Appendix 1: Non-Pharmacological Treatment Options for Postural Hypotension[1,2,5,7,8]

Reduce venous pooling

- Use of abdominal binders or compression hosiery – limited evidence to support their use – ankle brachial pressure must be measured before prescribing
- Stockings must be worn above the waist to ensure abdominal compression. Compliance is poor due to difficulty putting garments on and are uncomfortable
- Encourage patient to increase physical activity within their capabilities – swimming, aerobics, cycling and walking, may be suitable suggestions

Increase blood volume

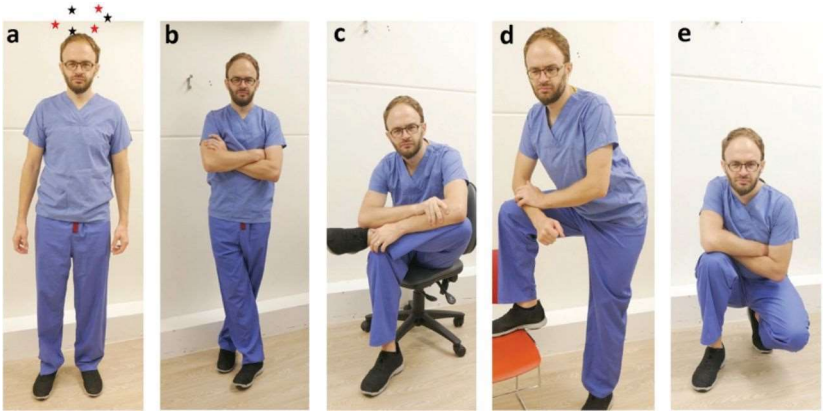
- Encourage water boluses (250-500ml) before standing for prolonged periods *
- Increase dietary salt intake i.e. 4-10g/day *
- Drink strong tea or coffee
- Raise the head of the bed by at least 10 degrees – this decreases nocturia

*(caution in patients with systemic hypertension, chronic kidney disease or heart failure)

Increase peripheral vascular resistance

- Raise legs when sitting, flex ankles and rotate feet
- Gentle marching on the spot while sitting
- Clenching thigh and buttock muscles, and crossing legs while standing
- Standing on tiptoes to stretch calf muscles
- Crouching and squatting exercises

Positions/exercises to help patients overcome symptoms of postural hypotension[1].



A. Standing
B. Tensing lower body muscles whilst crossing arms and legs
C. Tensing lower body muscles whilst crossing arms and legs
D. Raising a leg onto a raised surface
E. Squatting

(Reproduced with permission from Melanie Dani - Dani M, Dirksen A, Taraborrelli P et al. Orthostatic hypotension in older people: considerations, diagnosis and management. *Clinical Medicine Journal.* 2021. 21 (3) e275-e282;)

