Managing Multiple Comorbidities in the Elderly

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Comorbidity → Multimorbidity

- **Classification**
  - Counts
  - Convergent (same organ system) or Divergent

- **Correlated with frailty and age**

- **Significance**
  - Interpret symptoms
  - Competing risks for mortality
  - Risk for poor mobility and health status
  - Burden on resource utilization, on caregivers
Multimorbidity in ambulatory clinics in Scotland

- Prevalence 40% by age 65-69
- Onset 10 years earlier w/lower SES
Prevalence of Chronic Conditions in Medicare

- Anemia: 24%
- CKD: 14%
- Depression: 19%
- DM: 28%
- HTN: 58%
- HL: 46%
- IHD: 30%
- Arthritis: 30%
- CVA: 4%
- MI: 5%
- Afib: 8%
- MI: 1%
- A Fib: 1%
- Alz: 5%
- Ane Pl: 11%
- Breast Ca: 5%
- COPD: 12%
- CRC: 1%
- Cataract: 0%
- Diab: 0%
- Eho Ca: 0%
- Glaucoma: 0%
- HF: 15%
- Hip Fract: 1%
- Hypertonia: 10%
- Hyperthy: 28%
- IHD: 30%
- Lung Ca: 7%
- OS: 7%
- P-prostate Ca: 7%
- Rk/kidney: 1%
- Stroke: 4%
## Prevalence of Comorbidities w/ CV Diagnosis

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>Ischemic Heart Disease (N = 8,678,060)</th>
<th>HF* (N = 4,366,489)</th>
<th>AF* (N = 2,556,839)</th>
<th>Stroke* (N = 1,145,719)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>1 (81.3)</td>
<td>1 (85.6)</td>
<td>1 (84.5)</td>
<td>1 (89.0)</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>2 (69.1)</td>
<td>3 (62.6)</td>
<td>2 (64.4)</td>
<td>2 (69.9)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>3 (41.7)</td>
<td>5 (47.1)</td>
<td>7 (37.1)</td>
<td>6 (41.5)</td>
</tr>
<tr>
<td>Arthritis</td>
<td>4 (40.6)</td>
<td>6 (45.6)</td>
<td>6 (41.7)</td>
<td>5 (44.2)</td>
</tr>
<tr>
<td>Anemia</td>
<td>5 (38.7)</td>
<td>4 (51.2)</td>
<td>5 (43.0)</td>
<td>4 (46.8)</td>
</tr>
<tr>
<td>HF</td>
<td>6 (36.3)</td>
<td>Index</td>
<td>4 (50.9)</td>
<td>7 (37.2)</td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>Index</td>
<td>2 (72.1)</td>
<td>3 (63.5)</td>
<td>3 (58.1)</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>7 (30.2)</td>
<td>7 (44.8)</td>
<td>8 (34.4)</td>
<td>8 (35.2)</td>
</tr>
<tr>
<td>Cataract</td>
<td>8 (21.6)</td>
<td>†</td>
<td>10 (22.6)</td>
<td>†</td>
</tr>
<tr>
<td>COPD</td>
<td>9 (21.0)</td>
<td>8 (30.9)</td>
<td>9 (23.8)</td>
<td>†</td>
</tr>
<tr>
<td>AF</td>
<td>10 (18.7)</td>
<td>9 (28.8)</td>
<td>Index</td>
<td>†</td>
</tr>
<tr>
<td>Alzheimer’s disease/dementia</td>
<td>†</td>
<td>10 (26.3)</td>
<td>†</td>
<td>9 (33.8)</td>
</tr>
<tr>
<td>Depression</td>
<td>†</td>
<td>†</td>
<td>†</td>
<td>10 (29.7)</td>
</tr>
<tr>
<td>Stroke</td>
<td>†</td>
<td>†</td>
<td>†</td>
<td>Index</td>
</tr>
</tbody>
</table>

*Data shown as rank and percentage of persons with index condition who also had a comorbidity. The percentage is included parenthetically when applicable. †Comorbidity was not in the top 10 for this index condition (13).

AF indicates atrial fibrillation; COPD, chronic obstructive pulmonary disease; and HF, heart failure.
The “Multimorbidity MI”

- Universal MI Definition – Type 2 MI
  - Troponin/marker elevation
  - Ischemia from supply/demand mismatch
  - With other comorbid presentation

- Treatment focused on comorbid condition
- Outcome is related to comorbid condition
- More common among older, sicker patients

Graph showing survival rates for Type 1 MI and Type 2 MI over 3 years.
Multimorbidity and Hospital Mortality with MI

- Mortality w/CV comorbidity
  - 3.7% with 0 conditions
  - 14.2% with ≥4 conditions
- Mortality w/non-CV comorbidity
  - 6.9% with 0 conditions
  - 15.9% with ≥3 conditions
Composite endpoints and competing risks

- **After Eighty Trial** - 457 aged ≥80 years with NSTEMI or UA randomized to invasive or conservative approach

- Composite of death, MI, stroke, need for urgent revascularization at a mean of 1.53 years
  - 40.6% INV and 61.4% CON (HR 0.53, 0.41–0.69)
  - Composite driven by differences in MI (17% v. 30%) and urgent revasc (2% vs. 11%)
  - No difference in mortality (~25%) or stroke (~5%)

(1) Qualifying event types may vary with older age
(2) High rate of competing mortality makes benefit more difficult to assess
(3) Investigator bias/less use of urgent revasc (driver of composite) in CON age >90
Multimorbidity, HF and ICD

- NCDR ICD Registry and GWTG HF
- EF<35%, HF +/- ICD, comorbidities
- 50% have multimorbidity
- 0-3 comorbidities: HR 0.77 (0.69, 0.87)
- 4-5 comorbidities: HR 0.77 (0.65, 0.86)

Unknown confounding for ICD implantation and unknown cause of death

Khazanie P, JAHA 2015;4:e002061
Multimorbidity and Cause of Death in HF

- 824 ambulatory HF patients Nova Scotia, CA
  - Average EF 32%, 19% had ICD

- Death increases w/comorbidity
  - 46% HF, 14% Sudden, 14% other CV, 25% non-CV

- SCD constant (rare)
  - ICD shocks prevented SCD across comorbidity

*Cause of death not due to shockable events*
CVD as index condition – comorbidity – cause of death

- Evidence to describe multimorbidity is often incomplete
  - Pressure for simplicity in data collection

- Need to know context to inform patient-centered care
  - Competing Risk and Lag time to benefit

- Co-treatment may be critical in optimizing or worsening outcomes
Parting Thoughts

- Complexity Science and Multimorbidity
  - Human health (and health systems) are built around multiple self-adjusting and interacting parts
  - In complex systems, this context is unpredictability and paradox are ever present

- Tolerating Uncertainty in Health Care
  - Osler’s maxim: “Medicine is a science of uncertainty and an art of probability.”
  - Comfort with shades of grey rather than black and white
  - Improve care, avoid frustration, excessive testing and escalation of costs

Simpkin AL, Schwartzstein RM. Tolerating Uncertainty. NEJM 2016; 375;1713-15