No
	Lithium	[58, 59, 66]	Frequency undefined	Yes	No
Antiparkinsonism	Entacapone	[59, 60]	--	No	n/a
	Tolcapone		1%	No	n/a
	Bromocriptine	[59, 62]	Frequency undefined	No	n/a
Benzodiazapines [68]	Alprazolam	[57, 59, 61, 64]	>10%	Yes	Yes
	Chlordiazepoxide	[57, 59, 62, 64]	Frequency undefined	Yes	Yes
	Clonazepam	[57, 59, 62, 66]	Frequency undefined	Yes	Yes
	Clorazepate	[57, 59, 61]	Frequency undefined	Yes	Yes
	Diazepam	[57-59, 61, 62, 65, 66]	Frequency undefined	Yes	Yes
	Estazolam	[57, 59]	Frequency undefined	Yes	Yes
	Flurazepam	[57, 59]	Frequency undefined	Yes	Yes
	Halazepam	[68]	--	Yes	Yes
	Lorazepam	[57, 59]	Frequency undefined	Yes	Yes
	Oxazepam	[56, 57, 59]	Frequency undefined	Yes	Yes
	Quazepam	[68]	Frequency undefined	Yes	Yes
	Temazepam	[56-59, 62, 66]	Frequency undefined	Yes	Yes
	Triazolam	[57, 59, 62, 64]	<1%	Yes	Yes
	Bretazenil	[68]	--	Yes	Yes
	Bromazepam	[68]	Frequency undefined	Yes	Yes
	Camazepam	[68]	--	Yes	Yes
	Cinolazepam	[68]	--	Yes	Yes
	Clobazam	[68]	Frequency undefined	Yes	Yes
	Clotiazepam	[68]	--	Yes	Yes
	Cloxazolam	[68]	--	Yes	Yes
	Delorazepam	[68]	--	Yes	Yes
	Diclazepam	[68]	--	Yes	Yes
	Ethyl carfluzepate	[68]	--	Yes	Yes
Ethyl loflazepate	[68]	--	Yes	Yes	
Etizolam	[68]	--	Yes	Yes	
Flubromazepam	[68]	--	Yes	Yes	
Flunitrazepam	[68]	--	Yes	Yes	
Flutoprazepam	[68]	--	Yes	Yes	



	Ketazolam	[68]	--	Yes	Yes
	Loprazolam	[68]	--	Yes	Yes
	Lormetazepam	[68]	--	Yes	Yes
	Medazepam	[68]	--	Yes	Yes
	Midazolam	[59]	Frequency undefined	Yes	Yes
	Nimetzepam	[68]	--	Yes	Yes
	Nitrazepam	[68]	Frequency undefined	Yes	Yes
	Nordazepam	[68]	--	Yes	Yes
	Phenazepam	[68]	--	Yes	Yes
	Pinazepam	[68]	--	Yes	Yes
	Prazepam	[68]	--	Yes	Yes
	Premazepam	[68]	--	Yes	Yes
	Pyrazolam	[68]	--	Yes	Yes
	Tetrazeepam	[68]	--	Yes	Yes
	Clidinium- Chlordiazepoxide	[68]	--	Yes	Yes
Non-Benzodiazepine Hypnotics	Amobarbital		Frequency undefined	Yes	Yes
	Butobarbital		Frequency undefined	Yes	Yes
	Butalbital	[57]	--	Yes	Yes
	Mephobarbital		--	Yes	Yes
	Pentobarbital		Frequency undefined	Yes	Yes
	Secobarbital		Frequency undefined	Yes	Yes
	Aprobarbital		--	Yes	Yes
	Hexobarbital	[57]	--	Yes	Yes
	Benzazepam		--	Yes	Yes
	Brotizolam	[55]	--	Yes	Yes
	Deschloroetizolam		--	Yes	Yes
	Zaleplon	[57]	2-4%	Yes	Yes
	Zolpidem	[56, 57]	Frequency undefined	Yes	Yes
	Baclofen	[59, 60, 64]	<1%	Yes	Yes
	Chloral Hydrate		Frequency undefined	Yes	Yes
	Glutethimide		--	Yes	Yes
	Paraldehyde		Frequency undefined	Yes	Yes
	Zopiclone	[56]	Frequency undefined	Yes	Yes
	Eszopiclone		<1%	Yes	Yes
	Meprobamate	[57]	Frequency undefined	Yes	Yes
Phenobarbital	[57, 59]	--	Yes	Yes	
Opioid agonists [69]	Opium	[57]	--	Yes	Yes
	Tramadol	[56, 57, 59, 62, 64, 66]	<1%	Yes	Yes
	Codeine	[56, 57, 59, 61, 62, 64, 66]	Frequency undefined	Yes	Yes

