Geriatric Prescribing in the Emergency Patient

The intent of this flipchart is as a quick resource for appropriate medication management of common geriatric conditions.

Medications and doses listed are intended for more urgent and acute treatment and not necessarily for long-term use.

Created by the Department of Pharmacy, Peace Arch Hospital

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IS DRUG WITHDRAWAL CAUSING ANXIETY?
- May manifest as insomnia, agitation, headache, myalgia or other pain, dizziness, nausea, vomiting
- Often onset of withdrawal is 24-48 hours after large dosage decrease or abrupt discontinuation of medication

MEDICATION WHICH MAY CAUSE ANXIETY SYMPTOMS UPON WITHDRAWAL:
- Anticholinergics
- SSRIs (citalopram, paroxetine, sertraline, etc.)
- TCAs (amitriptyline, nortriptyline, imipramine, doxepin, etc.)
- Trazodone (particularly higher doses)
- Alcohol
- Hypnotics (less frequently with zopiclone, zolpidem)
- Benzodiazepines
- Opioids

IS A NEW MEDICATION OR DOSE CHANGE CONTRIBUTING TO ANXIETY?
Medication-related anxiety is often dose-related
Medications associated with causing anxiety: (bolded = more common)
- Carbamazepine
- Digoxin (toxicity)
- Felodipine
- Isoniazid
- Levodopa (Sinemet®, Prolopa® and other dopamine agonists) – related to resurgence of symptoms
- Levothyroxine (if dose too high)
- Methylphenidate (Ritalin®), pseudoephedrine, caffeine
- NSAIDs
- Prednisone
- Quinolones (such as ciprofloxacin, moxifloxacin, levofloxacin)
- Salbutamol (and salmeterol, formoterol (Berotec®) and terbutaline)
- SSRIs – particularly fluoxetine (Prozac®)
- Theophylline

SHORT-TERM ACUTE MANAGEMENT:
- Maximize use of non-pharmacological approaches
- Elderly can be very sensitive to effects of benzodiazepines
- Consider remote and recent past use of benzodiazepines for both benefit and side effect history
- Clonazepam 0.25 mg up to maximum BID PRN
- Lorazepam 0.5 mg po up to maximum BID PRN

DO NOT USE:
- Diazepam
- Chlordiazepoxide
- Flurazepam
- Alprazolam (Xanax®)
- Buspirone (Buspar®)
DELIRIUM - CAUSES

- In elderly patients, it is important to search out and remove the potential causes of delirium.
- Confusion in elderly is often delirium, but mislabeled as dementia.

PRISM-E:
PRISM-E is an acronym that can assist the clinician in identifying and relieving all the underlying factors that contribute to the onset and perpetuation of delirium.

<table>
<thead>
<tr>
<th>P</th>
<th>• PAIN</th>
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</table>
| R | • RESTRAINT  
  • RETENTION |
| I | • INFECTION |
| S | • SENSORY IMPAIRMENT  
  • SLEEPLESSNESS |
| M | • MEDICATION (new, withdrawal or change in dose)  
  • METABOLIC |
| E | • ENVIRONMENT  
  • EMOTIONS |

MEDICATIONS ASSOCIATED WITH DELIRIUM:
- Often dose related
- Includes non-prescription as well as prescription medications
- Consider with any medication change (not just listed below)

- Alcohol
- Anticonvulsants (such as phenytoin, carbamazepine, gabapentin)
- Anticholinergics (such as benztropine, scopolamine)
- Antidepressants (including SSRIs and particularly TCAs such as amitriptyline)
- Antiemetics (such as dimenhydrinate (Gravol®), meclizine)
- Antihistamines sedating – (such as chlorpheniramine (Chlortripolon®), diphenhydramine (Benadryl®))
- Antiparkinsonian Meds which contain levodopa (such as Sinemet®, Prolopa®)
- Antipsychotics (such as olanzapine, quetiapine, risperidone, methotrimeprazine (Nozinan®), loxapine)
- Benzodiazepines
- Corticosteroids (more common with higher doses)
- Digoxin (with high levels/doses)
- Gastrointestinal medications (particularly cimetidine)
- Muscle relaxants (such as cyclobenzaprine (Flexeril®), methocarbamol (Robaxin®), baclofen)
- Narcotics (particularly meperidine, pentazocine, propoxyphene)
- NSAIDs (most common with indomethacin, sulindac)
- Urinary antispasmodics (such as oxybutynin, tolterodine (Detrol®), solifenacin (Vesicare®)
DELIRIUM & AGITATION - TREATMENT

CLINICAL PEARLS:
- Use non-pharmacological approach if able (family members present, quiet environment, glasses and hearing aids in, etc.)
- Use PRISM-E to help identify factors contributing to underlying delirium. Cause(s) of delirium must be investigated and removed if possible.

