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| Medication | Geriatric Dosing | Clinical Pearls & Other Dosing Adjustments |
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| Antimuscarinic Agents (in alphabetical order) | | |
| Darifenacin ER tablet (Enablex) | Initial 7.5 mg daily, may increase to 15 mg daily (same as adult dosing) | - ER formulation; do not chew, divide, or crush<br>- No renal dosing adjustment necessary<br>- Adjust dose for: concomitant potent CYP3A4 inhibitors, hepatic impairment<br>- Use not recommended in severe hepatic impairment (Child-Pugh Class C) |
| Fesoterodine ER tablet (Toviaz) | Initial 4 mg daily, may increase to 8 mg daily | - ER formulation; do not chew, divide, or crush<br>- Prodrug metabolized to tolterodine<br>- Adjust dose for: concomitant potent CYP3A4 inhibitors, renal impairment (max 4 mg if CrCl < 30 mL/min)<br>- Use not recommended in severe hepatic impairment |
| Oxybutynin (information on this line applies to all formulations of oxybutynin) | See individual formulations below | - No renal or hepatic dosing adjustments necessary (has not been studied): use with caution<br>- Minor substrate of CYP3A4 |
| Oxybutynin IR tablet (Ditropan) | 2.5 mg 2-3 times daily; increase cautiously to max 5 mg four times daily | High doses should be avoided in older adults; even low doses are concerning for use in older adults with cognitive impairment |
| Oxybutynin ER tablet (Ditropan XL) | 5-10 mg daily, adjust by 5 mg increments every 1- ≥ 2 weeks up to 30 mg daily | Lower rates of dry mouth (61%), dizziness (6%), and constipation (13%) vs. oxybutynin IR |
| Oxybutynin transdermal gel 10% (100 mg/g) (Gelnique) | 1 sachet or 1 pump applied daily | - Apply to dry, intact skin<br>- Rotate application sites (abdomen, thigh, shoulder, upper arm)<br>- Application site reactions are more common (up to 14%) than dry mouth (10%) and constipation (1%) |
| Oxybutynin transdermal patch (Oxytrol, Oxytrol for Women [OTC]) | Apply one 3.9 mg/day patch twice weekly (every 3-4 days) | - Over the counter for women ≥ 18 years old<br>- Rotate application sites (abdomen, hip, buttock)<br>- Application site reactions are more common (up to 17%) than dry mouth (7%) and constipation (3%) |
| Solifenacin IR tablet (VESIcare) | 5 mg daily, may increase to 10 mg daily | - Dose-related QT prolongation risk<br>- Adjust dose for: concomitant potent CYP3A4 inhibitors, hepatic impairment (max 5 mg if Child-Pugh B), renal impairment (max 5 mg if CrCl < 30 mL/min) |

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| | | - Use not recommended in severe hepatic impairment |
| Tolterodine IR tablet (Detrol) | 2 mg twice daily; may be lowered to 1 mg twice daily | - Dose-related QT prolongation risk: increased risk in CYP2D6 poor metabolizers or with concomitant CYP3A4 or CYP2D6 inhibitor use (same as ER formulation)<br>- Adjust dose for: concomitant potent CYP3A4 inhibitors, renal impairment (1 mg twice daily if CrCl 10-30 mL/min, different than ER formulation), hepatic impairment (max 1 mg twice daily) |
| Tolterodine ER capsule (Detrol LA) | 4 mg daily; may be lowered to 2 mg daily | - Dose-related QT prolongation risk, as described above<br>- Adjust dose for: hepatic impairment (2 mg daily for Child-Pugh A, B), renal impairment (2 mg daily if CrCl 10-30 mL/min), concomitant potent CYP3A4 inhibitors<br>- Use not recommended in severe hepatic impairment<br>- Use not recommended if CrCl < 10 mL/min |
| Trospium (information on this line applies to all formulations of trospium) | See individual formulations below | - Undergoes minimal hepatic metabolism, independent of the main CYP450 pathways<br>- Use caution with other medications that are eliminated by active tubular secretion<br>- Lowest risk of drug-drug interactions as compared to other antimuscarinics<br>- Food decreases bioavailability by 70-80%; take on an empty stomach |
| Trospium IR tablet (Sanctura) | 20 mg twice daily (same as adult dosing, but recommended to consider initial dose of 20 mg daily in adults ≥ 75 years) | - Use 20 mg daily at bedtime if CrCl < 30mL/min (different than ER formulation) |
| Trospium ER capsule (Sanctura XR) | 60 mg daily in the morning | - Ethanol may increase peak serum concentration; avoid consuming alcohol within 2 hours of taking trospium ER<br>- Use not recommended if CrCl < 30mL/min |
| Beta-3-Agonists | | |
| Mirabegron (Myrbetriq) | 25 mg daily, then 50 mg daily after 4-8 weeks | - Avoid use in patients with uncontrolled hypertension (SBP ≥ 180 and/or DBP ≥ 110 mmHg)<br>- Dose-related QT prolongation risk<br>- Moderate inhibitor of CYP2D6<br>- Adjust dose for: hepatic impairment (max 25 mg if Child-Pugh B), renal impairment (25 mg max if eGFR 15-30 mL/min/1.73m$^2$)<br>- Use not recommended in severe hepatic impairment |