	Hydrocodone	[57-59, 64]	Frequency undefined	Yes	Yes
	Methadone	[57, 59, 64]	Frequency undefined	Yes	Yes
	Morphine	[57, 59, 61, 62, 64]	Frequency undefined	Yes	Yes
	Oxycodone	[57, 59, 62, 64, 66]	Frequency undefined	Yes	Yes
	Oxymorphone	[69]	Frequency undefined	Yes	Yes
	Loperamide	[57, 59, 60, 62, 64, 66]	Frequency undefined	Yes	Yes
	Meperidine	[59, 61, 62]	Frequency undefined	Yes	Yes
	Propoxyphene	[57-59, 64, 65]	--	Yes	Yes
	Acetylmorphine	[69]	--	Yes	Yes
	Alphaprodine	[69]	--	Yes	Yes
	Anileridine	[69]	--	Yes	Yes
	Bromadol	[69]	--	Yes	Yes
	Carfentanil	[69]	--	Yes	Yes
	Desomorphine	[69]	--	Yes	Yes
	Dextropropoxyphene	[69]	--	Yes	Yes
	Diacetyldihydromorphine	[69]	--	Yes	Yes
	Diacetylmorphine	[69]	--	Yes	Yes
	Dibenzoylmorphine	[69]	--	Yes	Yes
	Dihydrocodeine	[69]	Frequency undefined	Yes	Yes
	Dihydromorphine	[69]	--	Yes	Yes
	Diphenoxylate	[57]	--	Yes	Yes
	Dipropanoylmorphine	[69]	--	Yes	Yes
	Ethymorphine	[69]	--	Yes	Yes
	Etonitazene	[69]	--	Yes	Yes
	Fentanyl	[57-59, 61, 62, 66]	Frequency undefined	Yes	Yes
	Hydromorphone	[69]	Frequency undefined	Yes	Yes
	Levorphanol	[69]	Frequency undefined	Yes	Yes
	Nicomorphine	[69]	--	Yes	Yes
	Pethidine	[61]	Frequency undefined	Yes	Yes
	Tapentadol	[69]	<1%	Yes	Yes
	Thebaine	[69]	--	Yes	Yes
	Papaverine	[57]	--	Yes	Yes
	Buprenorphine	[69]	<1%	Yes	Yes
	Pentazocine	[57]	Frequency undefined	Yes	Yes
Antihypertensives	Tizanidine	[59, 60]	Frequency undefined	No	n/a
Antiarrhythmic	Disopyramide	[57, 59, 61, 62, 67]	--	Yes	Yes

	Digoxin	[59, 61]	5%	Yes	No
Anticholinergics and/or Antihistaminics [70]	Dicyclomine	[57-62]	Frequency undefined	Yes	Yes
	Scopolamine (Hyoscine)	[59, 61, 62, 64]	Frequency undefined	Yes	Yes
	Trihexyphenidyl	[57, 59, 61, 62, 64, 65, 67]	Frequency undefined	Yes	Yes
	Glycopyrrolate	[70]	--	No	n/a
	Ipratropium	[56, 59, 65]	--	No	n/a
	Tiotropium	[56]	--	No	n/a
	Hyoscyamine	[57-62]	Frequency undefined	Yes	Yes
	Propantheline	[57, 59, 61, 62, 64, 65]	--	Yes	Yes
	Clidinium	[57, 59]	Frequency undefined	Yes	Yes
	Emepronium	[59, 65]	--	No	n/a
	Methscopolamine	[57]	Frequency undefined	No	n/a
	Procyclidine	[59, 61, 62]	Frequency undefined	No	n/a
	Propiverine	[59]	--	No	n/a
	Tropatepine	[59, 67]	--	No	n/a
	Benztropine	[57, 59- 62, 65]	Frequency undefined	Yes	Yes
	Clemastine	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Atropine	[58-62, 64, 66]	--	Yes	Yes
	Belladonna alkaloids	[57, 59, 61, 64, 67]	--	Yes	Yes
	Doxylamine	[57, 59]	Frequency undefined	Yes	Yes
	Hydroxyzine	[57, 59, 61, 62, 66, 67]	--	Yes	Yes
	Brompheniramine	[57, 59, 61, 62]	--	Yes	Yes
	Dimenhydrinate	[57, 59, 61, 62]	--	Yes	Yes
	Loratadine	[57, 59, 60, 64, 66]	<2%	No	n/a
	Tripelennamine	[57]	--	No	n/a
	Alimemazine	[59, 61, 67]	--	No	n/a
	Phenyltoloxamine	[57]	--	No	n/a
	Pyrilamine	[59, 61, 62]	--	No	n/a

