

## Approach to Polypharmacy

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### Impact of Aging on polypharmacy:

- Understanding age-related changes associated with pharmacokinetics and pharmacodynamics helps one optimize safe prescribing and appreciate the impact of polypharmacy. Table 1 gives summary of these changes.

Parameter	Age Effect	Example
<b>Absorption</b>	Aging change: decrease rate of gastric emptying and slowing Impact: slows absorption capacity however bioavailability unchanged	Decreased absorption Vitamin B12, iron, calcium
<b>Distribution</b>	Hydrophilic medications: decrease Vd due to decreased total body water	Increased serum levels of digoxin and alcohol
	Hydrophobic meds: increase Vd due to increased fat	Increased half-life of Benzodiazepines
	Decreased muscle mass	Digoxin as it binds to skeletal muscle
	Decrease plasma protein especially albumin: higher proportion of unbound drug- more active	Diazepam
<b>Metabolism</b>	Aging Change: Decrease in liver mass and liver blood flow affects drug metabolism Impact: Decrease first pass metabolism which increases bioavailability of certain drugs Change in renal function also impacts drug metabolism in liver.	Increased bioavailability of Propranolol, labetalol due to decreased first pass metabolism
<b>Elimination</b>	Changes in the kidney: decrease kidney size, decrease blood flow and decrease functioning nephrons lead to decrease GFR Impact: takes longer for drug to eliminate. Hence advisable to dose medications in elderly as if they have chronic kidney disease.	Decreased clearance of diuretics, digoxin
<b>Pharmacodynamics</b>	With aging there is increased sensitivity to drugs especially in brain	Morphine- can have the same effect at half the dose given to younger patients Benzodiazepines

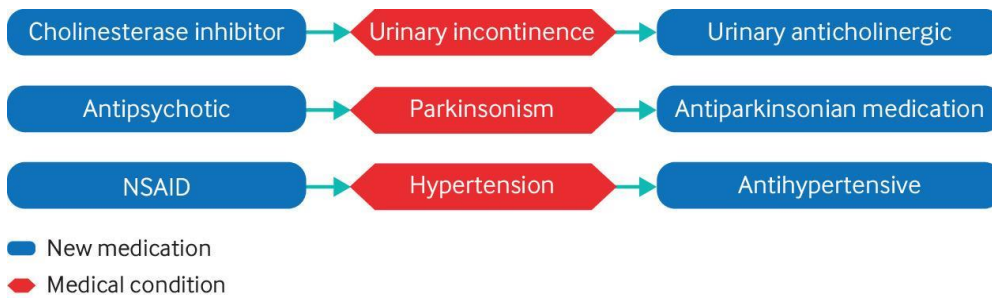
### Definition of polypharmacy:

- Most accepted definition based on systematic review by Masnoon et al. is > 5 medications. However, depending on the patient it could be anywhere between > 2 to >11
- Impact of polypharmacy: adverse outcomes such as falls, frailty, increased length of stay in hospital, readmission, mortality and ultimately death
- Adverse outcomes are more pronounced with psychotropic medications
  - o Definition of psychotropic medications: these are medications that effect mental function, behavior and experience. Ex: antipsychotics, anticholinergics, antidepressants, anxiolytics.

### Prescribing Cascade:

**Definition:** an adverse event is addressed by giving another medication as depicted in Figure 1

**Impact:** increased pill burden and adverse events which further increases need for hospitalizations and readmissions.



**Figure 1: Prescribing Cascade.** Pigott K L, Mehta N. et al. Using a clinical process map to identify prescribing cascades in your patient. *BMJ* 2020; 368 doi: <https://doi.org/10.1136/bmj.m261> (Published 19 February 2020)

### How to prevent polypharmacy and prescribing cascade

- Thorough medication review at least every 6-12 months
- Optimize prescribing by eliminating potentially inappropriate medications using Beers' criteria table (hospital pharmacy should have this available upon request)
- If an adverse event is identified such as urinary continence, taper off or discontinue as appropriate
- Avoid new psychotropic medications if possible
- De-prescribe psychotropic medications if appropriate
  - o Guide to de-prescribing
    - Identify medications and the indication
    - Assess drug-related harm
    - Identify benefit vs harm risk for patient
    - Prioritize which medications to discontinue
    - Initiate de-prescribing and monitor for improvement or any adverse effects as a result
  - o Various efforts are happening in the area of deprescribing.
    - De-prescribing algorithms developed by Canadian Deprescribing networks.
    - De-prescribing Research Network in US which promotes research and has a compilation of resources to assist with de-prescribing.
  - o [De-prescribing algorithms](#) are available for the following classes:
    - Proton Pump inhibitors
    - Antihyperglycemics
    - Antipsychotics
    - Benzodiazepine receptor agonist
    - Cholinesterase inhibitors and memantine

### Choosing Wisely Campaign with respect to medications in elderly

1. Antipsychotic medications are not the first choice to use in dementia with behaviors such as aggression, agitation and disruptive behaviors
2. Avoid tight glycaemic control in the elderly; they are more prone to hypoglycemia
3. Don't prescribe AchEIs in dementia patients unless they are being assessed periodically and being monitored for GI adverse events
4. Don't use BZD as first line for insomnia, anxiety, or delirium in the elderly
5. Don't prescribe a new medication without a thorough review of med list

### References

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2. <https://deprescribingresearch.org/>
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4. Lindsey PL. Psychotropic medication use among older adults: what all nurses need to know. *J Gerontol Nurs.* 2009 Sep;35(9):28-38. doi: 10.3928/00989134-20090731-01. PMID: 19715261; PMCID: PMC3128509.
5. Mangoni, A. A. Age related changes in pharmacokinetics and pharmacodynamics: basic principles and practical applications. *British Journal of Clinical Pharmacology.* 2/2003. 57:1, 6-14. doi: [10.1046/j.1365-2125.2003.02007.x](https://doi.org/10.1046/j.1365-2125.2003.02007.x)
6. Masnoon, N., Shakib, S., Kalisch-Ellett, L. et al. What is polypharmacy? A systematic review of definitions. *BMC Geriatr* 17, 230 (2017). <https://doi.org/10.1186/s12877-017-0621-2>