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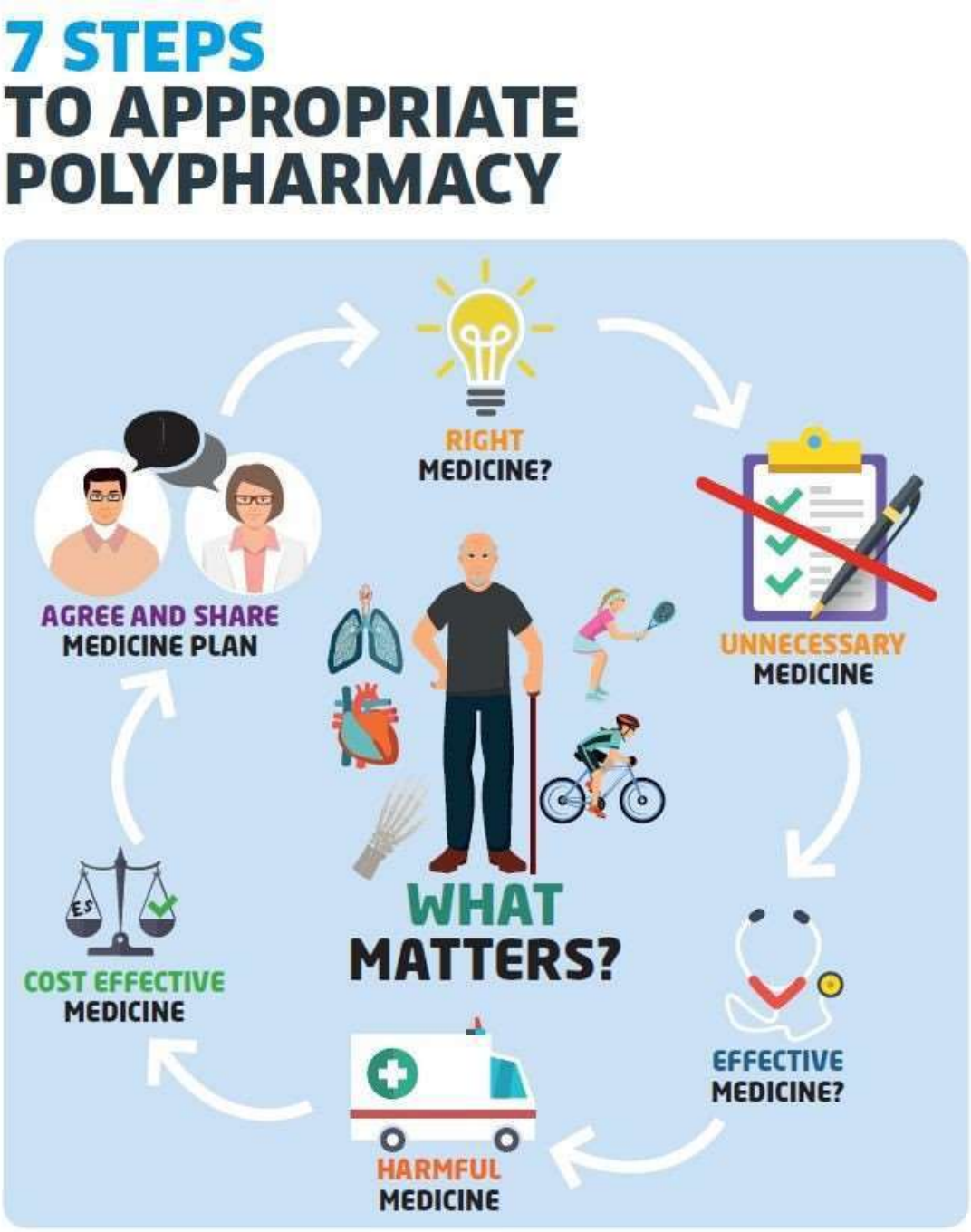
Appendix 2: The 7 Steps of appropriate polypharmacy

This image is from the Polypharmacy: Managing Medicines website https://managemeds.scot.nhs.uk/for-healthcare-professionals/7-steps/



A helpful video on managing polypharmacy, also from the above website, is https://vimeo.com/221320471

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Appendix 3: Drug causes of hypotension and practical prescribing advice[12,14,20]

Drug Class	Mechanism responsible for drug-related postural hypotension	Risk of adverse reaction	Recommendations
α-blockers	Reduce vascular resistance	High risk	Not recommended in elderly as anti-hypertensive. If used in treatment of urinary symptoms, uroselective drugs should be used. Administer at night where possible.
Nitrates	Vasodilation	High risk	Dose should be reduced to lowest effective dose or discontinue if patient asymptomatic. Consider switching to more favourable drug if required e.g. calcium channel blocker. If GTN spray/tablets required – advise patient to sit down.
β-blockers	Reduced inotropic cardiac response	Moderate risk	Only use if specifically indicated. Avoid Carvedilol (acts on both α and β receptors.)
Calcium channel blockers	Vasodilation, reduced cardiac response	Moderate risk	Dihydropyridine class e.g. amlodipine, lacidipine are better tolerated, may be protective. Avoid non-dihydropyridine class.
Angiotension Converting Enzyme Inhibitors (ACEI) or Angiotensin II receptor blocker (ARB)	Increased baroreceptor sensitivity due to blockade of renin-angiotensin system	Low risk	Preferred anti-hypertensive. Perindopril and Valsartan are best tolerated.
Diuretics	Volume depletion	Moderate risk	Loop diuretics should be avoided unless specifically indicated in the elderly. Thiazide and K+ sparing diuretics are best tolerated – require close monitoring of U & Es. If discontinuing – monitor patient for signs of heart failure.
Anti-depressants	Reduced vascular resistance, vasodilation	Moderate risk	Most commonly associated with tricyclic class e.g. amitriptyline. Lower risk with SSRIs or SNRIs – but use with caution as associated with increased risk of falls. Trial gradual withdrawal after 6-12 months use.