	Cyproheptadine	[57, 59-62, 66]	Frequency undefined	Yes	Yes
	Dexbrompheniramine	[57]	--	Yes	Yes
	Dexchlorpheniramine	[57, 59, 66, 67]	--	Yes	Yes
	Triprolidine	[57]	Frequency undefined	Yes	Yes
	Azatadine	[57]	--	No	n/a
	Pheniramine	[57]	--	No	n/a
	Fesoterodine	[59]	Frequency undefined	Yes	Yes
	Benzhexol	[70]	Frequency undefined	No	n/a
	Darifenacin	[59, 61, 62]	Frequency undefined	Yes	Yes
	Flavoxate	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Homatropine	[59, 64]	Frequency undefined	No	n/a
	Oxybutynin	[56-62, 66, 67]	Frequency undefined	Yes	Yes
	Solifenacin	[59]	Frequency undefined	Yes	Yes
	Tolterodine	[56-62, 64, 66]	<1%	Yes	Yes
	Trospium	[59]	--	Yes	Yes
	Diphenhydramine	[57-62, 64]	--	Yes	Yes
	Carbinoxamine	[59, 61, 62]	Frequency undefined	Yes	Yes
	Desloratadine	[59]	--	No	n/a
	Fexofenadine	[59, 64, 66]	--	No	n/a
	Levocetirizine	[59]	--	No	n/a
	Cetirizine	[57, 59, 60, 64, 66]	--	No	n/a
	Chlorpheniramine	[57, 59-62, 64, 67]	--	Yes	Yes
	Cimetidine	[59-62]	--	Yes	Yes
	Famotidine	[59]	--	Yes	Yes
	Nizatidine	[59]	--	Yes	Yes
	Ranitidine	[58-60, 62, 64-66]	--	Yes	Yes
	Astemizole	[57]	--	No	n/a
	Ketotifen	[59]	Frequency undefined	No	n/a
Antiemetic	Meclizine	[57, 59-62]	Frequency undefined	Yes	Yes
	Levomepromazine	[59, 60, 62, 67]	Frequency undefined	No	n/a
	Properidol		--	No	n/a
	Droperidol		--	No	n/a

	Domperidone	[59, 66]	--	No	n/a
Muscle Relaxers	Orphenadrine	[57, 59, 61, 62, 65, 67]	Frequency undefined	Yes	Yes
	Carisoprodol	[57, 59, 60]	Frequency undefined	Yes	Yes
	Chlorzoxazone	[57]	Frequency undefined	Yes	Yes
	Cyclobenzaprine	[57, 59-62, 64]	1-3%	Yes	Yes
	Metaxalone	[57]	Frequency undefined	Yes	Yes
	Methocarbamol	[57, 59, 60, 64]	Frequency undefined	Yes	Yes
	Alverine	[59, 61]	--	No	n/a
	Camsoprodol		--	No	n/a
	Chlorphenasin		--	No	n/a
	Dantrolene		Frequency undefined	No	n/a
Others	Amantadine	[59-62]	Frequency undefined	No	n/a
	Theophylline	[59, 61, 62, 65-67]	--	Yes	Yes

**Table A6: Inclusion criteria for list of medications associated with Falls**

Major Medication Category	Medication Name	Literature search	Incidence for falls, falling, gait disturbance/instability, abnormalities in gait in LexiComp	Present on the AGS 2015 Beers List	If "Yes" did the rationale in the AGS 2015 Beers List mention the syndrome?
Antipsychotics [71]	Thiopropazine	[71]	--	Yes	Yes
	Timiperone	[71]	--	Yes	Yes
	Buspirone	[57]	--	Yes	Yes
	Aripiprazole	[59]	<1%	Yes	Yes
	Quetiapine (fumarate)	[57-61]	2%	Yes	Yes
	Asenapine	[59]	--	Yes	Yes
	Clozapine	[58-62]	--	Yes	Yes
	lloperidone	[59]	--	Yes	Yes
	Lurasidone	[71]	--	Yes	Yes

Olanzapine	[57-62]	Frequency undefined	Yes	Yes
Paliperidone	[59]	--	Yes	Yes
Risperidone	[56, 57, 59-61]	4%	Yes	Yes
Ziprasidone	[57, 59]	≥1%	Yes	Yes
Molindone	[59, 61, 62]	--	Yes	Yes
Amisulpride	[71]	--	Yes	Yes
Blonanserin	[71]	--	Yes	Yes
Clotapine	[71]	--	Yes	Yes
Melperone	[56]	--	Yes	Yes
Nemonapride	[71]	--	Yes	Yes
Remoxipride	[71]	--	Yes	Yes
Sertindole	[71]	--	Yes	Yes
Zotepine	[71]	--	Yes	Yes
Fluspirilene	[71]	--	Yes	Yes
Chlorpromazine	[57-62]	--	Yes	Yes
Fluphenazine	[57, 59, 60, 62]	--	Yes	Yes
Perphenazine	[57, 59-61]	--	Yes	Yes
Promazine	[59, 61]	--	Yes	Yes
Thioridazine	[56, 57, 59-62]	--	Yes	Yes
Trifluoperazine	[57, 59, 61]	--	Yes	Yes
Triflupromazine	[57]	--	Yes	Yes
Mesoridazine	[71]	--	Yes	Yes
Prochlorperazine	[57, 59, 60, 62]	--	Yes	Yes
Promethazine	[57, 59-62]	--	Yes	Yes
Acepromazine	[59]	--	Yes	Yes
Aceprometazine	[59]	--	Yes	Yes
Dixyrazine	[71]	--	Yes	Yes
Pipotiazine	[71]	--	Yes	Yes
Prothipendyl	[71]	--	Yes	Yes
Perphenazine-amitriptyline	[60]	--	Yes	Yes
Haloperidol	[57, 59-61]	--	Yes	Yes
Loxapine	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
Pimozide	[59, 61, 62]	--	Yes	Yes

