Table 2b: An overview of therapeutic groups under each step

Step 2: Essential drug therapy – Only consider stopping following specialist advice

Discuss with expert before stopping	Discuss with expert before altering	
○ Diuretics - in LVSD (7)	○ Anti-epileptics	○ Thyroid hormones
○ ACE inhibitors - in LVSD (17)	○ Antipsychotics	○ Amiodarone
○ Steroids	○ Mood stabilisers	○ Antidiabetics (34)
○ Heart rate controlling drugs	○ Antidepressants	○ Insulin
	○ DMARDs	

Step 3: Potentially unnecessary drug therapy

Check for expired indication	Check for valid indication	Benefit versus Risk
○ PPI(1) /H^2 blocker (2)	○ Anticoagulant (5)	○ Antianginals (12)
○ Laxatives (3)	○ Anticoagulant + antiplatelet (6)	○ BP control (15)
○ Antispasmodics (4)	○ Aspirin (6)	○ Statins (14)
○ Oral steroid (22, 36)	○ Dipyridamole (6)	○ Corticosteroids (20)
○ Hypnotics/anxiolytics (24)	○ Diuretics (7)	○ Dementia drugs (26)
○ H^1 blockers (29)	○ Digoxin (9)	○ Bisphosphonates (37)
○ Metoclopramide (28)	○ Peripheral vasodilators (10)	○ HbA_{1c} control (34)
○ Antibacterials (oral/topical) (32)	○ Quinine (11)	○ Female hormones (42)
○ Antifungals (oral/topical) (33)	○ Antiarrhythmics (13)	○ DMARDs (48)
○ Sodium/potassium supplements (44, 45)	○ Theophylline (21)	(see *Drug Efficacy (NNT)* table)
○ Iron supplements (44)	○ Antipsychotics (25)	
○ Vitamin supplements (44)	○ Tricyclic antidepressants (27)	
○ Calcium/Vitamin D (44)	○ Opioids (30)	
○ Sip feeds (44)	○ Levodopa	
○ NSAIDs (46)	○ Nitrofurantoin (32)	
○ Drops, ointments, sprays etc. (49)	○ Alpha-blockers (39)	
	○ Finasteride (40)	
	○ Antimuscarinics (urological) (41)	
	○ Cytotoxics/immunosuppressants (43)	
	○ Muscle relaxants (47)	

Step 4: Effectiveness

If therapeutic objectives are not achieved: **Consider intensifying existing drug therapy**	For patients with the following indications: **Consider if patient would benefit from specified drug therapy**
○ Laxative - Constipation (3)	○ see *Drug Efficacy (NNT)* table
○ Antihypertensives - BP control (15)	○ CHD - Antithrombotic, statins, ACEI/ARB, beta blocker
○ Antidiabetics - HbA_{1c} control (34)	○ Previous stroke/TIA - Antithrombotic, statin, ACEI/ARB
○ Warfarin - INR control	○ LVSD - Diuretic, ACEI/ARB, beta blocker
○ Rate limiting drugs - Heart rate?	○ AF - Antithrombotic, rate control
○ Respiratory drugs – Symptoms?	○ DMT2 - Metformin
○ Pain control	○ High fracture risk – Bone protection

Step 5: Safety

Drugs poorly tolerated in frail adults	High –risk clinical scenarios	
See Gold National Framework on frailty	○ *Cumulative Toxicity* tool	○ NSAID + age >75 (without PPI)
○ Antipsychotics (incl. phenothiazines)	○ *Sick day rule* guidance	○ NSAID + history of peptic ulcer
○ NSAIDs (46)	○ Metformin + dehydration	○ NSAID + antithrombotic
○ Digoxin (doses ≥ 250 micrograms) (9)	○ ACEI/ARBs + dehydration	○ NSAID + CHF
○ Benzodiazepines (24)	○ Diuretics + dehydration	○ Glitazone + CHF
○ Anticholinergics (incl. TCAs) (27)	○ NSAIDs + dehydration	○ TCA + CHF
○ Combination analgesics	○ NSAID + ACEI/ARB + diuretic	○ Warfarin + macrolide/quinolone
	○ NSAID + CKD	○ ≥2 anticholinergics (*Anticholinergic Burden* Tool)

Step 6: Cost-effectiveness

Check for		
○ Costly formulations (e.g. dispersible)	○ Branded products	○ Unsynchronised dispensing intervals (28 or 56 day supplies)
○ Costly unlicensed 'specials'	○ >1 strength or formulation of same drug	

Step 7: Adherence/patient centredness

Check Self-Administration (Cognitive)	Check Self-Administration (Technical)	
○ Warfarin/DOACs	○ Inhalers	○ Any other devices
○ Anticipatory care meds e.g. COPD	○ Eye drops	○ Bisphosphonates/calcium
○ Analgesics		
○ Methotrexate		
○ Tablet burden		

