



Medication Management in the Older ED Patient

**UofT PGY3 Seminar
December 11, 2019**

Rebecca Schonnop, PGY4

Framework for today's session

1. Short presentation on the pharmacokinetics, pharmacodynamics, and polypharmacy in older persons
2. Multiple choice questions in groups
3. Group case work

Objectives

1. Review the pharmacokinetic and pharmacodynamic changes associated with aging
2. Review drug drug interactions
3. Understand the prescribing cascade
4. Develop an understanding on how to approach to polypharmacy and deprescribing in the ED

According to the 2016 Drug Use Among Seniors in Canada report,

- Older people average 6.9 different drug classes per year
- 25% of older people were prescribed 10+ drug classes each year



Top 10 medications for adverse drug events in older people?

Top 10 medications for adverse drug events in older people?

NEJM 2011

1. Warfarin
2. Insulins
3. Oral antiplatelet agents
4. Oral hypoglycemic agents
5. Opioid analgesics
6. Antibiotics
7. Digoxin
8. Antineoplastic agents
9. Antiadrenergic agents
10. Renin-angiotensin inhibitors
11. Sedative or hypnotic agents
12. Anticonvulsants
13. Diuretics

Physiology of Aging

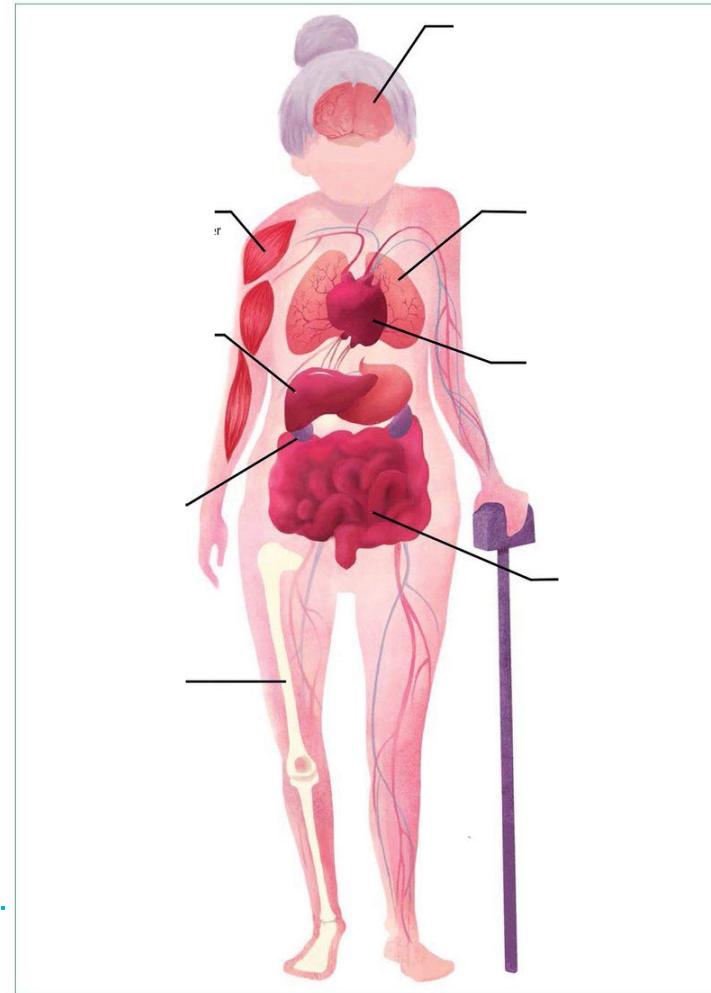


Figure 2: Physiological changes of ageing by organ system^{16-20,22}

Physiology of Aging

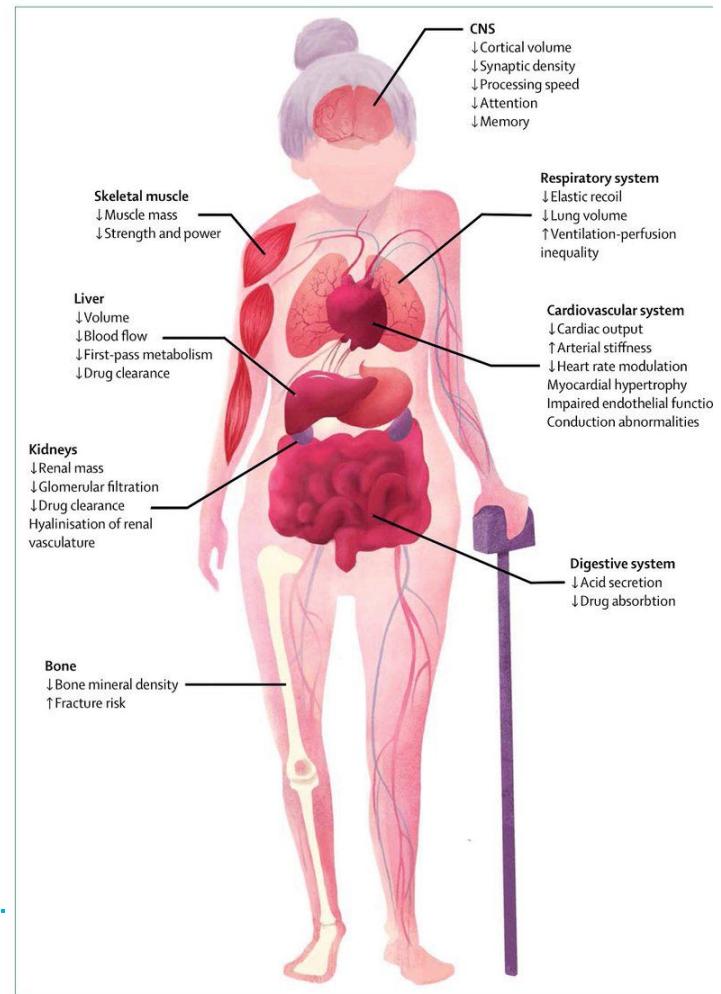


Figure 2: Physiological changes of ageing by organ system^{16-20,22}

Pharmacokinetic changes with aging

What the body does to the drug

Absorption

Distribution

Metabolism

Elimination

Absorption

Changes with aging	What does this mean clinically for the older ED patient?
↑ gastric pH	These changes are NOT clinically significant
↓ gastric ADH activity (greater ↓ in women)	
↓ gastric and intestinal motility	

Distribution

Changes with aging	What does this mean clinically for the older ED patient?
↑ proportion of fat	Lipophilic drugs (e.g. haloperidol, sedative hypnotics) will have: ↑ Vd ↓ plasma concentrations ↑ terminal half life
↓ proportion of water	Hydrophilic drugs (e.g. lithium, digoxin) will have: ↓ Vd ↑ effective concentration
↓ protein binding capacity	There may be ↑ free plasma levels of medications that have high protein binding capacity. e.g. phenytoin, valproic acid
↓ P-glycoprotein ability at blood brain barrier	↓ ability to prevent certain PGP substrate medications from crossing at BBB, thus more CNS effects will be seen. e.g. digoxin, risperidone, loperamide.

Metabolism

Changes with aging	What does this mean clinically for the older ED patient?