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| | | - Use not recommended if eGFR < 15 mL/min/1.73m$^2$ |
| Vibegron (Gemtesa) | 75 mg daily | - Tablets may be crushed and mixed with applesauce<br>- No dose adjustments necessary for mild-severe renal impairment or mild-moderate hepatic impairment<br>- Use not recommended in severe hepatic impairment<br>- Use not recommended if eGFR < 15 mL/min/1.73m$^2$ |
| Medications for CKD-MBD | | |
| Phosphate Binders | | |
| Calcium acetate (PhosLo) | 1334-2001 with each meal (three times daily) | - Hypercalcemia and gastrointestinal side effects most common (nausea, vomiting, diarrhea)<br>- Requires vitamin D to be absorbed |
| Calcium carbonate (Tums) | 500 mg with each meal (three times daily) | - Off-label use<br>- Adjust dose every 2-3 weeks based on phosphate concentration<br>- Do not exceed 3750 mg/day |
| Aluminum hydroxide | 300-600 mg three times daily | - Short-term use only (≤ 4 weeks)<br>- Aluminum toxicity associated with long-term use |
| Lanthanum (Fosrenal) | 1500-3000 mg in three divided doses | - Adjust by 250-500 mg at 2-3 week intervals as needed to obtain phosphorus concentrations<br>- Associated with bowl obstruction (contraindicated) |
| Sevelamer carbonate (Renvela) | Based on phosphorus levels:<br>5.5-7.5 = 800 mg three times a day<br>7.5-9 = 1200-1600 mg three times a day<br>≥ 9 = 1600 mg three times a day | - Take with meals<br>- Adjust dose by 400-800 mg per meal at 2-3 week intervals to target phosphorus levels<br>- Sevelamer hydrochloride (Renagel) associated with metabolic acidosis and is no longer preferred |
| Vitamin D Analogs | | |
| Calcifediol (Rayaldee) | 30 mcg daily at bedtime, may increase to 60 mcg after 3 months | - Corrected calcium should be < 9.8 mg/dL before initiating therapy<br>- Target 25-OH vitamin D 30-100 ng/mL, serum calcium < 9.8 mg/dL, phosphorus < 5.5 mg/dL |
| Calcitriol (Rocaltrol) | 0.25 mcg daily, may increase 0.5 mcg/day | - Different dosing for patients on dialysis<br>- IV formulation available |
| Doxercalciferol (Hectorol) | 1 mcg daily; titrate by 0.5 mcg/dose at 2-week intervals to target PTH level, max 3.5 mcg | - Different dosing for patients on dialysis<br>- IV formulation available |
| Paracalcitol (Zemplar) | iPTH ≤ 500 pg/mL = 1 mcg daily or 2 mcg three times a week | - Dose dependent on iPTH levels and adjusted every 2-4 weeks |

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| | iPTH > 500 pg/mL = 2 mcg daily or 4 mcg three times a week | |
| Calcimimetics | | |
| Cinacalcet (Sensipar) | 30 mg daily, increase dose in 30 mg/day increments every 2-4 weeks up to 180 mg daily | - For patients with hyperparathyroidism, secondary to dialysis-dependent CKD<br>- Dose adjustments to maintain target PTH concentrations<br>- No recommendations for patients with moderate to severe hepatic impairment |