	Thiothixene	[59, 60, 62]	--	Yes	Yes
	Benperidol	[71]	--	Yes	Yes
	Chlorprothixene	[57]	--	Yes	Yes
	Clopentixol	[71]	--	Yes	Yes
	Cyamemazine	[71]	--	Yes	Yes
	Flupentixol	[71]	--	Yes	Yes
	Penfluridol	[71]	--	Yes	Yes
	Perazine	[71]	--	Yes	Yes
	Pericyazine	[56]	--	Yes	Yes
	Zuclopenthixol	[71]	--	Yes	Yes
Antidepressants [71]	Bupropion	[59, 61]	--	Yes	Yes
	Mianserin	[56]	--	Yes	Yes
	Mirtazapine	[56-60]	--	Yes	Yes
	Duloxetine	[71]	<1%	Yes	Yes
	Venlafaxine	[57, 59]	<1%	Yes	Yes
	Fluoxetine	[57-59, 62]	Frequency undefined	Yes	Yes
	Sertraline	[57, 59]	Frequency undefined	Yes	Yes
	Citalopram	[56-59]	Frequency undefined	Yes	Yes
	Fluvoxamine	[59, 61, 62]	Frequency undefined	Yes	Yes
	Paroxetine	[57-62]	Frequency undefined	Yes	Yes
	Escitalopram	[57, 59]	<1%	Yes	Yes
	Nefazodone	[57, 59]	--	Yes	Yes
	Trazodone	[57, 59-61]	<1%	Yes	Yes
	Maprotiline	[59]	--	Yes	Yes
	Clomipramine	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Doxepin	[57-59, 61, 62]	Frequency undefined	Yes	Yes
	Imipramine	[57, 59-62]	Frequency undefined	Yes	Yes
	Amitriptyline	[56, 57, 59-62]	Frequency undefined	Yes	Yes
	Desipramine	[57, 59-62]	Frequency undefined	Yes	Yes
	Nortriptyline	[57-62]	Frequency undefined	Yes	Yes
	Protriptyline	[59, 62]	Frequency undefined	Yes	Yes
	Trimipramine	[57, 59, 61, 62]	Frequency undefined	Yes	Yes
	Amozapine	[71]	--	Yes	Yes
	Butriptyline	[71]	--	Yes	Yes
Dosulepin	[59]	--	Yes	Yes	
Iprindole	[71]	--	Yes	Yes	

	Lofepramine	[71]	--	Yes	Yes
	Opipramol	[59]	--	Yes	Yes
	Amoxapine	[59, 61]	Frequency undefined	Yes	Yes
Antiepileptics[71]	Sodium Valproate	[71]	--	No	n/a
	Oxcarbazepine	[57, 59, 61, 62]	4%	Yes	No
	Gabapentin	[56, 57]	2%	Yes	Yes
	Pregabalin	[71]	≤8%	Yes	Yes
	Topiramate	[71]	--	No	n/a
	Levetiracetam	[57]	1-10%	Yes	Yes
	Phenytoin	[57]	--	No	n/a
	Primidone	[57]	--	No	n/a
	Tiagabine	[57]	3-5%	Yes	Yes
	Vigabatrin	[71]	--	Yes	Yes
	Zonisamide	[71]	≥1%	Yes	Yes
	Beclamide	[71]	--	Yes	Yes
	Brivaracetam	[71]	--	Yes	Yes
	Eslicarbazepine acetate	[71]	3%	Yes	Yes
	Ethosuximide	[71]	--	Yes	Yes
	Ethotoin	[71]	--	Yes	Yes
	Fosphenytoin	[71]	--	Yes	Yes
	Mephenytoin	[71]	--	Yes	Yes
	Mesuximide	[71]	--	Yes	Yes
	Perampanel	[71]	4-16%	Yes	Yes
	Phenacemide	[71]	--	Yes	Yes
	Pheneturide	[71]	--	Yes	Yes
	Phensuximide	[71]	--	Yes	Yes
	Progabide	[71]	--	Yes	Yes
	Selectracetam	[71]	--	Yes	Yes
	Trimethadione	[71]	--	Yes	Yes
	Valproic Acid	[57, 59]	1-5%	Yes	Yes
	Valpromide	[71]	--	Yes	Yes
	Carbamazepine	[57, 59, 61, 62]	--	Yes	Yes
	Divalproex Sodium	[59]	1-5%	Yes	Yes
Lamotrigine	[57]	--	Yes	Yes	
Lithium	[58, 59]	--	Yes	Yes	
Ethadione	[71]	--	Yes	Yes	
Paramethadione	[71]	--	Yes	Yes	
Antiparkinsonism [72]	Entacapone	[59, 60]	--	No	n/a
	Levodopa / Carbidopa	[56, 59]	Frequency undefined	No	n/a
	Tolcapone	[72]	--	No	n/a
	Rotigotine	[72]	--	No	n/a
	Apomorphine	[72]	--	No	n/a
	Bromocriptine	[59, 62]	--	No	n/a