↓ liver blood flow by ~30%	Expect that drugs with high first pass extraction rate will have ↑ bioavailability in elderly, thus ↓ dose is recommended. e.g. labetalol, metoprolol, morphine, amitriptyline, imipramine. ↑ serum concentration of drugs when multiple drugs are metabolized by the same enzymes
↓ liver size by ~30%	
phase 1 metabolism ↓ by ~30%	
phase 2 has relatively no change assuming normal nutrition and the patient is not acutely unwell	

Elimination

Changes with aging	What does this mean clinically for the older ED patient?
↓ in nephrons	Calculate creatinine clearance Be cautious when prescribing drugs that are renally excreted. Likely the renal excretion will be ↓, and thus will have prolonged effects of the medications – particularly if the metabolites are active (e.g. nitrofurantoin, morphine, codeine, tramadol).
↓ in cortical blood flow	
GFR ↓ ~10% per decade	
age related loss of muscle mass	

Creatinine Clearance (Cockcroft-Gault Equation) ☆

Calculates CrCl according to the Cockcroft-Gault equation.

When to Use ▾

Pearls/Pitfalls ▾

Why Use ▾

Sex

Female

Male

Age

30

years

Weight

60

kg ↵

Creatinine

80

μmol/L ↵

Creatinine clearance, original Cockcroft-Gault

Copy Results 📋

Next Steps >>>

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Why Use ▾

Sex

Female

Male

Age

30

years

Weight

60

kg ↕

Creatinine

80

μmol/L ↕

86 mL/min

Creatinine clearance, original Cockcroft-Gault

Copy Results 📋

Next Steps >>>

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When to Use ▾

Pearls/Pitfalls ▾

Why Use ▾

Sex

Female

Male

Age

80

years

Weight

50

kg ↕

Creatinine

80

μmol/L ↕

39 mL/min

Creatinine clearance, original Cockcroft-Gault

Copy Results 📋

Next Steps >>>

This WILL affect your medication dosing

Pharmacodynamic changes with aging

What the drug does to the body

↑ sensitivity with aging	↓ sensitivity with aging
Sedative hypnotics	Beta blockers and stimulants
Opioids	Alpha adrenergic stimulants
Anticholinergics	
Antipsychotics	

Harmful Medications – Beers Criteria

CLINICAL INVESTIGATION

American Geriatrics Society 2019 Updated AGS Beers Criteria[®] for Potentially Inappropriate Medication Use in Older Adults

*By the 2019 American Geriatrics Society Beers Criteria[®] Update Expert Panel**

- 30 medication classes or medications to avoid in most older people (outside of hospice and palliative care settings);

Harmful Medications – Beers Criteria

CLINICAL INVESTIGATION

American Geriatrics Society 2019 Updated AGS Beers Criteria[®] for Potentially Inappropriate Medication Use in Older Adults

*By the 2019 American Geriatrics Society Beers Criteria[®] Update Expert Panel**

- 40 medications or medication classes to use with caution or avoid in patients with certain diseases or conditions.