Antipsychotics:
- Are not recommended for use solely as a sedative/hypnotic
- May be used to manage agitation, aggression, and behaviour on PRN basis for short-term use
- Unlikely to benefit wandering patients or those with disruptive vocalizations
- May lower seizure threshold (<1% seizure risk)
- May affect body’s ability to regulate temperature
- Incidence of extrapyramidal symptoms (EPS): haloperidol > loxapine > risperidone> olanzapine (Zyprexa®)> quetiapine (Seroquel®)
- Patients with Lewy Body Dementia or Parkinson’s: Quetiapine is preferred
- All antipsychotics may prolong QT interval - Symptoms of QT prolongation: dizziness, fainting, palpitation, nausea, vomiting; evident on ECG

<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>DOSE – (unless patient on established regimen already)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risperidone</td>
<td>0.125 to 0.25 mg daily to bid prn PO/SL</td>
</tr>
<tr>
<td>*NOTE: Dissolvable tablet available</td>
<td>avoid total doses greater than 2 mg/day</td>
</tr>
<tr>
<td>Olanzapine (Zyprexa®)</td>
<td>1.25 to 2.5mg q4h prn PO/SL</td>
</tr>
<tr>
<td>*NOTE: Dissolvable tablet available</td>
<td>avoid total doses greater than 10 mg/day</td>
</tr>
<tr>
<td>Quetiapine (Seroquel®)</td>
<td>6.25 to 12.5 mg PO q4h prn</td>
</tr>
<tr>
<td></td>
<td>avoid total doses greater than 50 mg/day</td>
</tr>
<tr>
<td>Haloperidol</td>
<td>0.25 to 0.5 mg q2 to 3 h prn PO/IM/SC/IV</td>
</tr>
<tr>
<td></td>
<td>(may use up to 1 mg in larger “younger” elderly)</td>
</tr>
<tr>
<td></td>
<td>avoid total doses greater than 2 mg/day</td>
</tr>
<tr>
<td>Loxapine</td>
<td>2.5 mg PO/IM/SC q4h prn up to 10 mg per 24 hours</td>
</tr>
</tbody>
</table>

Note: There is a “black box” warning on the newer antipsychotic agents – suggest review with family regarding increased risk of CVD and pneumonia if used in patients with pre-existing dementia.

MONITOR:
- Improvement in target symptoms
- Sit to stand BP daily x 3 days
- Patients with cardiac history, other medications which may cause QT interval prolongation, may require ECG monitoring
DRUG WITHDRAWAL

CLINICAL PEARLS:
- Withdrawal symptoms often manifest after large dose reductions or abrupt discontinuations after prolonged use
- This may be important if your elderly patient’s medication supply has “run out”
- The longer the half-life of the drug, the longer the time until symptoms of drug withdrawal occur
- Typically, withdrawal symptoms occur within 24 to 48 hours, but consider within 5 to 10 days since last dose

SYMPTOMS ARE OFTEN VARIED AND NON-SPECIFIC:

<table>
<thead>
<tr>
<th>CNS</th>
<th>AUTONOMIC</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Agitation, Anxiety</td>
<td>• Autonomic hyperactivity</td>
<td>• Fatigue</td>
</tr>
<tr>
<td>• Depression</td>
<td>• Tachycardia (HR &gt; 100)</td>
<td>• Increased appetite</td>
</tr>
<tr>
<td>• Dizziness</td>
<td>• Diarrhea</td>
<td>• Lacrimation, rhinorrhea</td>
</tr>
<tr>
<td>• Dysphoric mood</td>
<td>• Fever</td>
<td>• Malaise</td>
</tr>
<tr>
<td>• Grand mal seizures</td>
<td>• Nausea &amp; Vomiting</td>
<td>• Myalgias</td>
</tr>
<tr>
<td>• Hypersomnia (withdrawal from stimulants)</td>
<td>• Piloerection</td>
<td>• Psychomotor agitation or retardation</td>
</tr>
<tr>
<td>• Insomnia</td>
<td>• Pupillary dilation</td>
<td>• Yawning</td>
</tr>
<tr>
<td>• Psychotic symptoms</td>
<td>• Sweating</td>
<td></td>
</tr>
<tr>
<td>• Restlessness</td>
<td>• Tremor</td>
<td></td>
</tr>
<tr>
<td>• Hallucinations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Vivid dreams</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MEDICATIONS:
- Alcohol
- Antidepressants (all classes)
- Antipsychotics (all classes and generations)
- Barbiturates (i.e.: Fiorinal®)
- Benzodiazepines
- Beta blockers
- Clonidine
- Nicotine
- Non-prescription medications (such as dimenhydrinate (Gravol®), diphenhydramine (Benadryl®), chlorpheniramine (Chlortripolon®), scopolamine)
- Opioids
- Sedatives/Hypnotics
- Stimulants (such as methylphenidate (Ritalin®) and caffeine)

HOW TO MANAGE:
- Management depends on medication that is causing withdrawal symptoms
- Includes supportive care
- If offending medication reinstated, will need to withdraw more gradually than in a younger patient
- For alcohol withdrawal – use lower doses of lorazepam to control withdrawal symptoms with CIWA protocol (consider 1-2 mg instead of 2-4 mg on protocol)
- For nicotine withdrawal, may use patches, lozenges and gum
ELECTROLYTE IMBALANCES

HYponatremia – medication causes:
- Antihypertensives: ACE inhibitors, clonidine, methyldopa, thiazide diuretics (HCTZ, chorthalidone, indapamide), furosemide
- Antidepressants: SSRIs (citalopram, escitalopram, sertraline, fluoxetine, paroxetine, fluvoxamine), TCAs (amitriptyline, nortriptyline, imipramine, doxepin, etc.), MAOIs (tranylcypromine), bupropion, duloxetine, mirtazapine, venlafaxine, trazodone
- Antineoplastics (chemo meds)
- ADH analogues (desmopressin (DDAVP®))
- NSAIDs
- Opioids
- Anticonvulsants (carbamazepine, levetiracetam (Keppra®), valproic acid)
- Antiparkinson meds (amantadine, levodopa, pramipexole (Mirapex®))
- Antiarrhythmics: amiodarone, propafenone
- Clofibrate (Lopid®)
- Sulfonlurea Hypoglycemics (i.e. tolbutamide, chlorpropamide, glyburide, glimepiride)
- Antipsychotics (may be due to effects on dopamine levels)
- Tacrolimus

