International Prevalence of Dementia, Cognitive Impairment and Functional Dependence in Centenarians.

Catriona (Keenie) Daly, Perminder Sachdev, Henry Brodaty
Centenarian Research!

- Concerns about the burden to society
- Increase in centenarian population
- Interest in healthy ageing and longevity

Centenarian Research!
What We Know…

Risk Factors for Dementia in Centenarians

• African American race
• Low education
• Smoking
• Poor Physical Health
• The apolipoprotein E ε-4 allele is rare amongst centenarians.
What We Know…(2)

Changes in Neurocognition

↓ Episodic Memory (esp. attention & processing speed)

→ Language

→ Executive Function
What we (kind of) know…

Dementia Prevalence ???

- **27%** (or **42%** once drop-outs were accounted for) – He & Muenchrath (2011)
- **76%** - Silver, Newell, Brady, Hedley-White & Perls (2002)
## Limitations

<table>
<thead>
<tr>
<th>Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small sample sizes</td>
</tr>
<tr>
<td>Healthy volunteer effect</td>
</tr>
<tr>
<td>Non-ascertainment of all centenarians within a selected region</td>
</tr>
<tr>
<td>Refusal of proxy-consent by ‘protective’ family members</td>
</tr>
<tr>
<td>Frequent shift in residence</td>
</tr>
<tr>
<td>Selective Attrition</td>
</tr>
</tbody>
</table>
Risk & Protective Factors

Prevalence & Incidence

Cognitive function & decline

Contextual factors
CURRENT STUDY
Prevalence of Dementia in Centenarians & Near-Centenarians from 11 population-based studies.
<table>
<thead>
<tr>
<th>Harmonisation</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Education</td>
</tr>
<tr>
<td></td>
<td>Functional Dependence</td>
</tr>
<tr>
<td></td>
<td>Cognitive Impairment</td>
</tr>
</tbody>
</table>
Sample Characteristics

N = 3491

F = 78%

98.2 years
(SD = 2.56)

56.8% < HS
MMSE Score ≤ 22 + ADL Score impaired ≥ 2 items = Dementia Diagnosis
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Kappa Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 + Study</td>
<td>Multidisciplinary consensus</td>
<td>0.722*</td>
<td>.035</td>
</tr>
<tr>
<td>Go95+</td>
<td>Psychiatric Examination and informant reports</td>
<td>0.821*</td>
<td>.032</td>
</tr>
<tr>
<td>HKCS</td>
<td>Self-report hospital diagnosis</td>
<td>-0.053</td>
<td>.018</td>
</tr>
<tr>
<td>PT100</td>
<td>Binary groups based on Global Deterioration Scale (GDS)</td>
<td>0.028</td>
<td>.012</td>
</tr>
<tr>
<td>SCS</td>
<td>Multidisciplinary Consensus</td>
<td>0.708*</td>
<td>.043</td>
</tr>
</tbody>
</table>

* p<0.05
### Table 5. Algorithm Validity analyses

<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Kappa Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 + Study</td>
<td>Multidisciplinary consensus</td>
<td>0.722*</td>
<td>0.035</td>
</tr>
<tr>
<td>Go95+</td>
<td>Psychiatric Examination and informant reports</td>
<td>0.821*</td>
<td>0.032</td>
</tr>
<tr>
<td>HKCS</td>
<td>Self-report hospital diagnosis</td>
<td>0.053</td>
<td>0.018</td>
</tr>
<tr>
<td>PT100</td>
<td>Binary groups based on Global Deterioration Scale (GDS)</td>
<td>0.028</td>
<td>0.012</td>
</tr>
<tr>
<td>SCS</td>
<td>Multidisciplinary Consensus</td>
<td>0.708*</td>
<td>0.043</td>
</tr>
</tbody>
</table>

* p<0.05

**Kappa 0.722 -0.821 in three studies against consensus diagnosis or psychiatric examination**
51.4% cognitively impaired
62.9% functionally dependent
46.7% had dementia
Cognitive Impairment by Age Group

- 95-100: 30%
- 100-105: 70%
- 105+: 80%
Functional Impairment by Age Group

- 95-100
- 100-105
- 105+
Prevalence of Dementia by Study* 

*NOT age standardised
Limitations

• Dementia Diagnosis
  - Based on limited assessment
  - Conservative estimates
  - