Frailty Screening: Implications and tools for inpatient care including medication review

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Conjoint Professor of Geriatric Pharmacology, Sydney University
Outline

1. Screening for frailty in hospital
2. Frailty and medication review
SCREENING FOR FRAILTY IN HOSPITAL

Should we screen for frailty in hospitalised older people?
New screening tools for clinicians
## Principles and Practice of Screening for Disease

*Wilson and Jungner, 1968, WHO*

<table>
<thead>
<tr>
<th>Screening Criteria</th>
<th>Application to Frailty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The condition sought should be an important health problem.</td>
<td>Common, risk of adverse outcomes</td>
</tr>
<tr>
<td>2. There should be an accepted treatment for patients with recognized disease.</td>
<td>Emerging evidence: exercise, medication review, nutrition, ?Vit D</td>
</tr>
<tr>
<td>3. Facilities for diagnosis and treatment should be available.</td>
<td>Access to multi-disciplinary geriatric evaluation and management</td>
</tr>
<tr>
<td>4. There should be a recognizable latent or early symptomatic stage.</td>
<td>Yes</td>
</tr>
<tr>
<td>5. There should be a suitable test or examination.</td>
<td>Range of screening tools</td>
</tr>
<tr>
<td>6. The test should be acceptable to the population.</td>
<td>Application to inpatients</td>
</tr>
<tr>
<td>7. The natural history of the condition, including its development, should be adequately understood.</td>
<td>Emerging</td>
</tr>
<tr>
<td>8. There should be an agreed policy on whom to treat.</td>
<td>Emerging</td>
</tr>
<tr>
<td>9. Cost of case-finding economically balanced in relation to possible expenditure on medical care as a whole.</td>
<td>Unknown</td>
</tr>
<tr>
<td>10. Case-finding should be a continuing process and not a “once and for all” project.</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Why screen for frailty in hospital?

• Frailty predicts adverse outcomes
• Frailty *may* predict response to treatment
• Population level:
  – Health services planning
    • determine resource requirements
    • provide services to address frailty
• Individual patient level:
  – Inform individual patient risk assessment
Risks of screening for frailty in hospital

• Validity of screening tools
• Frailty could be misused to deny treatment to patients who may derive net benefit
  – one of many factors that informs patient outcomes
• Frailty could be misused as an insufficient surrogate for geriatric assessment
Inpatient Screening Tools for Frailty

• Clinical Frailty Scale
• Frailty Phenotype
  – Three or more of:
    • Exhaustion
    • Low physical activity
    • Slowness
    • Unintentional weight loss
    • Weakness
  – Measures impaired by acute illness
  – FRAIL scale (fatigue, resistance, aerobic capacity, illnesses, weight loss)
• Deficit Accumulation Frailty Index
  – Geriatric assessment
  – REFS
  – Frailty index using routine data (clinical, lab)
## Reported Edmonton Frail Scale (REFS)

<table>
<thead>
<tr>
<th>Frailty domain</th>
<th>Item</th>
<th>0 Point</th>
<th>1 Point</th>
<th>2 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognition</td>
<td>Please imagine that this pre-drawn circle is a clock. I would like you to place the numbers in the correct positions then place the hands to indicate a time of ‘ten after eleven’</td>
<td>No errors</td>
<td>Minor spacing errors</td>
<td>Other errors</td>
</tr>
<tr>
<td>General health status</td>
<td>In the past year, how many times have you been admitted to a hospital?</td>
<td>0</td>
<td>1–2</td>
<td>≥2</td>
</tr>
<tr>
<td>Functional independence</td>
<td>In general, how would you describe your health? (meal preparation, shopping, transportation, telephone, housekeeping, laundry, managing money, taking medications)</td>
<td>Excellent/Very good/Good</td>
<td>Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>Social support</td>
<td>When you need help, can you count on someone who is willing and able to meet your needs?</td>
<td>Always</td>
<td>Sometimes</td>
<td>Never</td>
</tr>
<tr>
<td>Medication use</td>
<td>Do you use five or more different prescription medications on a regular basis?</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Nutrition</td>
<td>At times, do you forget to take your prescription medications?</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Mood</td>
<td>Have you recently lost weight such that your clothing has become looser?</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Continence</td>
<td>Do you often feel sad or depressed?</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Self-reported performance</td>
<td>Do you have a problem with losing control of urine when you don’t want to?</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

### REFS at RNSH:
- Studies of medication use and outcomes according to frailty
- Study of surgical patients and outcomes according to frailty
- Planned study in trauma service

Hilmer et al., AJA 2009
Frailty Index Using Routine Data

- Cognitive screens
- Waterlow
- OMS Falls risk score
- ADRs
- Number of medicines
- Diagnoses