Appendix 3: Continued[12,14,20]

Trazodone	Reduced vascular resistance	Moderate risk	Effect thought to be plasma-drug concentration dependent. Prescribe lowest effective dose and trial of modified release preparation.
Anti-psychotics	Reduced vascular resistance	High risk	Lowest effective dose should be prescribed. Effect may be transient due to tolerance development and is usually dose dependent. Seek specialist advice if required. High risk – clozapine, quetiapine, chlorpromazine. Lower risk – haloperidol, olanzapine.
Benzodiazepines	Unknown	Moderate risk	Avoid use in elderly. Prescribe lowest effective dose if required. If plan to discontinue after long term use, withdraw slowly. Zolpidem is best tolerated.
Memantine	Unknown	Low/moderate risk	Studies were unreliable as there was no adjustment for patient's dementia status. Consider risk/benefit to patient before adjustment.
Levodopa	Vasodilation	High risk	Prescribe lowest effective dose. Consider specialist review.

Appendix 4 – Anti-cholinergic burden
Image taken from the NHS Scotland Polypharmacy Guidance 2018[15]
With thanks to the Scottish Government Polypharmacy Model of Care Group 2018

How to assess and reduce the anticholinergic burden

Not all drugs with anticholinergic properties may individually put patients at risk of severe adverse effects, however when used in combination, effects may accumulate. Reducing the anticholinergic burden may result in improvements in short term memory, confusion, behaviours and delirium.

A scale or table that assigns a cumulative anticholinergic score to a patient's prescribed medication can be used to assess *Anticholinergic Burden*. A number of these scoring systems are available. While this approach is valid, the overall aim is to reduce overall anticholinergic exposure as much as possible. The table below is intended to be a guide as to which areas anticholinergic burden is likely to be the highest.

Table 3B Reducing *Anticholinergic Burden*

AVOID IF POSSIBLE Highly anticholinergic drugs	**CAUTION** Drugs with some anticholinergic activity	**Alternatives and general notes**
Antidepressants		
Tricyclic antidepressants	**SSRIs*** **Mirtazapine**	**Venlafaxine**, **trazodone** and **duloxetine** have low anticholinergic activity *SSRIs, **Sertraline** best choice. Avoid **paroxetine**
Antipsychotics		
Fluphenazine **Chlorpromazine** **Clozapine** **Doxepin** **Levomepromazine**	**Olanzapine** **Quetiapine** **Risperidone** **Haloperidol**	**Aripiprazole** is an acceptable choice **Trifluoperazine** and **perphenazine** have unknown activity (conflicting data)
Nausea and vertigo		
	Prochlorperazine	**Metoclopramide** has unknown activity (conflicting data). However, carries specific MHRA caution regarding parkinsonian and cognitive side effects **Domperidone** does not usually penetrate the CNS, but caution is required for QT prolongation Nausea treatments all cause potential problems. Keep courses as short as possible
Urinary antispasmodics		
Oxybutynin **Tolterodine** **Fesoterodine** **Flavoxate** **Darifenacin** **Solifenacin** **Propiverine**	**Dosulepin**	**Mirabegron** has no recorded anticholinergic activity and may be an option It is essential to ensure that medication is effective and stop if not
Sedatives		
		Zolpidem and **zopiclone** no anticholinergic activity but falls risk Avoid sedative antihistamines Non-drug measures are preferred

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AVOID IF POSSIBLE Highly anticholinergic drugs	**CAUTION** Drugs with some anticholinergic activity	**Alternatives and general notes**
Antihistamines		
Chlorphenamine **Promethazine** **Hydroxyzine** **Clemastine** **Cyproheptadine**	**Cetirizine** **Loratadine** **Fexofenadine**	Consider locally acting products for hayfever symptoms If taken for seasonal conditions check this is happening
H2-receptor antagonists		
	Ranitidine **Cimetidine**	PPIs have no anticholinergic burden. Prescribe at the lowest dose to control symptoms **Omeprazole** or **pantoprazole** may be preferred over **lansoprazole**. Caution with increased risk of *Clostridium difficile* infection
Drugs used in Parkinson's Disease		
Procyclidine **Trixehiphenidyl (benzhexol)** **Orphenadrine**	**Amantadine** **Bromocriptine**	**Entacapone** has small potential for anticholinergic activity **Co-careldopa**, **pramipexole**, **ropinirole** and **selegiline** have no significant anticholinergic activity
Spasticity		
Tizanidine	**Baclofen** **Diazepam** **Methocarbamol**	
Analgesia		
	Opiates	**Paracetamol** and NSAIDs are not thought to have anticholinergic activity G**abapentin** has minimal anticholinergic activity
Others		
Atropine **Hyoscine** **Propantheline** **Dicycloverine** **Ipratropium**	**Loperamide** **Carbamazepine** **Theophylline** **Lithium**	**Furosemide** and **digoxin** have unknown anticholinergic activity. The following have no or negligible anticholinergic activity: **Corticosteroids**, **statins**, **beta-blockers**, **ACE inhibitors**, **calcium channel blockers**, **triptans**, **valproate**, **phenytoin**, **phenobarbitone**, **topiramate**.