	Phenelzine	[57, 59, 62]	--	No	n/a
	Rasagiline	[72]	5%	No	n/a
	Tranylcypromine	[57]	--	No	n/a
	Isocarboxazid	[72]	--	No	n/a
	Selegiline	[56, 57, 59]	--	No	n/a
	Pramipexole	[57, 59]	4%	No	n/a
	Ropinirole	[57]	1-10%	No	n/a
Benzodiazapines	Alprazolam	[57, 59, 61]	Frequency undefined	Yes	Yes
	Chlordiazepoxide	[57, 59, 62]	Frequency undefined	Yes	Yes
	Clonazepam	[57, 59, 62]	Frequency undefined	Yes	Yes
	Clorazepate	[57, 59, 61]	Frequency undefined	Yes	Yes
	Diazepam	[57-59, 61, 62]	Frequency undefined	Yes	Yes
	Estazolam	[57, 59]	Frequency undefined	Yes	Yes
	Flurazepam	[57, 59]	Frequency undefined	Yes	Yes
	Halazepam	[71]	--	Yes	Yes
	Lorazepam	[59]	1%	Yes	Yes
	Oxazepam	[56, 57, 59]	Frequency undefined	Yes	Yes
	Quazepam	[71]	Frequency undefined	Yes	Yes
	Temazepam	[56-59, 62]	Frequency undefined	Yes	Yes
	Triazolam	[57, 59, 62]	Frequency undefined	Yes	Yes
	Bretazenil	[71]	--	Yes	Yes
	Bromazepam	[71]	Frequency undefined	Yes	Yes
	Camazepam	[71]	--	Yes	Yes
	Cinolazepam	[71]	--	Yes	Yes
	Clobazam	[71]	Frequency undefined	Yes	Yes
	Clotiazepam	[71]	Frequency undefined	Yes	Yes
	Cloxazolam	[71]	--	Yes	Yes
	Delorazepam	[71]	--	Yes	Yes
	Diclazepam	[71]	--	Yes	Yes
	Ethyl carfluzepate	[71]	--	Yes	Yes
	Ethyl loflazepate	[71]	--	Yes	Yes
	Etizolam	[71]	--	Yes	Yes
	Flubromazepam	[71]	--	Yes	Yes
	Flunitrazepam	[71]	--	Yes	Yes
Flutoprazepam	[71]	--	Yes	Yes	
Ketazolam	[71]	--	Yes	Yes	

	Loprazolam	[71]	--	Yes	Yes
	Lormetazepam	[71]	--	Yes	Yes
	Medazepam	[71]	--	Yes	Yes
	Midazolam	[59]	Frequency undefined	Yes	Yes
	Nimetzepam	[71]	--	Yes	Yes
	Nitrazepam	[71]	Frequency undefined	Yes	Yes
	Nordazepam	[71]	--	Yes	Yes
	Phenazepam	[71]	--	Yes	Yes
	Pinazepam	[71]	--	Yes	Yes
	Prazepam	[71]	--	Yes	Yes
	Premazepam	[71]	--	Yes	Yes
	Pyrazolam	[71]	--	Yes	Yes
	Tetrazepam	[71]	--	Yes	Yes
	Clidinium- Chlordiazepoxide	[71]	--	Yes	Yes
Non-Benzodiazepine Hypnotics	Amobarbital	[71]	--	Yes	Yes
	Butobarbital	[71]	--	Yes	Yes
	Butalbital	[57]	--	Yes	Yes
	Mephobarbital	[71]	--	Yes	Yes
	Pentobarbital	[71]	--	Yes	Yes
	Secobarbital	[71]	--	Yes	Yes
	Aprobarbital	[71]	--	Yes	Yes
	Hexobarbital	[57]	--	Yes	Yes
	Bentazepam	[71]	--	Yes	Yes
	Brotizolam	[71]	--	Yes	Yes
	Deschloroetizolam	[71]	--	Yes	Yes
	Zaleplon	[57]	Frequency undefined	Yes	Yes
	Zolpidem	[56, 57]	Frequency undefined	Yes	Yes
	Baclofen	[59, 60]	--	Yes	Yes
	Chloral Hydrate	[71]	Frequency undefined	Yes	Yes
	Glutethimide	[71]	--	Yes	Yes
	Paraldehyde	[71]	--	Yes	Yes
	Zopiclone	[56]	Frequency undefined	Yes	Yes
	Valnoctamide	[71]	--	Yes	Yes
	Eszopiclone	[71]	Frequency undefined	Yes	Yes
Meprobamate	[57]	--	Yes	Yes	
Phenobarbital	[57, 59]	--	Yes	Yes	
Opioid agonists [73]	Opium	[57]	--	Yes	Yes
	Tramadol	[56, 57, 59, 62]	<1%	Yes	Yes
	Codeine	[56, 57, 59, 61, 62]	--	Yes	Yes
	Hydrocodone	[57-59]	1-10%	Yes	Yes
	Methadone	[57, 59]	--	Yes	Yes

