Transforming Everyday Life
into Extraordinary Ideas
Measuring Frailty in Canadian Population using CLSA data

Parminder Raina
Director, McMaster Institute of Research on Aging (MIRA)
Canada Research Chair & Professor,
Department of Health Evidence & Impact
Faculty of Health Science, McMaster University

Perception of Aging

Younger age Older age

Physiologic reserve

Time

Dependent

hip fracture

chronic conditions

Younger age Older age
There is no “typical” older person
Health and Functional Abilities in older age are not random

What makes us age differently?

- Genetic inheritance
- Who we are

and a lifetime of:

- Where we live
- Our health behaviour
- Our access to health care
Heterogeneity of Aging

Reserve vs Age

- Early Life
- Young Adult Life
- Older Age

Frailty Threshold

What is Frailty?

• Current consensus definition:

“Frailty is a clinical state in which there is an increase in an individual’s vulnerability for developing increased dependency and/or mortality when exposed to a stressor.”

*A “stressor” is a health problem or life event that happens to you, such as a new diagnosis, hospitalization, or death of a loved one.

Why Measure Frailty?

- Early identification of frailty
- Better prevention and treatment options
- Shift level of population risk
Challenges

• A good measure should help us understand more about frailty, including:
  • How it develops biologically
  • How it affects function and health over time
  • How it relates to social, environmental and behavioural factors

• This requires longitudinal, population-based data with great breadth

→ The CLSA
Environmental influences
(e.g., rural, socio-economic, exercise, nutrition)

Chronic diseases
(e.g., diabetes, cancer, dementia, arthritis, cardio)

Inflammation

Epigenetics
(e.g., telomeres/oxidative stress, psychological & cognitive abilities, immune functions)

Genetics

Health & Social Services Utilization

Time (Longitudinal Study)
Objectives

• Measure frailty in the CLSA
  • Create a Frailty Index that can be used to measure frailty in the population
  • Measured as proportion of many health deficits
    • Includes physical, psychological, and social measures

• What do we think is related to frailty?
  • How closely does the Frailty Index fit these expectations?
• Most CLSA participants have low frailty
• Only 6.9% had a Frailty Index over 0.25
• This means a person had problems in ¼ of the variables measured
  • The more things that are wrong with you, the more likely you are to be frail
Frailty and Income

Frailty Index

Total Household Income

- Less than $20 000
- $20 000 to $50 000
- $50 000 to $100 000
- $100 000 to $150 000
- $150 000 or more

Frailty Index
How did we assess the validity of the CLSA Frailty Index?

<table>
<thead>
<tr>
<th>Less Frail</th>
<th>More Frail</th>
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</thead>
<tbody>
<tr>
<td>• Younger</td>
<td>• Older</td>
</tr>
<tr>
<td>• Male</td>
<td>• Female</td>
</tr>
<tr>
<td>• High income</td>
<td>• More falls</td>
</tr>
<tr>
<td>• High education</td>
<td>• More injuries</td>
</tr>
<tr>
<td></td>
<td>• Need home care</td>
</tr>
<tr>
<td></td>
<td>• Use a cane, walker, or wheelchair</td>
</tr>
<tr>
<td></td>
<td>• Social Isolation</td>
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Frailty  ➔  Limitations  ➔  Social Isolation and its Impact on Biology

**BRAIN**

- Social Isolation (STRESS)
- Sympathetic Nervous System
  - β-adrenergic stimulation

**Monocyte expansion**

- New monocytes are:
  - ↑ Inflammation
  - ↓ IFN genes
  - ↓ GC sensitivity
  - ↑ CTRA (Conserved Transcriptional Response to Adversity)

**Bone Marrow**

- GM-CSF (from Monocytes?)

- Norepinepherine
Myeloid cells
Summary

• Why measure frailty in the population?
  • Changes in frailty over time will allow us to develop trajectories to assess health and community care needs of aging populations

• Identify triggers of frailty at the population and individual levels to design health promotion strategies to prevent decline and dependence

• Inform the development of Interventions for clinical care at the level of individuals
Are there any questions?