Notes: This is a developing area with disagreements between different sources. Some of this table is based on incomplete or poor evidence, or on expert opinion. The anticholinergic effects of drugs may become better understood with time. Some of these therapeutic areas are highly specialised (for example Parkinson's disease) and would require expert advice before considering a change. As noted here less anticholinergic alternatives often have other concerns. If an anticholinergic agent must be used, consider reducing the dose. [15-21]

Appendix 5
Medication and Falls Risk in the Older Person. NHS Scotland Polypharmacy Guidance 2018. With thanks to the Scottish Government Polypharmacy Model of Care Group 2018

3.2 Medication and falls risk in the Older Person

This classification has been based upon a review of the clinical evidence of medicines most commonly implicated in falls.[22] The list is not meant to be fully comprehensive but intended to raise awareness. Advice is provided on how medicines should be stopped (deprescribed).

Highest risk	Guidance
Antidepressants	Avoid tricyclics with high anti-muscarinic activity, e.g. amitriptyline. SSRIs are associated with a reduced incidence of side effects. Trial of gradual antidepressant withdrawal should be attempted after 6 –12 months
Antipsychotics including atypicals	Risk of hypotension is dose related reduced by the 'start low go slow approach.' Atypical antipsychotics have similar falls risk to traditional ones. Attempted withdrawal **MUST** always be gradual. Prochlorperazine is often inappropriately prescribed for dizziness and causes drug induced Parkinson's disease
Anti-muscarinic drugs	Oxybutynin may cause acute confusional states in the elderly especially those with pre-existing cognitive impairment
Benzodiazepines & Hypnotics	Dose reduction is beneficial if withdrawal is not possible . Avoid long acting benzodiazepines. Newer hypnotics are associated with reduced hangover effects but all licensed for short-term use only
Dopaminergics in Parkinson's disease	Sudden excessive daytime sleepiness can occur with levodopa and other dopamine receptor agonists. Dose titration is important in initiation due risk of inducing confusion. Maintenance doses may need to be reduced with aging
Moderate risk	
Anti-arrhythmics	Dizziness and drowsiness are possible signs of digoxin toxicity. Risks of toxicity are greater in renal impairment or in the presence of hypokalaemia. Flecainide has a high risk for drug interactions and can also cause dizziness
Anti-epileptics	High risk for potential drug interactions. Important side effects include: Dizziness, drowsiness and blurred vision (dose related)
Opiate analgesics	Drowsiness is common with initiation, but tolerance to this is usually seen within 2 weeks of continuous treatment. Drowsiness is rare with codeine unless used in combination with other CNS drugs. Confusion reported with tramadol
Antihistamines	Somnolence may affect up-to 40% of patients with older antihistamines. The newer antihistamines cause less sedation and psychomotor impairment. Risk of hypotension with cinnarizine is a dose related side effect
Alpha-blockers	Doses used for treatment of BPH less likely to cause hypotension than those required to treat hypertension
ACEI/ARB	Risk of hypotension is potentiated by concomitant diuretic use. Incidence of dizziness affects twice as many patients with heart failure than hypertension
Diuretics	Postural hypotension, dizziness and nocturia are problems seen in the elderly. Diuretics should **not** be used in the long-term treatment of gravitational oedema
Beta-blockers	Postural hypotension and can affect up to 10% of patients. Can accumulate in renal impairment and therefore dose reduction is often necessary
Lower risk	
CCBs	Incidence of dizziness low especially for once daily dihydropyridine CCBs
Nitrates	Advise patient to sit when using GTN spray or tablets
Oral anti-diabetic drugs	Dizziness due to hypoglycaemia, but usually avoidable. Avoid long acting sulfonylureas e.g. chlorpropamide.

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PPIs & H2 Antagonists	Avoid cimetidine in polypharmacy patients as high risk of drug interactions, and causes confusion.