Harmful Medications – Beers Criteria

CLINICAL INVESTIGATION

American Geriatrics Society 2019 Updated AGS Beers Criteria[®] for Potentially Inappropriate Medication Use in Older Adults

*By the 2019 American Geriatrics Society Beers Criteria[®] Update Expert Panel**

- Medications to avoid in combination with other treatments because of the risk for harmful “drug-drug” interactions;

Harmful Medications – Beers Criteria

CLINICAL INVESTIGATION

American Geriatrics Society 2019 Updated AGS Beers Criteria[®] for Potentially Inappropriate Medication Use in Older Adults

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- Medications to use with caution because of the potential for harmful side effects;

Harmful Medications – Beers Criteria

CLINICAL INVESTIGATION

American Geriatrics Society 2019 Updated AGS Beers Criteria[®] for Potentially Inappropriate Medication Use in Older Adults

*By the 2019 American Geriatrics Society Beers Criteria[®] Update Expert Panel**

- Medications that are dosed differently or avoided among people with reduced kidney function.

Drug-Drug Interactions

1. Pharmacokinetic drug-drug interactions
2. Pharmacodynamic drug-drug interactions
 - a. **Additive:** e.g. sedating effects of multiple CNS depressants used concurrently
 - b. **Synergistic** e.g. opioids and acetaminophen
 - c. **Antagonistic:** e.g. NSAIDs can increase blood pressure, which antagonizes effects of anti-hypertensives.

Drug-Drug Interactions: Resources

1. Lexicomp (subscription required)
2. Flockhart Cytochrome P450 Drug Interaction Table

Common Medication Interactions

Hypoglycemics + β Receptor Blockers

- Impaired glycemic control
- Unrecognized glycemic crisis

Common Medication Interactions

ACEi + ARBs and NSAIDS

- Mild to severe hypertension
- Renal insufficiency

Common Medication Interactions

Clopidogrel + PPIs

- Increased risk of thrombosis due to CYP2C19 inhibition.

Common Medication Interactions

SSRIs/SNRIs + NSAIDs/ASA

- Increased risk of bleeding

Common Medication Interactions

Corticosteroids and NSAIDs

- Increased bleeding risk
- Fluid retention and hypertension

Prescribing Cascade

- Misinterpretation of an adverse reaction as another medical condition —> leads to the prescription of new medications, with their own potential to cause side-effects
- Always consider any new signs or symptoms as a possible consequence of current drug treatments

Deprescribing

- The ED is not the safest point of care to start this
- Identify concerning medications, bring this to the attention of the patient/caregiver.
- Encourage f/u with GP to review their medications
 - Send a letter/fax the chart to the GP to prompt discussion
- Consider de-prescribing NSAIDs
- Consider benzo tapering. Provide the EMPOWER trial pdf.

Importance of knowing medications

- Encourage reading about medications you commonly use/see in the ED
- Learn the MOA, adverse effects, pharmacokinetics and pharmacodynamics, and key drug drug interactions

Resources to know about...

1. **MedsCheck** – medication review that can be completed by any community pharmacist for free annually, for patients on 3+ medications who have a chronic medical condition.
(http://www.health.gov.on.ca/en/pro/programs/drugs/medscheck/medscheck_original.aspx)
2. **EMPOWER** for benzo deprescribing (<http://www.criugm.qc.ca/fichier/pdf/BENZOeng.pdf>)
3. **Algorithms and guidelines for discontinuing/tapering** PPIs, antihyperglycemics, antipsychotics, benzos, and cholinesterase inhibitors (<https://deprescribing.org/>)
4. **STOPP/START tool**
(https://docs.wixstatic.com/ugd/2a1cfa_8ee866ed1cfb4f0681a5e422c1891f1a.pdf)
5. **Resources for studying:** UptoDate, Lexicomp, www.drugbank.com, Micromedex, drug monograph on Health Canada Drug Database)
6. Monthly **educational webcasts** on safe prescribing for older adults - [GeriMedRisk](#)
7. **Harmful medications** - Beers Criteria

Questions?

Next up: Break into groups to do MCQ and case work