Hyperkalemia - medication causes:
- ACE inhibitors (enalapril, fosinopril, perindopril, ramipril, trandolapril, etc.)
- ARBs (candesartan, valsartan, irbesartan, etc.)
- Amiloride; Triamterene
- Spironolactone
- K supplements (including salt-substitutes)
- NSAIDs
- Co-trimoxazole (Septra® or Bactrim®) (specifically the trimethoprim component)
- Cyclosporine
- Tacrolimus
- Pentamidine
- Digoxin (in acute toxicity)
- Herbal Supplements: licorice root, dandelion

Hypokalemia - medication causes:
- Diuretics: thiazides (hydrochlorothiazide, chlorothalidone, indapamide), furosemide, ethacrynic acid, metolazone
- Beta agonists (high dose) such as salbutamol, salmeterol & terbutaline
- Penicillin (high dose)
- Sorbitol (often found in liquid medications including acetaminophen)
- Laxatives (in general)
- Insulin overdose
- Sodium Polystyrene Sodium (Kayexylate®) overuse
- Corticosteroids
HOW CAN MEDS INCREASE RISK OF FALLS?

- Dizziness
- Orthostatic or postural hypotension
- Drowsiness
- Confusion, “muddling”
- Parkinsonian symptoms
- Balance and gait disturbances
- Changes in vision (blurred, double vision, halos)
- Impact on bladder, bowels

CLINICAL PEARLS

- Ask about dizziness or light-headedness upon sitting or standing
- Monitor for orthostatic hypotension (i.e. obtain sit-to-stand BP and HR)
- Consider recent med changes - dose changes, additions, discontinuations

WHAT VALS CAN INCREASE RISK OF FALLS?

- More than 3 - 5 prescription concomitant meds (regardless of type of med) increases risk of falls

- Psychoactive or psychotropic drugs
  - Antidepressants (TCAs, SSRIs, etc.)
  - Antipsychotics (haloperidol, loxapine, risperidone, olanzapine, quetiapine)
  - Sedative/hypnotics (benzodiazepines, zopiclone, OTC sleep aids)
  - Antihistamines (diphenhydramine (Benadryl®), dimenhydrinate (Gravol®))
  - Anticonvulsants (including gabapentin, phenytoin)

- Alcohol (more than 1 or 2 drinks/day)

- Analgesics (opioids/narcotics, NSAIDs)

- Muscle relaxants (methocarbamol (Robaxin®), cyclobenzaprine (Flexeril®))

- Cardiovascular meds
  - Antihypertensives
  - Antiarrhythmias
  - Diuretics
CLSINOMNIA

CLINICAL PEARLS:
- Address other causes of insomnia, such as nocturia or pain, before automatically giving a sleeping pill
- Ask about caffeine and stimulant use (such as in oral decongestants)
- Ask about OTC sleep aids such as Nytol® (diphenhydramine) - Avoid use (refer to “Do not use” info, below)
- If chronic, regular sedative used, continue current medication to avoid withdrawal
- Antipsychotics are not recommended for use solely as a sedative/hypnotic

IS YOUR PATIENT CONFUSED?
- Confusion in an elderly patient may be a symptom of withdrawal from a sedative or alternatively due to the sedative itself

WHAT SHOULD YOU USE FOR YOUR GERIATRIC PATIENT?
- Reserve for situations where poor quality sleep or daytime functioning are affected
- If a patient does not currently use a sleeping pill
  - Use the smallest dose possible
  - Use HS PRN only (don't automatically give)

<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>COMMENTS</th>
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<tbody>
<tr>
<td>Zopiclone 3.75 mg po HS PRN</td>
<td>May repeat 3.75 mg dose in 1 hour if unable to sleep</td>
</tr>
<tr>
<td></td>
<td>Health Canada Warning November 2014: maximum dose in elderly is 5mg nightly</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>Use only for patients intolerant to zopiclone, using at home regularly or if otherwise clinically indicated</td>
</tr>
<tr>
<td>Lorazepam 0.5 mg po HS PRN</td>
<td>older adults are more sensitive to the effects of benzodiazepines on the CNS &amp; more prone to side effects (such as confusion, amnesia, decreased daytime ability and mobility, cognitive impairment)</td>
</tr>
<tr>
<td>Oxazepam 7.5 to10 mg po HS PRN</td>
<td></td>
</tr>
<tr>
<td>Trazodone 25 mg po HS</td>
<td>May be helpful if agitation is contributing to insomnia</td>
</tr>
<tr>
<td></td>
<td>Note: may cause dizziness, postural hypotension at higher doses in elderly</td>
</tr>
</tbody>
</table>