	Morphine	[57, 59, 61, 62]	1-10%	Yes	Yes
	Oxycodone	[57, 59, 62]	--	Yes	Yes
	Oxymorphone	[73]	--	Yes	Yes
	Loperamide	[57, 59, 60, 62]	--	Yes	Yes
	Meperidine	[59, 61, 62]	--	Yes	Yes
	Propoxyphene	[57-59]	--	Yes	Yes
	Acetylmorphine	[73]	--	Yes	Yes
	Alphaprodine	[73]	--	Yes	Yes
	Anileridine	[73]	--	Yes	Yes
	Bromadol	[73]	--	Yes	Yes
	Carfentanil	[73]	--	Yes	Yes
	Desomorphine	[73]	--	Yes	Yes
	Dextropropoxyphene	[73]	--	Yes	Yes
	Diacetyldihydromorphine	[73]	--	Yes	Yes
	Diacetylmorphine	[73]	--	Yes	Yes
	Dibenzoylmorphine	[73]	--	Yes	Yes
	Dihydrocodeine	[73]	--	Yes	Yes
	Dihydromorphine	[73]	--	Yes	Yes
	Diphenoxylate	[57]	--	Yes	Yes
	Dipropanoilmorphine	[73]	--	Yes	Yes
	Ethymorphine	[73]	--	Yes	Yes
	Etonitazene	[73]	--	Yes	Yes
	Fentanyl	[57-59, 61, 62]	1-10%	Yes	Yes
	Hydromorphone	[73]	Frequency undefined	Yes	Yes
	Levorphanol	[73]	--	Yes	Yes
	Nicomorphine	[73]	--	Yes	Yes
	Pethidine	[61]	--	Yes	Yes
	Tapentadol	[73]	--	Yes	Yes
	Thebaine	[73]	--	Yes	Yes
	Papaverine	[57]	--	Yes	Yes
	Buprenorphine	[73]	--	Yes	Yes
	Pentazocine	[57]	--	Yes	Yes
Non-Opioid/Non-Steroidal Anti-inflammatory and/or Analgesics	Dichloralphenazone	[57]	--	No	n/a
	Colchicine	[59, 61]	--	Yes	Yes
	Lumiracoxib	[59]	--	No	n/a
	Nefopam	[59]	--	No	n/a
	Ketorolac	[59]	--	Yes	No
	Celecoxib	[59]	--	No	n/a
Antihypertensives [73]	Spironolactone	[73]	--	Yes	No
	Idazoxan	[73]	--	No	n/a
	Phenoxybenzamine	[73]	--	No	n/a

Tolazoline	[73]	--	No	n/a
Yohimbine	[73]	--	No	n/a
Pseudoephedrine	[59]	--	Yes	Yes
Guanabenz	[57]	--	Yes	Yes
Atipamezole	[73]	--	No	n/a
Doxazosin	[57]	--	Yes	Yes
Prazosin	[57]	--	Yes	Yes
Terazosin	[57]	--	Yes	Yes
Alfuzosin	[73]	--	No	n/a
Silodosin	[73]	--	No	n/a
Tamsulosin	[56, 57]	--	No	n/a
Phentolamine	[73]	--	No	n/a
Carvedilol	[73]	--	No	n/a
Candesartan	[73]	--	No	n/a
Eprosartan	[73]	--	No	n/a
Irbesartan	[73]	--	No	n/a
Olmesartan	[73]	--	No	n/a
Telmisartan	[73]	--	No	n/a
Valsartan	[73]	--	No	n/a
Losartan	[73]	--	No	n/a
Benzaepril	[59]	--	No	n/a
Enalapril	[73]	--	No	n/a
Fosinopril	[73]	--	No	n/a
Quinapril	[73]	--	No	n/a
Ramipril	[73]	--	No	n/a
Trandolapril	[59]	--	No	n/a
Captopril	[59, 61]	--	No	n/a
Lisinopril	[73]	--	No	n/a
Moexipril	[73]	--	No	n/a
Perindopril	[73]	Frequency undefined	No	n/a
Guanethidine	[57]	--	No	n/a
Hydralazine	[59, 61]	--	No	n/a
Minoxidil	[73]	--	No	n/a
Sotalol	[73]	--	No	n/a
Acebutolol	[73]	--	No	n/a
Atenolol	[59, 61]	--	No	n/a
Betaxolol	[59]	--	No	n/a
Bisoprolol	[73]	--	No	n/a
Bucindolol	[73]	--	No	n/a
Carteolol	[73]	--	No	n/a
Esmolol	[73]	--	No	n/a
Labetalol	[73]	--	No	n/a
Metoprolol	[59, 61]	--	No	n/a
Nadolol	[73]	--	No	n/a
Nebivolol	[73]	--	No	n/a
Penbutolol	[73]	--	No	n/a