Table 2c: Detail by therapeutic area based on amalgamated medication assessment tools

Gastrointestinal system			
1	PPIs		○ If long term treatment is necessary, ensure dose does not exceed usual maintenance doses. Use the minimum dose required to treat symptoms ○ CAUTION: Clostridium difficile, osteoporosis, hypomagnesaemia
2	H2 blockers		○ CAUTION: Anticholinergic ADRs. *Anticholinergic Burden* tool
3	Laxatives		○ CAUTION: Vicious cycle of fluid loss > hypokalaemia > constipation ○ If >1 laxative, Do not stop abruptly. Reduce stimulant first and monitor effect ○ See advice from NICE on non-pharmacological options
4	Antispasmodics		○ Rarely effective, rarely indicated long term ○ CAUTION: Anticholinergic side effects
Cardiovascular System			
5	Anticoagulants		○ Check for expired indications (e.g. temporary loss of mobility that has now resolved) ○ Much more effective for stroke prevention in AF than anti-platelets ○ CAUTION: Bleeding events. Avoid combination of anticoagulants, antiplatelets and NSAIDs ○ Ensure patient adherence to dosing and monitoring regimen ○ Is patient is unfit for anticoagulation (warfarin and DOACs) for cognitive reasons
6	Antiplatelets		○ NOTE: Antiplatelets are no longer indicated for primary prevention of CHD ○ Aspirin plus clopidogrel indicated for maximum 12 months after ACS only ○ CAUTION: Bleeding events. Avoid combination of anticoagulants, antiplatelets and NSAIDs ○ Consider PPI in those with additional GI risk factors (consider lansoprazole or pantoprazole in preference to (es)omeprazole in patients taking clopidogrel) ○ Consider antiplatelets as part of secondary prevention strategy after CVD events ○ First line antiplatelet for secondary stroke prevention is clopidogrel
7	Diuretics		○ Usually essential for symptom control in heart failure ○ Note: Not indicated for dependent ankle oedema (consider medication causes, e.g. CCBs) ○ CAUTION: AKI and electrolyte disturbances ○ Advise patient to stop during intercurrent illness (*Sick Day Rule* guidance); is U&E monitoring robust?
8	Spironolactone		○ CAUTION: Hyperkalaemia. Risk factors include CKD (CI if eGFR<30ml/min), dose >25 mg daily , co-treatment with ACEI/ARBs, amiloride, triamterene, potassium supplements
9	Digoxin		○ CAUTION: Toxicity. Risk factors are: CKD, dose>125 micrograms daily, poor adherence, hypokalaemia, drug-drug interactions
10	Peripheral vasodilators		○ Rarely effective; rarely indicated long term
11	Quinine		○ Use short term only when nocturnal leg cramps cause regular disruption of sleep ○ Review effectiveness regularly ○ CAUTION: Thrombocytopenia, blindness, deafness
12	Antianginals		○ Consider reducing antianginal treatment if mobility has decreased ○ CAUTION: Hypotension (consider use of other BP lowering drugs; avoid the combination of nitrates with PDE-5 inhibitors)
13	Antiarrhythmic *Amiodarone*		○ In AF: Rate control usually has better benefit/risk balance than rhythm control ○ CAUTION: Overdosing. Maintenance should be max 200mg/day ○ CAUTION: Thyroid complications. Ensure monitoring tests are being done
14	Statins		○ Recommended for primary and secondary prevention in patients at high risk of CVD ○ CAUTION: Rhabomyolysis: Interactions (e.g. fibrates, dihydropyridines, antiinfectives) ○ Consider need for and intensity of treatment in light of life expectancy and ADR risk
15	BP Lowering Drugs		○ Limited evidence supporting tight BP control in older frail group ○ Individualise BP targets for primary and secondary prevention of CVD guidelines ○ Consider intensity of treatment in light of CVD risk life expectancy and ADR risk
16	Beta-blockers		○ Usually essential for rate and angina control in CHD and CHF (and often in AF) ○ BNF recommends up-titration of beta-blockers dose in CHF to evidence based target doses ○ CAUTION: Bradycardia in combination with diltiazem/verapamil, digoxin and amiodarone
17	ACEI/ARBs		○ Usually essential for symptom control in CHF. For other potential benefits, see *Drug Efficacy (NNT)* table ○ BNF recommends up-titration of ACEI/ARB doses in CHF to evidence based target doses ○ CAUTION: AKI. Avoid combination with NSAIDs and advise patient to stop when at risk of dehydration (*Sick Day Rule* guidance)
18	CCBs		○ CAUTION: Constipation, ankle oedema