DO NOT USE:
- **Antidepressants** amitriptyline & other tricyclic antidepressants, mirtazapine (these are not indicated for sleep alone)
- **Barbiturates** – long acting and high rate of physical dependence
- **Non-Prescription Medications (mostly antihistamine)** dimenhydridate (Gravol®), diphenhydramine (BenadryC, Nytol®, Sleep-Eze®, Sominex®, Unisom®, Tylenol Nighttime®)
- **Antipsychotic Medications** haloperidol, quetiapine (Seroquel®), risperidone, olanzapine
- **Longer-acting Benzodiazepines** flurazepam, bromazepam, alprazolam, diazepam, chlordiazepoxide, clonazepam
- **Ultra-short acting Benzodiazepines** triazolam (Halcion®), midazolam
- **Zolpidem** – may cause complex sleep behaviours and has insufficient evidence in elderly
CLINICAL PEARLS:
- Determine cause of nausea (N), vomiting (V) before treating these symptoms
- Any medication change may cause N&V (i.e. new or discontinued med or dose change)
- Avoid giving dimenhydrinate automatically with morphine and other opioids. Consider starting with a lower dose of opioid and giving anti-nauseant only if needed.
- Avoid combining use of prokinetic agents (metoclopramide, domperidone) with anticholinergics (dimenhydrinate) as these reduce effects of each other.
- Onset and duration of action of many meds may be delayed and unpredictable in elderly (especially IM route)
- Reassess effects of medication and discontinue if ineffective

MEDICATION CAUSES:
Nausea more likely upon starting these agents (typically resolves with continued use):
- Antibiotics
- Antidepressants
- Cholinesterase inhibitors (such as Donepezil, Galantamine, Rivastigmine)
- Cytotoxics (Chemotherapy) and radiation
- Iron
- NSAIDs
- Opioids
- Potassium
- Theophylline

Nausea more likely with chronic use, high doses, or toxicity
- Anticonvulsants
- Digoxin
- Opioids
- Theophylline

MEDICATION WITHDRAWAL CAUSING NAUSEA & VOMITING:
- Opioids
- Benzodiazepines
- Alcohol

MEDICATION MANAGEMENT:

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>COMMENTS</th>
<th>MEDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemically Induced (Medications or Toxins)</td>
<td>Tolerance to N&amp;V from medications develops quickly – may only need short course of anti-emetic</td>
<td>Dimenhydrinate (Gravo®) 12.5 to 25 mg PO/IV/SC q6h prn</td>
</tr>
<tr>
<td>Opioid-induced</td>
<td></td>
<td>Prochlorperazine (Stemetil®) 2.5 to 5 mg PO q8h prn</td>
</tr>
<tr>
<td>GI dysmotility If bowel obstruction suspected: AVOID prokinetic agents</td>
<td>May be caused by drugs such as opioids or anticholinergics</td>
<td>Metoclopramide 5 to 10 mg q6 to 8h PO/SC/IV prn</td>
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<tr>
<td></td>
<td></td>
<td>Domperidone 5 to 10 mg PO q6 to 8h prn</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ondansetron 4 mg PO/IV q8 to 12h prn</td>
</tr>
<tr>
<td>Vertigo</td>
<td>Often see autonomic symptoms such as pallor, diaphoresis, salivation as well</td>
<td>No optimal agents available Could trial: Dimenhydrinate 12.5 to 25 mg PO/IV/SC q6h prn OR Betahistine (Serc®) 8 mg PO TID PRN</td>
</tr>
<tr>
<td>GERD/Irritation</td>
<td>May be caused by drugs such as ASA, NSAIDs, iron, potassium, some antibiotics, alcohol</td>
<td>Antacid 15-30 mL QID PRN H2 antagonist – Ranitidine 150 mg PO BID or 50 mg IV q12h PPI – Pantoprazole 40 mg PO daily</td>
</tr>
<tr>
<td>Chemotherapy Induced</td>
<td></td>
<td>Ondansetron 4 to 8 mg PO/IV q12h prn +/- Dexamethasone 4 mg PO/IV q12h</td>
</tr>
</tbody>
</table>
PAIN - ACUTE

FOR CURRENT OPIOID USER:
- Order usual opioid dose, and supplement with immediate release (IR) opioid for breakthrough acute pain.
- Best to use the same opioid when possible for both regularly scheduled and PRN doses – easier to monitor and titrate

WHAT SHOULD YOU START WITH FOR YOUR GERIATRIC PATIENT?
- Acetaminophen 650 to 975 mg PO/PR QID prn (lower dose for long-term use)
- Morphine 1 to 2.5 mg PO q3 to 4h prn OR 0.5 to 2 mg SC/IV q3 to 4h prn
- Hydromorphone 0.5 to 2 mg PO q3-4h prn OR 0.25-1 mg SC/IV q3 to 4h prn
- Ensure any patient taking narcotics is ordered a bowel protocol

CAUTIOUS USE:

<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>COMMENTS</th>
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</thead>
<tbody>
<tr>
<td>NSAIDs &amp; COXIBs</td>
<td>AVOID in patients with:</td>
</tr>
<tr>
<td></td>
<td>▪ Hypertension</td>
</tr>
<tr>
<td></td>
<td>▪ CHF</td>
</tr>
<tr>
<td>Ibuprofen 200 to</td>
<td>▪ Renal impairment (eGFR &lt; 60)</td>
</tr>
<tr>
<td>400mg PO q6-8h prn</td>
<td></td>
</tr>
<tr>
<td>Diclofenac 50 mg</td>
<td>▪ Gastro reflux or GERD</td>
</tr>
<tr>
<td>PO or PR q12h prn</td>
<td>▪ Past GI bleed</td>
</tr>
<tr>
<td>Naproxen 250 mg</td>
<td>Naproxen possibly a safer cardiac option</td>
</tr>
<tr>
<td>PO or PR q8h prn</td>
<td>NSAIDs may cause confusion (rarely)</td>
</tr>
<tr>
<td>Ketorolac IV 15mg</td>
<td>May cause dizziness, vertigo, drowsiness, headache in increasing order of frequency:</td>
</tr>
<tr>
<td>q6h prn</td>
<td>▪ Ibuprofen &lt; Diclofenac &lt; Naproxen &lt; Ketorolac &lt; Indomethacin</td>
</tr>
<tr>
<td>Celecoxib 100mg</td>
<td>COXIBs have equal efficacy and similar renal/CV toxicity to other NSAIDs</td>
</tr>
<tr>
<td>daily to BID</td>
<td></td>
</tr>
<tr>
<td>Fentanyl 12.5 to</td>
<td>Very short duration of action</td>
</tr>
<tr>
<td>25 mg IV/SC q2-3h prn</td>
<td></td>
</tr>
<tr>
<td>Tylenol #3® tablets</td>
<td>Caution if previous constipation or bowel obstruction with codeine</td>
</tr>
<tr>
<td>1 to 2 tablets q4 to 6h</td>
<td></td>
</tr>
<tr>
<td>Oxycodone 2.5-5mg PO q4-6h prn</td>
<td>Each tablet of Tylenol#3 or Percocet contains</td>
</tr>
<tr>
<td>(Percocet®) contains 5mg oxycodone</td>
<td>~ 325 mg acetaminophen</td>
</tr>
</tbody>
</table>

RARELY APPROPRIATE:
Muscle relaxants
- (Cyclobenzaprine (Flexeril®), methocarbamol (Robaxacet®, Robaxin®), diazepam
  - Use smallest dose for short time only

DO NOT USE:
- Pentazocine
- Meperidine
- Fentanyl Patch - do not use for opioid naïve and also is acutely not effective due to long onset of action
- Buprenorphine Patch (Butrans®) - do not use for acute pain due to long and delayed duration of action
PNEUMONIA

Elderly patients require more time to develop a fever and may only increase temperature by 2.5°C or less. Symptoms may be non-specific (i.e. change in mental status, falls, confusion, fatigue, failure to thrive).

CLINICAL PEARLS:
- Symptoms in the elderly could include classic respiratory symptoms but often include atypical symptoms such as mental status changes, falls, increased HR, hypotension, increased or decreased temp, increased or decreased WBC
- Strep pneumo is still the most common pathogen for bacterial pneumonia
- Viral causes of community acquired pneumonia (CAP) is common – not always bacteria
- Need to ensure more frequent INR monitoring if patient on warfarin and given fluoroquinolones (such as levofloxacin or moxifloxacin) or co-trimoxazole (Septra® or Bactrim®)
- Moxifloxacin and clarithromycin may affect QTc – use caution in patients with other QTc prolonging medications or who have QTc > 450 msec (avoid if > 500 msec)
- Azithromycin may affect QTc but to a lesser extent than clarithromycin

TREATMENT:
- Don’t use same class of medication if patient has received in the past 3 months
- Empiric treatment of CAP for elderly patients is the same as for the younger adult
- May use ceftriaxone IV or amoxicillin-clavulanate PO with Macrolide or Doxycycline (i.e. if patient had received no antibiotic or has received any fluoroquinolone in past 3 months)
- May use moxifloxacin (if cephalosporin and/or macrolide used in past 3 months)
- Oral moxifloxacin has good bioavailability (90%) and could be considered in clinically stable patients able to swallow
- For patients in whom a UTI may also be suspected: moxifloxacin and macrolides have limited urinary effects and alternative choices may be superior
- For aspiration pneumonia coverage of anaerobes is controversial and may have been overemphasized in the past. May be beneficial in patients with poor oral hygiene, poor dentition, and with putrid sputum - may be more significant in witnessed aspiration and/or recent abdominal surgery
- Refer to current local antibiogram (available on FHA intranet)
- Treatment duration typically 7 to 14 days – may stepdown to oral therapy before 7 days to complete course of therapy (after afebrile 48-72 hours)
- Pneumonia due to Klebsiella may require 14 days therapy
URINARY TRACT INFECTION

Elderly patients require more time to develop a fever and may only increase by less than 2.5°C. Symptoms may often be non-specific (i.e. change in mental status, falls, confusion, fatigue, failure to thrive).

CLINICAL PEARLS:
- Obtain urinalysis and culture if suspected
- Avoid catheterization in elderly unless absolutely necessary – regular and frequent toileting may help prevent incontinence – create a toileting schedule
- Symptoms in the elderly could include classic urinary symptoms but often include atypical symptoms such as mental status changes, weakness, falls, new or increased incontinence, increased HR, hypotension, increased or decreased temp, increased or decreased WBC
- Consider treatment if symptomatic AND bacteria ≥ 100 mega CFU/L AND pyuria ≥ 10 WBCs per HPF (don’t treat asymptomatic bacteriuria)
- Some consider 10 mega CFU/L as the cut-off for treatment in symptomatic elderly patients
- Need to ensure more frequent INR monitoring if patient on warfarin and given fluoroquinolones (i.e. ciprofloxacin) or co-trimoxazole