<table>
<thead>
<tr>
<th>Domain</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognition</td>
<td>2</td>
</tr>
<tr>
<td>Sensorium</td>
<td>5</td>
</tr>
<tr>
<td>Continence</td>
<td>2</td>
</tr>
<tr>
<td>Skin Condition</td>
<td>4</td>
</tr>
<tr>
<td>Functional performance</td>
<td>4</td>
</tr>
<tr>
<td>Communication</td>
<td>1</td>
</tr>
<tr>
<td>Nutrition</td>
<td>1</td>
</tr>
<tr>
<td>Mood</td>
<td>2</td>
</tr>
<tr>
<td>Medication use</td>
<td>2</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>1</td>
</tr>
<tr>
<td>Disease diagnoses</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
</tr>
</tbody>
</table>

Frailty Index Using Routine Data in Hospital
- Validation in TO HOME study (NSLHD and SLHD)
- Build in eMR

Sarita Lo, Ruth Hubbard, Danijela Gnjidic, Sarah Hilmer
FRAILTY AND MEDICATION REVIEW

Clinical pharmacology of frailty
Prescribing and deprescribing for frail older people
New tools for clinicians: education, guidelines, eHealth tools, QUM indicators
Clinical Pharmacology of Frailty

SUMMARY

Frailty is associated with greater exposure to polypharmacy, drug interactions, and medicines that increase the risk of falls including those with anticholinergic and sedative effects.

People who are frail experience a higher incidence and severity of adverse drug events because of their medicine use and potential changes in pharmacokinetics and pharmacodynamics.

Prescribing for these patients requires constant vigilance and review, considering the impact of every medicine, as well as overall drug load, comorbidities, function and goals of care.

Hilmer and Gnjidic, Aust Presc 2017
Application to Dosing in Frailty

• Most drugs require lower doses in old age and frailty due to reduced lean body mass, reduced hepatic and renal clearance, and increased susceptibility to adverse drug effects
Frailty and Gentamicin Pharmacokinetics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frail</th>
<th>Non-frail</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vd (L)</td>
<td>14.8±1.4</td>
<td>15.2±2.2</td>
<td>ns</td>
</tr>
<tr>
<td>CL (mL/min)</td>
<td>46.6±10.7</td>
<td>58.2±12.4</td>
<td>0.01</td>
</tr>
<tr>
<td>Serum creatinine (mg/dL)</td>
<td>1.1±0.1</td>
<td>1.0±0.3</td>
<td>ns</td>
</tr>
<tr>
<td>CG CrCL (mL/min)</td>
<td>45.7±10.9</td>
<td>59.4±13.8</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>eGFR (mL/min)</td>
<td>65.8±14.4</td>
<td>76.8±17.9</td>
<td>ns</td>
</tr>
</tbody>
</table>

‘...addition of frailty to the model reduced the random variability in gentamicin clearance by 12% after adjustment for renal function (estimated creatinine clearance using lean body weight) and lean body weight’
PRESCRIBING AND DEPRESCRIBING FOR FRAIL OLDER PEOPLE
Prevalence of Polypharmacy in Australia

- Hyperpolypharmacy (≥10)
- Polypharmacy (≥5)
- No polypharmacy (0-4)

Morgan et al., MJA 2012; Hubbard et al., MJA 2015; Jokanovic et al., JAMDA 2016
Risks of polypharmacy in older people

• Pharmacological risks
  – ‘Inappropriate’ prescribing
  – Drug interactions
    • Drug-drug
    • Drug-disease
    • Drug-food
    • Drug-geriatric syndrome
  – Prescribing cascade

• Clinical risks
  – Adverse drug reactions
  – Geriatric syndromes
  – Hospitalisation and health care utilisation
  – Institutionalisation and death

• Patient/carer burden
  – Administration time
  – Cost

Gnjidic et al., JCE 2012
### Table 2: Prevalence of medication exposure at and between admission and discharge

<table>
<thead>
<tr>
<th>Medication exposure</th>
<th>Total (n = 204)</th>
<th>Robust (n = 101)</th>
<th>Frail (n = 103)</th>
<th>P value (frail vs. robust)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRID count admission</td>
<td>2.5 ± 2.1</td>
<td>1.6 ± 1.5</td>
<td>3.4 ± 2.2</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>FRID count discharge</td>
<td>2.5 ± 1.9</td>
<td>1.7 ± 1.3</td>
<td>3.3 ± 2.0</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>FRID change: discharge–admission</td>
<td>0 ± 2.8</td>
<td>0.1 ± 2.0</td>
<td>-0.1 ± 3.0</td>
<td>-</td>
</tr>
<tr>
<td>Medication count admission</td>
<td>7.1 ± 4.7</td>
<td>4.4 ± 3.3</td>
<td>9.8 ± 4.3</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Medication count discharge</td>
<td>7.7 ± 4.6</td>
<td>4.9 ± 3.3</td>
<td>10.3 ± 4.2</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Medication change: discharge–admission</td>
<td>0.6 ± 6.5*</td>
<td>0.5 ± 4.6*</td>
<td>0.5 ± 6.0*</td>
<td>-</td>
</tr>
<tr>
<td>DDIs admission</td>
<td>40 (20)</td>
<td>5 (5)</td>
<td>35 (35)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>DDIs discharge</td>
<td>40 (20)</td>
<td>10 (10)</td>
<td>30 (30)</td>
<td>0.001</td>
</tr>
<tr>
<td>DDI change: discharge–admission</td>
<td>0 (0)</td>
<td>5 (5)</td>
<td>-5 (-5)</td>
<td>-</td>
</tr>
<tr>
<td>Complementary medicines count</td>
<td>1.1 ± 1.2</td>
<td>0.7 ± 1.2</td>
<td>1.5 ± 1.3</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Chi-squared analysis, McNemar's test for proportions and Mann-Whitney U test as appropriate. Significance determined as P < 0.05. Data presented as mean ± SD or number (percentage of robust/frail population).

* Represents significant changes in medication exposure from admission to discharge.
Among participants not on anticoagulants, the frail had significantly reduced fibrin generation compared to the non-frail.

In the warfarin-treated group, there was no difference on coagulation profiles between the frail and the non-frail from any of the coagulation tests.

Amongst participants taking aspirin, the frail had higher adjusted arachidonic acid agonist test measures than the non-frail.

Suggests that in frail participants, platelet aggregation is less responsive to aspirin than in non-frail.

Nguyen et al., IMJ 2016; Nguyen et al., Heart, Lung, Circulation 2016
Not just number but also type and dose of medicines determines risk

A Drug Burden Index to Define the Functional Burden of Medications in Older People
Sarah N. Hilmer, MD, PhD; Donald E. Mager, PharmD, PhD; Eleanor M. Simonsick, PhD; Ying Cao, MB; Shari M. Ling, MD; B. Gwen Windham, MD; Tamara B. Harris, MD, MS; Joseph T. Hanlon, PharmD, MS; Susan M. Rubin, MPH; Ronald I. Shorr, MD, MS; Douglas C. Bauer, MD, MPH; Darrell R. Abernethy, MD, PhD

Arch Intern Med. 2007;167:781-787

\[
\frac{E}{\alpha} = \sum \frac{D}{\delta + D}
\]

- Drug Burden Index (DBI) is a pharmacological measure of an older person’s total exposure to medicines with anticholinergic and sedative effects that impair physical and cognitive function
- Main drug classes:
  - Antipsychotics
  - Benzodiazepines and Z drugs
  - Opioids and gabapentin/pregabalin
  - Antidepressants
  - Antimuscarinics
  - Antihistamines
Evaluation of Drug Burden Index

- DBI associated with:
  - Impaired physical function
  - Falls
  - Frailty
  - Hospitalisation and GP visits
  - Institutionalisation
  - Mortality

- Evaluated in older people from community, retirement villages, nursing homes and hospitals internationally
Drug Burden Index as a clinical risk assessment tool

- Development, validation and feasibility testing of DBI software in practice
- Trials in practice:
  - Home Medicines Reviews by pharmacists
  - Hospital inpatients

Kouladjian et al., J Social Admin Pharmacy, 2015
Implementation of DBI in hospital

Retrospective audit before study

- Increase DBI
- Decrease DBI
- No change in DBI

Intervention

Control

Hilmer et al., NSW Health ACI, Project Pharmacist Rayan Nahas
I prefer to organize my pills by side effects...

This one makes me sleepy. This one makes me moody. This one makes me tired...
Deprescribing is the process of withdrawal of an inappropriate medication, supervised by a health care professional with the goal of managing polypharmacy and improving outcomes.
New Tools for Clinicians: education, guidelines, eHealth tools, QUM indicators

- Polypharmacy is common in frail older people and is associated with significant risks of adverse outcomes
- Need to take opportunities to review medicines during admission, on transfer to RACF, and when patient’s condition or goals of care change
- Deprescribing is one of many outcomes of a medication review
- There is emerging evidence on the outcomes and implementation of deprescribing to inform our practice
HETI Module on Reviewing Inappropriate Polypharmacy in Hospital

HETI module initiated by TRG 274, Reduce Inappropriate Polypharmacy in Older Inpatients
Available now through HETI course code 183595643
Evaluation over next few months (Dr Brendan Ng)
Medication Management and Polypharmacy in Older Persons

See also Medication Management Referrals

Assessment

1. Obtain an accurate medication history.
2. Review medications, aiming to identify any specific problems.
   - Check medication indications.
   - Identify discrepancies between medicines being taken and those prescribed.
3. Assess:
   - physical and cognitive function.
   - patient goals, function, and prognosis.
   - signs or symptoms of medicine-related problems, and identify any contributing medicines.