Pindolol	[73]	--	No	n/a
Propranolol	[73]	--	No	n/a
Timolol	[73]	--	No	n/a
Diltiazem	[59]	--	Yes	No
Verapamil	[73]	--	Yes	No
Aranidipine	[73]	--	No	n/a
Azelnidipine	[73]	--	No	n/a
Benidipine	[73]	--	No	n/a
Clevidipine	[73]	--	No	n/a
Efonidipine	[73]	--	No	n/a
Fendiline	[73]	--	No	n/a
Gallopamil	[73]	--	No	n/a
Lacidipine	[73]	--	No	n/a
Lercanidipine	[73]	--	No	n/a
Manidipine	[73]	--	No	n/a
Nilvadipine	[73]	--	No	n/a
Nitrendipine	[73]	--	No	n/a
Pranidipine	[73]	--	No	n/a
Tizanidine	[59, 60]	--	No	n/a
Clonidine	[57]	--	Yes	Yes
Methyldopa	[57]	--	Yes	Yes
Guanfacine	[57]	--	Yes	Yes
Felodipine	[73]	--	No	n/a
Nifedipine	[59, 61]	--	Yes	Yes
Amlodipine	[73]	--	No	n/a
Isradipine	[73]	--	No	n/a
Nicardipine	[73]	--	No	n/a
Nimodipine	[73]	--	No	n/a
Nisoldipine	[73]	--	No	n/a
Bumetanide	[73]	--	No	n/a
Ethacrynic acid	[73]	--	No	n/a
Furosemide	[59, 61]	--	No	n/a
Torsemide	[73]	--	No	n/a
Isosorbide Dinitrate	[59, 61]	--	No	n/a
Isosorbide Mononitrate	[59, 61]	--	No	n/a
Nitroglycerin	[73]	--	No	n/a
Triamterene	[59, 61]	--	Yes	No
Eplerenone	[73]	--	No	n/a
Amiloride	[73]	--	Yes	No
Chlorothiazide	[73]	--	No	n/a
Hydrochlorothiazide	[73]	--	No	n/a
Polythiazide	[73]	--	No	n/a
Chlorthalidone	[59, 61]	--	No	n/a
Indapamide	[73]	--	No	n/a
Metolazone	[73]	--	No	n/a
Reserpine	[57]	--	Yes	Yes

Antiarrhythmic	Disopyramide	[57, 59, 61, 62]	--	Yes	Yes
	Quinidine	[59, 61]	--	No	n/a
	Digoxin	[59, 61]	--	Yes	No
Antidiabetics [74]	Nateglinide	[74]	--	No	n/a
	Repaglinide	[74]	--	No	n/a
	Exenatide	[74]	--	No	n/a
	Liraglutide	[74]	--	No	n/a
	Lixisenatide	[74]	--	No	n/a
	Insulin	[74]	--	Yes	Yes
	NPH	[74]	--	Yes	Yes
	Aspart	[74]	--	Yes	Yes
	Detemir Insulin	[74]	--	Yes	Yes
	Glargine Insulin	[74]	--	Yes	Yes
	Glusine	[74]	--	Yes	Yes
	Lispro	[74]	--	Yes	Yes
	Glyburide	[74]	--	Yes	Yes
	Acetohexamide	[74]	--	No	n/a
	Chlorpropamide	[74]	--	Yes	Yes
	Gliclazide	[74]	--	No	n/a
	Glimepiride	[74]	--	No	n/a
	Glipizide	[74]	<1%	No	n/a
	Gliquidone	[74]	--	No	n/a
	Glycopyramide	[74]	--	No	n/a
Tolazamide	[74]	--	No	n/a	
Tolbutamide	[74]	--	No	n/a	
Anticholinergics and/or Antihistaminics [75]	Dicyclomine	[57-62]	--	Yes	Yes
	Scopolamine (Hyoscine)	[59, 61, 62]	--	Yes	Yes
	Trihexyphenidyl	[57, 59, 61, 62]	--	Yes	Yes
	Glycopyrrolate	[75]	--	No	n/a
	Ipratropium	[56, 59]	--	No	n/a
	Tiotropium	[56]	--	No	n/a
	Hyoscyamine	[57-62]	--	Yes	Yes
	Propantheline	[57, 59, 61, 62]	--	Yes	Yes
	Clidinium	[57, 59]	--	Yes	Yes
	Emepronium	[59]	--	No	n/a
	Methscopolamine	[57, 59]	--	No	n/a
	Procyclidine	[59, 61, 62]	--	No	n/a
	Propiverine	[59]	--	No	n/a
	Tropatepine	[59]	--	No	n/a
	Benztrapine	[57, 59-62]	--	Yes	Yes