TREATMENT:
- Consider ciprofloxacin, co-trimoxazole (Septra® or Bactrim®) or nitrofurantoin (Macrobid®) (if eGFR greater than 40mL/min) as first line agents
- Nitrofurantoin not effective if eGFR less than 40 mL/min
- Nitrofurantoin requires a 7 day course
- Nitrofurantoin may be less effective in older males due to potential prostate involvement (unable to get high enough tissue concentration)
- Ciprofloxacin and co-trimoxazole can be given for 3 to 5 days in uncomplicated cases
- Moxifloxacin not effective for UTI as not enough gets into the urine
- Be familiar with local antibiogram (available on FHA Intranet)
- Male patients with prostatitis may require longer duration of therapy

CATHETER-ASSOCIATED UTI:
- Consider treatment if symptomatic (as above)
- These patients will have high incidence of bacteriuria (don’t treat asymptomatic bacteriuria)
- Remove and replace catheter (if it is needed) and treat empirically
- Obtain urine specimen after catheter removed and/or replaced since bacteria may adhere to old catheter
- Minimum treatment duration of 7 days (usually 10 to 14 days)
# APPENDIX A: ANTIChOLINERGIC SIDE EFFECTs

<table>
<thead>
<tr>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CNS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drowsiness</td>
<td>Excitement</td>
<td>Profound restlessness and disorientation; Agitation</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Restlessness</td>
<td>Hallucinations; Delirium</td>
</tr>
<tr>
<td>Mild amnesia</td>
<td>Confusion</td>
<td>Ataxia, Muscle Twitching</td>
</tr>
<tr>
<td>Inability to concentrate</td>
<td>Memory impairment</td>
<td>Hyperreflexia; Seizures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exacerbation of cognitive impairment (in dementia)</td>
</tr>
<tr>
<td><strong>Eyes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inability to accommodate</td>
<td>Vision disturbances</td>
<td>Increase risk of accidents; Falls</td>
</tr>
<tr>
<td>Vision disturbances</td>
<td>Dizziness</td>
<td>Exacerbation of acute angle closure glaucoma</td>
</tr>
<tr>
<td>Dizziness</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mouth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry mouth</td>
<td>Disturbing dry mouth</td>
<td>Difficulty chewing, swallowing, and speaking</td>
</tr>
<tr>
<td></td>
<td>Speech problems</td>
<td>Impaired perception of taste &amp; texture of food</td>
</tr>
<tr>
<td></td>
<td>Decrease Appetite</td>
<td>Mucosal damage</td>
</tr>
<tr>
<td><strong>GI</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Esophagitis</td>
<td>Decrease Gastric secretions</td>
<td>Fecal impaction</td>
</tr>
<tr>
<td>Decrease Gastric emptying</td>
<td>Decrease Peristalsis; Constipation</td>
<td>Altered medication absorption</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paralytic ileus; Pseudo-obstruction</td>
</tr>
<tr>
<td><strong>CVS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase HR</td>
<td>Conduction disturbance; SVT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exacerbation of angina</td>
<td></td>
</tr>
<tr>
<td><strong>Urinary</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary hesitancy</td>
<td>Urinary hesitancy</td>
<td>Urinary retention; UTI</td>
</tr>
<tr>
<td>Skin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease Sweating</td>
<td>Decrease Sweating</td>
<td>Thermoregulatory impairment leading to hyperthermia</td>
</tr>
</tbody>
</table>

**WHAT MEDICATIONS CAN CAUSE ANTIChOLINERGIC (Ach) SIGNS AND SYMPTOMS?**

<table>
<thead>
<tr>
<th>Medications with Ach mechanism of action</th>
<th>Medications with Ach side effects</th>
<th>Medications with some in vitro Ach activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyoscine (Buscopan®)</td>
<td>Disopyramide (Rythmodan®)</td>
<td>Cimetidine</td>
</tr>
<tr>
<td>Dimenhydrinate (Gravol®)</td>
<td>Quinidine</td>
<td>Theophylline</td>
</tr>
<tr>
<td>Prochlorperazine (Stemetil®)</td>
<td>Diphenhydramine (Benadryl®)</td>
<td>Digoxin</td>
</tr>
<tr>
<td>Benztropine (Cogentin®)</td>
<td>Cyclobenzaprine (Flexeril®)</td>
<td>Nifedipine</td>
</tr>
<tr>
<td>Trihexyphenidyl (Artane®)</td>
<td>Tricyclic antidepressants</td>
<td>Furosemide</td>
</tr>
<tr>
<td>Belladonna</td>
<td>(amitriptyline, nortriptyline, imipramine, doxepin, etc.)</td>
<td>Ranitidine</td>
</tr>
<tr>
<td>Oxybutynin (Ditropan®)</td>
<td>Chlorpromazine, fluphenazine (Modayc®)</td>
<td>Isosorbide</td>
</tr>
<tr>
<td>Flavoxate (Urispas®)</td>
<td>Meperidine (Demorol®)</td>
<td>Warfarin</td>
</tr>
<tr>
<td>Atropine</td>
<td></td>
<td>Dipyridamole (Persantine®)</td>
</tr>
<tr>
<td>Ipratropium (Atrovent®)</td>
<td></td>
<td>Codeine</td>
</tr>
<tr>
<td>Tiotropium (Spiriva®)</td>
<td></td>
<td>Captopril</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dyzide®</td>
</tr>
</tbody>
</table>
APPENDIX B: EXTRAPYRAMIDAL SYMPTOMS “EPS”

WHAT DO THEY INCLUDE?
- Dystonia – involuntary sustained muscle contractions that result in twisting and reptitive movements or abnormal postures
- Akathisia – motor restlessness
- Parkinsonism – Akinesia, bradykinesia
- Tardive Dyskinesia – delayed onset and may be non-reversible - involuntary movements such as lip-smacking

COMMON MEDICATIONS WHICH CAN CAUSE:
- Antipsychotics (haloperidol > loxapine > risperidone > olanzapine > quetiapine)
- Metoclopramide

HOW TO TREAT?
- In elderly, dose reduction (if clinically appropriate) or removal of the offending med is the first line therapy
- Although EPS can be reversed with anticholinergic medications, these may cause undesirable side effects in elderly (see Appendix on Anticholinergic Side Effects)
APPENDIX C: GERIATRIC RESOURCES

OTHER GERIATRIC RESOURCES WITHIN FHA:
Geriatric Medicine Consult
Geriatric Emergency Nurse Clinician
Clinical Pharmacist
Delirium Watch

FHA INTRANET RESOURCES:
Appropriate Use of Drugs in the Elderly (Jan 2010)
FHA Clinical Education – Detecting the 3 D’s
VCH Antipsychotic Guidelines for BPSD Management (in depth review)
BC Guidelines (www.bcguidelines.ca)
FHA Local Antibiograms:
- Fraser East (ARH, CCH, FCH, MMH) Antiobiogram
- Fraser North (BH, ERH, RCH, RMH) Antiobiogram
- Fraser South (DH, JPOSC, LMH, PAH, SMH) Antiobiogram
FHA Protocols: CIWA Alcohol withdrawal, Pneumonia, Delirium

OTHER:


ABBREVIATIONS USED:

ACE Angiotensin-converting Enzyme
ADH Anti-Diuretic Hormone
ARB Angiotensin II receptor blockers
COX-2 Cyclooxygenase-2
CVS Cardiovascular System
EPS Extrapyramidal Symptoms
NSAID Non Steroidal Anti-inflammatory Drug
OTC Over the Counter (i.e.- does not require a prescription)
SSRI Selective serotonin re-uptake inhibitors
TCA Tricyclic Antidepressant
UTI Urinary Tract Infection

“It is an art of no little importance to administer medicines properly, but it is an art of much greater and more difficult acquisition to know when to suspend or altogether to omit them.”

Phillipe Pinel (1745-1826)
## FRASER EAST ANTIBIOGRAM

### Table of Contents

- **Gram Positive**
  - S. pneumoniae (Group A)
  - S. pyogenes
  - S. aureus
  - S. epidermidis
  - S. saprophyticus
  - E. faecalis
  - E. coli
  - K. pneumoniae
  - P. mirabilis
  - H. influenzae
  - S. pneumoniae (Group B)
  - S. agalactiae

- **Gram Negative**
  - E. coli
  - K. pneumoniae
  - P. mirabilis
  - H. influenzae
  - S. pneumoniae
  - S. aureus

### Antimicrobial Susceptibility Chart

<table>
<thead>
<tr>
<th>Antimicrobial</th>
<th>ARH</th>
<th>CGH</th>
<th>FCH</th>
<th>MMH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gentamicin</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Amikacin</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Moxifloxacin</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>78</td>
<td>56</td>
<td>87</td>
<td>57</td>
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<tr>
<td>Doxycycline</td>
<td>97</td>
<td>96</td>
<td>85</td>
<td>92</td>
</tr>
<tr>
<td>Linezolid</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>98</td>
<td>99</td>
<td>97</td>
<td>98</td>
</tr>
<tr>
<td>TMP-SMX</td>
<td>94</td>
<td>95</td>
<td>93</td>
<td>79</td>
</tr>
</tbody>
</table>

### Notes:
- This chart is provided as a guide to empiric therapy until culture and susceptibility results are available.
- **R** = Inherently resistant
- **S** = Predictably ≤99% susceptible
- **N** = Not recommended
- **M** = Synergy with penicillins or vancomycin
- **R/E** = Resistant / Extended-spectrum β-lactamase (ESBL) producing strains
- **MRO Prevalence**: ESBL E. coli 9%
  - ESBL Klebsiella spp. 4%

---

Produced by the collaborative efforts of the Fraser Health Department of Laboratory Medicine and Pathology, FHA Medication Use Evaluation Teams and FHA-Antimicrobial Stewardship Program.
<table>
<thead>
<tr>
<th>Number of Isolates</th>
<th>Gram Positive</th>
<th>Gram Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MECA (Methicillin-Resistant)</td>
<td>MECA (Methicillin-Resistant)</td>
</tr>
<tr>
<td></td>
<td>Staphylococcus aureus</td>
<td>Staphylococcus aureus</td>
</tr>
<tr>
<td></td>
<td>MRSA (Methicillin-Resistant Staphylococcus aureus)</td>
<td>MRSA (Methicillin-Resistant Staphylococcus aureus)</td>
</tr>
<tr>
<td></td>
<td>Coagulase Negative Staphylococci</td>
<td>Coagulase Negative Staphylococci</td>
</tr>
<tr>
<td></td>
<td>Group A Streptococci</td>
<td>Group A Streptococci</td>
</tr>
<tr>
<td></td>
<td>Enterococcus spp.</td>
<td>Enterococcus spp.</td>
</tr>
<tr>
<td></td>
<td>Escherichia coli^7</td>
<td>Escherichia coli^7</td>
</tr>
<tr>
<td></td>
<td>Klebsiella spp^9</td>
<td>Klebsiella spp^9</td>
</tr>
<tr>
<td></td>
<td>Proteus mirabilis</td>
<td>Proteus mirabilis</td>
</tr>
<tr>
<td></td>
<td>P. aeruginosa</td>
<td>P. aeruginosa</td>
</tr>
<tr>
<td></td>
<td>Pseudomonas cepacia</td>
<td>Pseudomonas cepacia</td>
</tr>
<tr>
<td></td>
<td>Stenotrophomonas maltophilia</td>
<td>Stenotrophomonas maltophilia</td>
</tr>
<tr>
<td></td>
<td>Acinetobacter spp</td>
<td>Acinetobacter spp</td>
</tr>
<tr>
<td></td>
<td>Enterobacter cloacae</td>
<td>Enterobacter cloacae</td>
</tr>
</tbody>
</table>