			○ Dihydropyridines – CAUTION: Reflex tachycardia/cardiodepression: Avoid nifedipine in CHD/CHF ○ Diltiazem/verapamil – CAUTION: Bradycardia in combination with beta-blockers or digoxin
19	Spironolactone		○ Recommended in moderate to severe CHF*: Drug Efficacy (NNT)* table ○ CAUTION: Hyperkalaemia. Risk factors CKD, combination with ACEI/ARB, triamterene, amiloride ○ CAUTION: AKI. Avoid combination with NSAIDs and advise patient to stop when at risk of dehydration (*Sick Day Rule* guidance)
Respiratory System			
20	Inhalers		○ Assess symptom control (SIGN 153 ; ask about frequency of inhaler use/adherence) ○ Assess inhaler technique and adherence to dosing schedule ○ Also see *Quality Prescribing in Respiratory*
21	Theophylline		○ Monotherapy in COPD is not appropriate – safer, more effective alternatives are available ○ CAUTION: Toxicity (tachycardia, CNS excitation) ○ Avoid combination with macrolides or quinolones
22	Steroids		○ Long term oral use for respiratory disease is rarely indicated ○ Withdraw gradually if: use >3 weeks, >40 mg prednisolone/day ○ Stepping down steroid inhalers: Reduce slowly (by 50% every 3 months) ○ CAUTION: Osteoporotic fractures: Bone protection if long term treatment necessary ○ Ensure use of steroids aligned with COPD GOLD guideline
23	Antihistamines (1st generation)		○ Rarely indicated long term ○ CAUTION: Anticholinergic ADRs. *Anticholinergic Burden* tool
Central Nervous System			
24	Hypnotics and anxiolytics		○ CAUTION: Risk of falls/fractures, confusion, memory impairment. See Section 3.4 and NICE guidance on Insomnia ○ CAUTION: Risk of dependency
25	Antipsychotics		○ CAUTION: Risk of stroke and death in elderly patients with dementia. See antipsychotics ○ CAUTION: Anticholinergic ADRs for phenothiazines (e.g. chlorpromazine). See *Anticholinergic Burden* tool. ○ CAUTION: Worsening of Parkinson's disease (specialist advice is recommended)
26	Antidementia Drugs		○ Formally assess benefit: Continue if functional or behavioural symptoms improve Cognitive scores e.g. MMSE can help as a guide but should not rely only on cognition scores if these are inappropriate in the individual patient e.g. communication, language difficulty. See NICE Guidance.
27	Antidepressant Tricyclics		○ Confirm need (First episode: Treat for 6-9 months; Second + episode: Treat for ≥2 years) ○ CAUTION: Anticholinergic ADRs. *Anticholinergic Burden* tool. SSRIs are better tolerated ○ CAUTION: Risk of GI bleeding may be increased ○ Avoid combination with MAOIs because of the risk of serotonin syndrome
28	Metoclopramide		○ Now only licensed for a maximum of 5 days (does not apply to use in palliative care) ○ CAUTION: Worsening of Parkinson's disease (domperidone is more suitable but note contra-indications in cardiac disease and severe liver disease)
29	Antihistamines		○ Rarely indicated for long term treatment of vertigo ○ Anticholinergic ADRs. See *Anticholinergic Burden* tool
30	Opioids		○ Assess effectiveness/choice (is pain neuropathic or otherwise not responsive to opiates? e.g. chronic back pain, widespread pain, fibromyalgia, medically unexplained symptoms) ○ Refer to *Quality Prescribing in Chronic Pain* ○ SIGN 136 Management of Chronic Pain ○ SIGN 106 Control of Pain in Adults with Cancer ○ CAUTION: Constipation. Use laxatives ○ CAUTION: Cognitive impairment and respiratory depression, dependency, immunosuppression and suppression of sex hormones
31	Paracetamol		○ CAUTION: Overdosing ○ Ensure patient is aware of minimum interval between doses and maximum daily dose ○ Avoid more than 1 paracetamol containing product ○ Dose reduction where low body weight [<50kg]or renal or hepatic impairment
32	Antiepileptics		○ Assess effectiveness/dose if used for pain management: Is pain neuropathic, use DN4 or LANSS to aid diagnosis. Titrate dose up to assess effectiveness. Limited evidence for musculoskeletal pain/fibromyalgia) See SIGN 136, *Quality Prescribing in Chronic Pain* ○ CAUTION: Dizziness, blurred vision and sedation. Check renal function. Reduce dose in CKD.

