

Table 9.1 Medications Used to Treat Spasticity and Muscle Spasm

Medication	Indications	Dosing	Side effects affecting rehabilitation	Other side effects or considerations
Baclofen (Lioresal)	Spasticity	Adults: 5 mg 3 times/day; titrate by 5 mg/day every 3 days to maximum dose of 80 mg/day. Children ages 2-7 yr: 10-15 mg/day in 3 divided doses; titrate by 1-15 mg/day every 3 days to maximum dose of 40 mg/day. Children ages 8 yr and older: Same dose as for ages 2-7; maximum dose of 60 mg daily.	Cog: ++ S: +++ A: ++ Motor: +++ D: ++ Com: ++ F: +++	Oral: Initial sedation, muscle weakness, ataxia, orthostatic hypotension, fatigue, headache, nausea, dizziness; confusion and hallucinations reported in elderly or those with history of stroke. Intrathecal: Chronic constipation, hypotonia, somnolence, headache, vomiting, paresthesias. Eliminated by the kidneys; reduce dose with renal dysfunction. Abrupt discontinuance results in rebound increase in spasticity, rhabdomyolysis, disorientation, hallucination, and seizures.
Diazepam (Valium)	Spasticity or muscle spasm	Adults: 2-10 mg 2-4 times/day. Children: 0.12-0.8 mg/kg/day in 3-4 divided doses.	Cog: +++ S: +++ A: ++ Motor: +++ D: +++ Com: ++ F: +++	Sedation, impaired memory, decreased attention, ataxia, weakness, constipation, urinary retention, worsened depression, impaired cognition, tolerance, dependence, withdrawal symptoms of anxiety, agitation, restlessness, irritability, tremor, nausea, hyperpyrexia, seizures. Enhances the effects of other CNS depressants, including alcohol. May block the action of levodopa. Cimetidine, disulfiram, omeprazole, isoniazid, oxcarbazepine, ticlopidine, topiramate, ketoconazole, itraconazole, probenecid, fluoxetine, fluvoxamine, erythromycin, propranolol, imipramine, ciprofloxacin, and valproic acid prolong action by inhibiting elimination of diazepam. Rifampin, phenytoin, phenobarbital, St. John's wort, carbamazepine, and dexamethasone decrease levels and effects.
Dantrolene (Dantrium)	Spasticity	Adults: Start at 25 mg/day and increase to 2-4 times/day, then increase by 25 mg every 4-7 days to maximum dose of 400 mg/day. Children: 0.5 mg/kg twice/day, then increase to 3-4 times/day after 4-7 d.	Cog: ++ S: +++ A: ++ Motor: +++ D: +++ Com: ++ F: +++	Drowsiness, dizziness, nausea, diarrhea, dysphagia. Dose-limiting hepatotoxicity; test baseline liver function and monitor throughout therapy. Hyperkalemia when combined with verapamil, increased risk for hepatotoxicity when combined with estrogens, and increased CNS depression when combined with other CNS depressants. Avoid combining with MAOI.
Clonidine (Catapres)	Spasticity	Adults Oral: 0.1 mg twice/day. Patch: 0.1-0.3 mg once/day. Children: 5-10 µg/kg	Cog: + S: +++ A: 0 Motor: + D: +	Hypotension, dizziness, sedation, gastrointestinal upset. Gradually taper off when discontinuing therapy to avoid rebound effects. Additive sedation occurs when used with other CNS

From L. Carl, J. Gallo, and P. Johnson, 2014, *Practical Pharmacology in Rehabilitation: Effect of Medication on Therapy* (Champaign, IL: Human Kinetics).

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		daily in 2-3 divided doses.	Com: + F: ++	depressants. May be administered as an epidural injection, a daily patch, or orally.
Tizanidine (Zanaflex)	Spasticity	Adults: Start at 4 mg and increase by 2-4 mg to a maximum dose 36 mg/day in 3-4 divided doses. Children: Not established.	Cog: ++ S: +++ A: 0 Motor: + D: ++ Com: ++ F: +++	Sedation, hypotension, dizziness, gastrointestinal upset. Starting with a very low dose and titrating slowly may reduce or eliminate side effects such as sedation, xerostomia, and dizziness. Monitor liver-function tests. Schedule therapy for 2 h after the dose, when peak effects are seen with this medication.
Botulinum toxin (Botox, Myobloc)	Focal spasticity	Adults: Dosing is based on units/kg. Maximum dose for a large muscle is 3-6 units/kg and maximum dose for a small muscle is 1-2 units/kg. Maximum dose per injection site is 50 units. Children: Not established.	Cog: 0 S: 0 A: 0 Motor: ++ D: ++ Com: 0 F: ++	Pain on injection, muscle soreness, bruising, excessive weakness in injected and adjacent muscles, rash, fever, possible changes in gait.
Gabapentin (Neurontin)	Spasticity	Adults: Start at 300 mg (day 1), 300 mg twice/day (day 2), and 300 mg 3 times/day (day 3), then increase by 300 mg/day every 7 days to maximum dose of 1800 mg/day. Children: Start at 10-15 mg/kg/day in 3 divided doses, then titrate to 25-35 mg/kg/day to maximum dose of 40 mg/kg/day.	Cog: ++ S: +++ A: ++ Motor: +++ D: 0 Com: ++ F: +++	Sedation, fatigue, dizziness, ataxia, peripheral edema. No known drug interactions. Adjust dose for renal insufficiency.
Phenol injection	Focal spasticity	Adults: Inject 2-3 ml of 5% solution at each site. Children: Not established.	Cog: 0 S: 0 A: 0 Motor: ++ D: 0 Com: + F: ++	Peripheral edema, wound infection, skin sloughing, pain, chronic dysesthesias. No known drug interactions.
Carisoprodol (Soma)	Muscle spasm	Adults and adolescents: 250-350 mg 3 times/day and at bedtime. Children <12: Not recommended.	Cog: ++ S: +++ A: 0 Motor: +++ D: ++ Com: ++ F: ++	Headaches, dizziness, drowsiness, facial flushing, insomnia, coordination problems. Abuse potential. Potentiates effects of opiates, allowing reduction in opiate dosage. Metabolized by CYP2C19 to meprobamate.
Chlorzoxazone (Parafon Forte)	Muscle spasm	Adults: 500 mg 3 times/day; may	Cog: ++ S: ++	Stomach upset, drowsiness, dizziness, lightheadedness, weakness, hepatotoxicity.

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Medication	Indications	Dosing	Side effects affecting rehabilitation	Other side effects or considerations
		increase to 750 mg 3 times/day. Children: Not established.	A: 0 Motor: ++ D: ++ Com: ++ F: ++	Additive hepatotoxicity when used with acetaminophen (Tylenol).
Cyclobenzaprine (Flexeril)	Muscle spasm	Adults: 10 mg 2-4 times/day. Maximum dose of 60 mg/day. Long-acting product: 15 and 30 mg once/day. Children: Not established.	Cog: ++++ S: ++++ A: 0 Motor: +++ D: ++ Com: ++ F: ++++	Somnolence, confusion, dizziness, paresthesias, seizures, arrhythmias. Avoid using with MAOI, SSRI, guanethidine, and other CNS depressants. Chemical structure like that of tricyclic antidepressants. Limit use to no more than 3 wk.
Metaxalone (Skelaxin)	Muscle spasm	Adults: 800 mg 3-4 times/day. Children: Not established.	Cog: ++ S: ++ A: ++ Motor: ++ D: ++ Com: ++ F: ++	Nausea, vomiting, headache, irritability. CYP450 enzyme metabolism and drug interactions.
Methocarbamol (Robaxin, Skelex)	Muscle spasm	Adults: 500-750 mg 4 times/day. Children: Not established.	Cog: ++++ S: ++++ A: ++ Motor: +++ D: ++ Com: ++ F: +++	Somnolence, dizziness, vertigo, syncope, muscular incoordination, stomach upset, flushing, blurred vision, fever, skin rash, pruritus, bradycardia, jaundice, mood changes, slow heart rate, fainting, clumsiness, difficulty urinating. Additive sedation when taken with other CNS depressants. Metabolized by demethylation, so no significant drug interactions exist. May cause discoloration of urine (black, blue, or green).
Orphenadrine citrate (Norflex)	Muscle spasm	Adults: 100 mg twice/day (sustained release) or 60-100 mg 3 times/day. Children: Not established.	Cog: ++ S: +++ A: ++ Motor: ++ D: ++ Com: ++ F: ++++	Dry mouth, dizziness, drowsiness, restlessness, insomnia, constipation, urine retention, orthostatic hypotension, euphoria. Anticholinergic agent closely related to diphenhydramine (Benadryl). Avoid combining with other anticholinergic agents.

Cog = cognition; S = sedation; A = agitation or mania; Motor = discoordination; D = dysphagia; Com = communication; F = falls; CNS = central nervous system; MAOI = monoamine oxidase inhibitor; SSRI = selective serotonin reuptake inhibitor. The likelihood rating scale for encountering the side effects is as follows: 0 = Almost no probability of encountering side effects. + = Little likelihood of encountering side effects. +/++ = Low probability of encountering side effects; however, probability increases with increased dosage. ++ = Medium likelihood of encountering side effects. +++ = High likelihood of encountering side effects, particularly with high doses. ++++ = Highest likelihood of encountering side effects; best to avoid in at-risk patients.