**KEY**
- **R** = Inherently resistant
- **S** = Predictively 90% susceptible
- **P** = Susceptibility not tested
- **N** = Not recommended

**Notes:**
- This antibiogram includes only the first isolate of a specific organism from any patient.
- SpICE Organisms are *Serratia*, *Providencia*, *Morganella*, *Citrobacter*, *Enterobacter* and *P. vulgaris*. These organisms may carry inherent genes that cause in-vivo resistance to all cephalosporins.
- Interpretation based on dose of cephalosporin 2g IV q8h.
- Susceptibility for *S. maltophilia* represents minocycline.
- *S. aureus* isolates with an MIC of 2 will be interpreted as susceptible but may result in clinical failure.
- For urinary tract isolates only.
- Combined from all FHS sites.
- Susceptibility to erythromycin for these organisms is the same as for tetracycline/clarithromycin.
- Ampicillin results predict penicillin results for *E. faecalis*.

Produced by the collaborative efforts of the Fraser Health Department of Laboratory Medicine and Pathology, FHS Medication Use Evaluation Team and FHS Antimicrobial Stewardship Program.
## FRASER SOUTH ANTIBIOGRAM

**2013 ANTIBIOTIC SUSCEPTIBILITY (%)**

### DH, JPOCS, LMH, PAH, SMH

<table>
<thead>
<tr>
<th>Number of Isolates</th>
<th>DH</th>
<th>JPOCS</th>
<th>LMH</th>
<th>PAH</th>
<th>SMH</th>
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</thead>
<tbody>
<tr>
<td>Cloxacillin</td>
<td>68</td>
<td>R</td>
<td>99</td>
<td>41</td>
<td>N</td>
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<tr>
<td>Penicillin</td>
<td>N</td>
<td>R</td>
<td>N</td>
<td>N</td>
<td>100</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>N</td>
<td>R</td>
<td>N</td>
<td>100</td>
<td>99</td>
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<tr>
<td>Amoxicillin/Clavulinate</td>
<td>68</td>
<td>R</td>
<td>99</td>
<td>41</td>
<td>100</td>
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<tr>
<td>Piperacillin/Tazobactam</td>
<td>68</td>
<td>R</td>
<td>99</td>
<td>41</td>
<td>100</td>
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<tr>
<td>Cephalaxin - 1st gen</td>
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<td>R</td>
<td>99</td>
<td>42</td>
<td>100</td>
</tr>
<tr>
<td>Cefazolin - 1st gen</td>
<td>68</td>
<td>R</td>
<td>99</td>
<td>41</td>
<td>100</td>
</tr>
<tr>
<td>Cefixime - 3rd gen</td>
<td>R</td>
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<tr>
<td>Cefotaxime / Ceftriaxone - 3rd gen</td>
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<td>99</td>
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<td>42</td>
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<tr>
<td>Cefazidime - 3rd gen</td>
<td>R</td>
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<td>Aztreonam - restricted</td>
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<td>R</td>
<td>R</td>
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<td>Imipenem - restricted</td>
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<td>R</td>
<td>99</td>
<td>99</td>
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<tr>
<td>Meropenem - restricted</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>99</td>
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<tr>
<td>Gentamicin</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>99</td>
<td>99</td>
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<tr>
<td>Tobramycin</td>
<td>N</td>
<td>N</td>
<td>R</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Amikacin</td>
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<td>N</td>
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<td>N</td>
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<td>Chloramphenicol</td>
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<td>Moxifloxacin</td>
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<td>Azithromycin / Clarithromycin</td>
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<td>Clarithromycin</td>
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<td>12</td>
<td>77</td>
<td>37</td>
<td>86</td>
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<td>Doxycycline</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>Linezolid - restricted</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>97</td>
<td>97</td>
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<tr>
<td>Metronidazole</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Nitrofurantoin - simple cystitis only</td>
<td>57</td>
<td>97</td>
<td>96</td>
<td>98</td>
<td>83</td>
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<tr>
<td>TMP-SMX or Cotrimoxazole</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
</tbody>
</table>

**KEY**
- R = Resistant
- S = Susceptible
- N = Not tested
- I = Indeterminate
- Synergy with penicillin or vanco

**MDRO Prevalence:**
- ESBL: E. coli: 10%
- CRE: K. pneumonia: 5%

**NOTES:**
- This antibiogram includes only the first isolate of a specific organism from any patient.
- SPICE organisms are Serratia, Providencia, Morganella, Citrobacter, Enterobacter and P. vulgaris. These organisms may carry inherent genes that cause In-vivo resistance to all cephalosporins.
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