Anti-Infective			
32	Antibacterials (Oral) *Nitrofurantoin*		○ No benefit for treating asymptomatic bacteriuria (ASB) in diabetes or older adults ○ Review use of long term antibiotics for recurrent UTI (every 6 months) ○ Lack of evidence for antibiotic use in preventing catheter-associated ASB ○ CAUTION: Pulmonary/renal ADRs; avoid in renal impairment; contraindicated if eGFR<30ml/min
33	Antifungals		○ CAUTION: Risk of exacerbation of heart failure with azole antifungals. ○ CAUTION: Many serious drug interactions with azole antifungals.
Endocrine System			
34	Antidiabetics		○ Indicated to control symptoms of hyperglycaemia (metformin is first line in DMT2) ○ NOTE: It takes years for the benefit (microvascular) of tight HbA_{1C}. Establish individual HbA_{1C} targets balancing any benefits vs hypoglycaemia risk. See *Drug Efficacy (NNT)* table
35	Metformin Sulfonylureas Glitazones		○ CAUTION: Risk of lactic acidosis. Avoid if eGFR < 30 ml/min. Stop with dehydration ○ CAUTION: Hypoglycaemia: Active metabolites accumulate with impaired renal function ○ Avoid in patients with heart failure ○ Refer to Quality Prescribing in Diabetes
36	Steroids		○ Rarely indicated for long term use. Consider dose reduction/withdrawal where possible

37	Bisphosphonates		○ Consider need for treatment in light of risk factors for osteoporotic fractures: previous osteoporotic fragility fracture, parental history of hip fracture, alcohol intake ≥ 4 units/d, rheumatoid arthritis, oral steroids, BMI<22kg/m^2), ankylosing spondylitis, Crohn's disease, prolonged immobility, untreated menopause. See *Drug Efficacy (NNT)* table
			○ Check patient's ability and willingness to take bisphosphonates (and calcium) as instructed
			○ If the patient has been taking a bisphosphonate for osteoporosis for at least 3 years, discuss the option of discontinuing. There is no consistent evidence of benefit or harm of continued use after at least 3 years therapy. NICE NG56. Continue calcium and vitamin D.
			  ○ There are no current guidelines for bisphosphonate holidays/discontinuation in the UK. See NICE NG56
			  ○ There is no evidence to guide monitoring after discontinuation
			  ○ Women who stop alendronate after 5 years rather than continuing for 10 years show moderate decline in bone mineral density and a gradual rise in biochemical markers but no high fracture risk except clinically asymptomatic fractures.
			  ○ Women at high fracture risk may benefit from continuing alendronate beyond 5 years but this should be a considered, rather than automatic decision

Genito-urinary system			
39	Alpha-blockers		○ Generally not indicated if patient has a long term catheter
40	Finasteride		○ Generally not indicated if a patient has a long term catheter – discuss with urology
41	Antimuscarinics		○ Review continued need/effectiveness after 3 to 6 months ○ CAUTION: Anticholinergic ADRs (oxybutynin may decrease MMSE score in dementia)
42	Female Hormones		○ NOTE: There is no cardio-protective effect or cognitive protection in older women ○ CAUTION: Carcinogenic potential in breast and endometrium ○ Discuss with patient individual balance of benefits and risk
Malignant Disease			
43	Cytotoxics etc.		○ Is treatment still consistent with treatment objectives? Refer to initiating prescriber
Nutrition & Metabolic Disorders			
44	Supplements		○ Confirm continued need/effectiveness after 3 to 6 months – monitor weight
45	Potassium		○ CAUTION: Hyperkalaemia. Risk factors: Use without stop/review date, CKD, co-treatment with ACEI/ARBs, spironolactone, amiloride, triamterene, trimethoprim)
Musculoskeletal System			
46	NSAIDs		○ CAUTION: Gastro-intestinal ADRs (Risk factors: age>75, GI ulcer, antithrombotics, steroids, SSRIs, high alcohol use). If NSAIDs are essential: Consider gastro-protection with a PPI ○ CAUTION: Cardiovascular ADRs (Risk factors: CVD risk>20%, previous CVD events, HF) ○ CAUTION: Renal ADRs (Risk factors: age>65, on ACEI, ARBs and/or diuretics, CKD or HF). If NSAIDs are essential: Monitor eGFR; stop during intercurrent illness
47	Skeletal Muscle Relaxants		○ Rarely indicated long term (except for spasticity) ○ CAUTION: Anticholinergic ADRs
48	DMARDs		○ Assess effectiveness and discuss any need for changes with secondary care specialist ○ Ensure patient adherence to dosing/monitoring regimen ○ CAUTION: Methotrexate overdosing. Avoid preparations with different strengths
Eye, skin, nose & oropharynx			
49	Drops, sprays, ointments		○ Set a review/stop date for topical antibacterials/antifungals and sympathomimetics ○ Review need for preservative free eye drops (e.g. previous preservative toxicity)