Management

Avoid the prescribing cascade

Consider if any new symptom in an older person could be a side effect of medication.
Compile a comprehensive medication history
Identify potentially inappropriate medications and determine whether they can be ceased

**Decreased or no benefit**
- Not correct drug for disease
- Tolerance to medication
- Improvement in clinical condition
- Benefit for short term only
- Short life expectancy

**Increased risk**
- Increasing age/ frailty (increased risk of ADRs)
- New medication initiated
- New medical condition diagnosed

Scott I.A. et al. JAMA Intern Med. 2015;175(5):827-834
# Identify potentially inappropriate medications

<table>
<thead>
<tr>
<th>Tool</th>
<th>Identifies</th>
<th>Computer Decision Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug Burden Index (DBI)</td>
<td>Anticholinergic and sedative medications</td>
<td>G-MEDSS®</td>
</tr>
<tr>
<td>Beers Criteria</td>
<td>Consensus list of medications to be avoided in older people</td>
<td>AGS BEERS CRITERIA 2015x</td>
</tr>
<tr>
<td>STOPP and START criteria</td>
<td>Consensus lists of medications that are either inappropriate or appropriate for older people</td>
<td>SENSORx</td>
</tr>
</tbody>
</table>
This patient has the following potential **anticholinergic and sedative** side effects

Confusion, Constipation, Dizziness/Drowsiness, Dry Eyes, Dry Mouth, Falls

<table>
<thead>
<tr>
<th>Medication</th>
<th>Frequency</th>
<th>DBI</th>
<th>Deprescribe?</th>
</tr>
</thead>
<tbody>
<tr>
<td>lisinopril 10mg</td>
<td>1 d</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>amiodarone 200mg</td>
<td>1 d</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>dabigatran 150mg</td>
<td>1 2x daily</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>losartan 50mg</td>
<td>1 d</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>frusemide 40mg</td>
<td>1 d</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medication</th>
<th>Frequency</th>
<th>DBI</th>
<th>Deprescribe?</th>
</tr>
</thead>
<tbody>
<tr>
<td>tolterodine 2mg</td>
<td>1 d</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>ibuprofen 400mg</td>
<td>1 3x daily</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>triazolam 0.125mg</td>
<td>2 bedtime</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>galantamine 16mg</td>
<td>1 d</td>
<td>0.67</td>
<td></td>
</tr>
</tbody>
</table>

**Low risk: DBI = 0**  
**Moderate risk: 0 < DBI < 1**  
**High risk: DBI ≥ 1**

Total DBI for this patient: 1.83
Plan and initiate withdrawal

• Is tapering required?
  – Adverse drug withdrawal reactions
  – Minimise the impact of return of condition (determine lowest effective dose)

• Symptom action plan?

• Communication and co-ordination with patient and carers/family

• Communication with all health professionals (nurses, doctors, pharmacists, allied health in hospital and community)
Deprescribing protocols

• Australian Medicines Handbook (AMH) and AMH Aged Care Companion
  – CIAP

• Tasmanian Primary Health Network

• Canadian Deprescribing Network
  – Algorithms for:
    • proton pump inhibitors
    • benzodiazepines
    • antipsychotics
    • hypoglycaemics
    • cholinesterase inhibitors and memantine (Reeve et al., NHMRC)
  – Depresribing.org/resources/deprescribing-guidelines-algorithms

• Algorithms in eMR (under development, TRG 274)
Communication about medicines between staff in geriatric medicine wards

Chan et al., BJCP 2017
Monitor, Support, Document

Monitor:
• Withdrawal symptoms
• Return of condition
• Beneficial effects

Support:
• Education, lifestyle measures, referral to allied health (e.g. dietitian, counselling services)

Documentation:
• For communication and record keeping
• Developing discharge summary tools (TRG 274)
Reducing inappropriate polypharmacy is a priority for consumers

• Over 90% patients say that they would like to stop a medicine if their doctor said they could

• Increasing lay press on risks of polypharmacy and benefits of deprescribing

• Consumer resources being developed
  – NPS Medicinewise
  – CADeN
  – MRFF
Conclusions

• Screening for frailty in hospital patients is feasible but needs to be used with caution and evaluated
• Understanding pharmacology of frailty can inform medication review:
  – Often lower doses required
  – Some medicines cause some older patients more harm than good and can be deprescribed
• Increasing evidence on harms of polypharmacy, safety of deprescribing, how to deprescribe
• Pharmacists, hospital doctors, GPs, nurses, patients and carers can work together, assisted by new tools, to apply this to clinical practice in hospital
Acknowledgements