	Clemastine	[57, 59, 61, 62]	--	Yes	Yes
	Atropine	[58-62]	--	Yes	Yes
	Belladonna alkaloids	[57, 59, 61]	--	Yes	Yes
	Doxylamine	[57, 59]	--	Yes	Yes
	Hydroxyzine	[57, 59, 61, 62]	--	Yes	Yes
	Brompheniramine	[57, 59, 61, 62]	--	Yes	Yes
	Dimenhydrinate	[57, 59, 61, 62]	--	Yes	Yes
	Loratadine	[57, 59, 60]	--	No	n/a
	Tripelennamine	[57, 59]	--	No	n/a
	Alimemazine	[59, 61]	--	No	n/a
	Phenyltoloxamine	[57, 59]	--	No	n/a
	Pyrilamine	[59, 61, 62]	--	No	n/a
	Cyproheptadine	[57, 59-62]	--	Yes	Yes
	Dexbrompheniramine	[57]	--	Yes	Yes
	Dexchlorpheniramine	[57, 59]	--	Yes	Yes
	Tripolidine	[57]	--	Yes	Yes
	Azatadine	[57]	--	No	n/a
	Pheniramine	[57]	--	No	n/a
	Fesoterodine	[59]	--	Yes	Yes
	Benzhexol	[75]	--	No	n/a
	Darifenacin	[59, 61, 62]	--	Yes	Yes
	Flavoxate	[57, 59, 61, 62]	--	No	n/a
	Homatropine	[59]	--	No	n/a
	Oxybutynin	[56-62]	1-5%	Yes	Yes
	Solifenacin	[59]	--	Yes	Yes
	Tolterodine	[56-62]	--	Yes	Yes
	Trospium	[59]	--	Yes	Yes
	Diphenhydramine	[57-62]	--	Yes	Yes
	Carbinoxamine	[59, 61, 62]	--	Yes	Yes
	Desloratadine	[59]	--	No	n/a
	Fexofenadine	[59]	--	No	n/a
	Levocetirizine	[59]	--	No	n/a
	Cetirizine	[57, 59, 60]	--	No	n/a

	Chlorpheniramine	[57, 59-62]	--	Yes	Yes
	Cimetidine	[59-62]	--	Yes	Yes
	Famotidine	[59]	--	Yes	Yes
	Nizatidine	[59]	--	Yes	Yes
	Ranitidine	[58-60, 62]	--	Yes	Yes
	Astemizole	[57]	--	No	n/a
	Ketotifen	[59]	--	No	n/a
Antiemetic	Meclizine	[57, 59-62]	--	Yes	Yes
	Levomopromazine	[59, 60, 62]	--	No	n/a
	Trimethobenzamide	[57]	--	No	n/a
	Prochlorperazine	[72]	--	No	n/a
	Droperidol	[72]	--	No	n/a
	Metoclopramide	[57, 59]	--	Yes	Yes
	Domperidone	[59]	--	No	n/a
Hormone Replacement	Cortisone	[59]	--	Yes	No
	Dexamethasone	[59]	--	Yes	No
	Hydrocortisone	[59, 61]	--	Yes	No
	Methylprednisolone	[59]	--	Yes	No
	Prednisolone	[59]	--	Yes	No
	Fluticasone-salmeterol	[59]	--	Yes	No
Muscle Relaxers [76]	Orphenadrine	[57, 59, 61, 62]	--	Yes	Yes
	Carisoprodol	[57, 59, 60]	--	Yes	Yes
	Chlorzoxazone	[57]	--	Yes	Yes
	Cyclobenzaprine	[57, 59-62]	--	Yes	Yes
	Metaxalone	[57]	--	Yes	Yes
	Methocarbamol	[57, 59, 60]	--	Yes	Yes
	Alverine	[59, 61]	--	No	n/a
	Camsoprodol	[76]	--	No	n/a
	Chlorphenasin	[76]	--	No	n/a
	Pancuronium	[59]	--	No	n/a
	Dantrolene	[76]	--	No	n/a
Immunosuppressants	Cyclosporine	[59]	--	No	n/a
	Methotrexate	[59]	--	No	n/a
	Azathioprine	[59]	--	No	n/a
Non-Opioid Cough Suppressant & Expectorant	Guaifenesin	[59]	--	No	n/a
	Benzonatate	[57]	--	No	n/a
	Dextromethorphan	[57, 59]	--	No	n/a
Antimicrobial	Gentamicin	[59]	Frequency undefined	No	n/a



	Cycloserine	[59]	--	No	n/a
	Cefamandole	[59]	--	No	n/a
	Cefoxitin	[59]	--	No	n/a
	Cephalothin	[59]	--	No	n/a
	Vancomycin	[59]	--	No	n/a
	Clindamycin	[59]	--	No	n/a
	Ampicillin	[59]	--	No	n/a
	Piperacillin	[59]	--	No	n/a
Others	Tyrosine Hydroxylase	[72]	--	No	n/a
	Amantadine	[59-62]	<1%	No	n/a
	Theophylline	[59, 61, 62]	Frequency undefined	Yes	Yes
	Dipyridamole	[59, 61]	Frequency undefined	Yes	Yes
	Naratriptan	[59]	Frequency undefined	No	n/a
	Sumatriptan	[59]	Frequency undefined	No	n/a
	Zolmitriptan	[59]	Frequency undefined	No	n/a
	Bisacodyl	[59]	Frequency undefined	No	n/a
	Warfarin	[59, 61]	Frequency undefined	Yes	No

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