Managing complex multimorbidity: From expectation to clinical practice

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Marjorie

- Hypertension
- Atrial fibrillation
- Mitral valve replacement
- Dyslipidemia
- Depression
- Osteoporosis
- Type 2 diabetes mellitus
- COPD, 80 pack year passive smoking history, open wood fire
- 2 moderate COPD exacerbations in the past 12 months

Weight: 52 kg
Height: 149 cm (BMI 23.4 kg/m²)
BP: 138/94 mmHg
Na: 129
Creatinine: 120 umol/L
eGFR: 50 ml/min
Creatinine clearance: 82 ml/min
Potassium: 5 mmol/L
HbA₁c: 58 mmol/mol
Total cholesterol: 6.2 mmol/L
(HDL 1.2 mmol/LL, triglycerides 3.1 mmol/L, LDL 5.0 mmol/L)

Medication:
1. Perindopril 5 mg
2. Amlodipine 5 mg
3. Atorvastatin 10 mg OD
4. Warfarin
5. Escitalopram 10 mg OD
6. Digoxin 125 micrograms OD
7. Alendronic acid 70 mg weekly
8. Cholecalciferol 5600 UI/weekly
9. Metformin 1000 mg twice daily
10. Fluticasone propionate + salmeterol twice daily (Diskus inhaler)
11. Salbutamol (as needed)
12. Movicol oral powder TDS
13. Aspirin 75 mg OD
14. Temazepam 10 mg nocte
15. Ferric sulfate 200 mg tablets TDS
16. Lansoprazole 30 mg OD
17. Longtec 5 mg MR BD
18. Carbocisteine 375 mg BD
<table>
<thead>
<tr>
<th>Year</th>
<th>Age 50</th>
<th>Age 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>Hypertension</td>
<td>Depressive episodes x3</td>
</tr>
<tr>
<td>1997</td>
<td>COPD Depression</td>
<td>COPD exac x2</td>
</tr>
<tr>
<td>2003</td>
<td>Back pain</td>
<td>AKI stage 1</td>
</tr>
<tr>
<td>2007</td>
<td>Type II diabetes</td>
<td>Cellulitis</td>
</tr>
<tr>
<td>2011</td>
<td>Polyarthritis</td>
<td>epistaxis</td>
</tr>
<tr>
<td>2012</td>
<td>Atrial fibrillation</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>Metallic MV replacement</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>Cataract removal</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>CKD stage III</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>COPD exac</td>
<td></td>
</tr>
</tbody>
</table>
Multi-risk scoring tools - Marjorie

A multi-risk scoring tool is available from: www.liverpool-multimorbidity.org*

Calculators included:
- Framingham 10-year CVD Risk Score
- HAS-BLED
- CHA₂DS₂-VASc
- MDRD GFR Equation
- Child-Turcotte-Pugh (CTP)
- FRAX

ALT, alanine aminotransferase; AP, alkaline phosphatase; AST, aspartate transaminase; CHA₂DS₂-VASc, congestive heart failure, hypertension, age ≥ 75 (doubled), diabetes mellitus, prior stroke or transient ischemic attack (doubled), vascular disease, age 65 to 74, female; Cr, creatinine; CVD, cardiovascular disease; HAS-BLED, Hypertension, Abnormal liver/renal function, Stroke history, Bleeding history or predisposition, Labile INR, Elderly, Drug/alcohol usage; INR, international normalised ratio; MDRD GFR, Modification of Diet in Renal Disease study equation for estimating Glomerular Filtration Rate; TIA, transient ischemic attack.

Prescribing by indication – age 70

R2 Overprescribing review: “...clinical indications must be routinely recorded at the point of prescribing”

<table>
<thead>
<tr>
<th>Indication</th>
<th>Prescription</th>
<th>Problems/Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Hypertension 138/94</td>
<td>Perindopril 5mg</td>
<td>↑</td>
</tr>
<tr>
<td></td>
<td>Amlodipine 5mg</td>
<td>↑</td>
</tr>
<tr>
<td>2. Metallic mitral valve</td>
<td>Warfarin*</td>
<td>Fatigue, BB</td>
</tr>
<tr>
<td>3. Atrial Fibrillation</td>
<td>Digoxin 125 microg*</td>
<td>Primary prevention</td>
</tr>
<tr>
<td></td>
<td>Aspirin 75mg</td>
<td></td>
</tr>
<tr>
<td>4. Dyslipidaemia</td>
<td>Atorvastatin 10mg</td>
<td>↑</td>
</tr>
<tr>
<td>CNS: Depression</td>
<td>Escitalopram 10mg OD*</td>
<td>SSRI ↑ bleeding, Na</td>
</tr>
<tr>
<td></td>
<td>Temazepam 10mg noce*</td>
<td>ACB* = 6</td>
</tr>
<tr>
<td>Respiratory: COPD</td>
<td>Fluticasone propionate + salmeterol twice daily (Diskus inh)</td>
<td>LAMA+LABA X ICS? Or Trimbow?</td>
</tr>
<tr>
<td></td>
<td>Salbutamol (as needed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carbocisteine 375 mg BD</td>
<td>X Wrong dose, no cough</td>
</tr>
<tr>
<td>MSK: Osteoporosis</td>
<td>Alendronic acid</td>
<td>Drug holiday</td>
</tr>
<tr>
<td></td>
<td>Longtec 5mg BD*</td>
<td></td>
</tr>
<tr>
<td>Anaemia?</td>
<td>Ferrous sulfate 200mg TDS</td>
<td>Check ferritin</td>
</tr>
<tr>
<td>Constipation</td>
<td>Movicol</td>
<td>osmotic needs stimulant</td>
</tr>
<tr>
<td>Type 2 DM HbA1c 58</td>
<td>Metformin 1g BD*</td>
<td>Add DPP4 (linagliptin liver exc)</td>
</tr>
<tr>
<td>CKD III – eGFR 50 ml/min</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CKD III, chronic kidney disease stage 3; DM, diabetes mellitus; eGFR, estimated glomerular filtration rate; HbA1c, haemoglobin A1c.
10 years later....
Patient journey

2013
Age 70

2017
Fall
Polyarthritis
COPD exac x3
Back pain
Bladder instability

# NOF

2018
HFrEF

2019
Constipation
Falls
Postural hypotension
Moderate frailty

2020
Pneumonia
Dizziness “off legs”
TIA
Fluid overload

2021
Ischaemic foot, foot ulcer
Depressive episodes x3
Arm haematoma
Faecal impaction
Immobile, housebound – care home
Severe frailty

2022
?
End of life

2023
Age 80
Risk scores are largely unchanged a decade later but the patient is radically changed

Major increased risk is for osteoporotic fracture

Multi-risk scoring

www.liverpool-multimorbidity.org*

Risk scores are largely unchanged a decade later but the patient is radically changed

Major increased risk is for osteoporotic fracture

CHA₂Ds₂-VASc, congestive heart failure, hypertension, age ≥75 (doubled), diabetes mellitus, prior stroke or transient ischemic attack (doubled), vascular disease, age 65 to 74, female; Cr, creatinine; CVD, cardiovascular disease; HAS-BLED, Hypertension, Abnormal liver/renal function, Stroke history, Bleeding history or predisposition, Labile INR, Elderly, Drug/alcohol usage; INR, international normalised ratio; MDRD GFR, Modification of Diet in Renal Disease study equation for estimating Glomerular Filtration Rate; TIA, transient ischemic attack

### Prescribing by indication – age 80

R2 Overprescribing review: “...clinical indications must be routinely recorded at the point of prescribing”

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<tbody>
<tr>
<td><strong>CVD</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Hypertension 110/60</td>
<td>Perindopril 10mg</td>
<td>X CCB, wean down ACEi</td>
</tr>
<tr>
<td></td>
<td>Amlodipine 5mg</td>
<td></td>
</tr>
<tr>
<td>2. Metallic MV</td>
<td>Warfarin*</td>
<td>Wean down</td>
</tr>
<tr>
<td>3. Atrial Fibrillation, TIA</td>
<td>Bisoprolol 5mg OD</td>
<td></td>
</tr>
<tr>
<td><strong>HFrEF</strong></td>
<td>Bumetanide 1mg OD, spironolactone 25mg</td>
<td></td>
</tr>
<tr>
<td><strong>dyslipidaemia</strong></td>
<td>Dapagliflozin 10mg OD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Atorvastatin 20mg OD</td>
<td></td>
</tr>
<tr>
<td><strong>CNS:</strong> Depression</td>
<td>Escitalopram 10mg OD*</td>
<td>Support to discontinue if ineffective</td>
</tr>
<tr>
<td></td>
<td>Temazepam 10mg*</td>
<td></td>
</tr>
<tr>
<td><strong>Respiratory:</strong> COPD</td>
<td>Trimbow</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Salbutamol (as needed)</td>
<td></td>
</tr>
<tr>
<td><strong>Bladder Instability</strong></td>
<td>Oxybutynin***</td>
<td>X or Switch to mirabegron</td>
</tr>
<tr>
<td><strong>MSK:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Osteoporosis #NOF</td>
<td>Longtec 5mg BD*</td>
<td></td>
</tr>
<tr>
<td>2. Back pain</td>
<td>Amitriptyline 50 mg daily***</td>
<td>Support to discontinue</td>
</tr>
<tr>
<td></td>
<td>Gabapentin 300mg TDS</td>
<td>ACB = 10</td>
</tr>
<tr>
<td><strong>Constipation</strong></td>
<td>MoviCOL</td>
<td></td>
</tr>
<tr>
<td><strong>Type 2 DM HbA1c, 46</strong></td>
<td>Metformin* 1g BD, linagliptin</td>
<td>Reduce metformin dose, X linagliptin</td>
</tr>
<tr>
<td>CKD III – eGFR 40 ml/min</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CKD III**, chronic kidney disease stage 3; **DM**, diabetes mellitus; **eGFR**, estimated glomerular filtration rate; **HbA1c**, haemoglobin A1c.
Accumulation of medicines risks

Escalating anticholinergic burden across the life course

Amitriptyline 50mg nocte
Tiotropium, tiotropium inh
Prednisolone 30mg F/F reducing
Mirtazapine 30mg OD
Furosemide 40mg BD
Digoxin 125 micrograms OD
Captopril 25mg TDS
Oxybutynin 10mg OD

Negatively affect the quality of life and functional abilities of older people

Incontinence
Cognitive impairment
Falls
Move to care home
Death

age ↑; kidney function ↓; muscle mass ↓; unsteady; frail
PLWH with high ACB performed worse on tests of learning and executive function compared with HIV- controls with high ACB

- [http://www.acbcalc.com/](http://www.acbcalc.com/) (multiple tools, no gold standard)
- Score ≥3 higher risk of confusion, falls, delirium and death (>65’s)
- Every additional ACB point increases risk of death by 26%
- ACB3 amitriptyline, chlorphenamine, olanzapine, oxybutynin, paroxetine, quetiapine
- Common – prednisolone, furosemide, anti-histamines, tricyclics
- Stop, dose reduce, exchange: quetiapine (3) -> risperidone (1) in AD, oxybutynin (3) -> mirabegron (0)
- Most computerised prescribing support tools are not integrated into clinical workflows.

How might we predict this better and intervene earlier using existing information?
Drugs to treat symptoms

Drugs to prevent disease

High BP
- Amlodipine
- Simvastatin

Cholesterol disorder
- GTN spray

Angina
- Aspirin, Bisoprolol, Ramipril

Heart attack
- Dapagliflozin

Heart failure
- Apixaban

Mini stroke
- Furosemide

Asthma
- Salbutamol Inh

Incontinence
- Oxybutynin

Bumetanide Inh

age ↑; kidney function ↓; muscle mass ↓; unsteady; frail

Many hidden factors influence decision to move from preventative to symptomatic treatment

Hospitalisation/transition of care
Thank you!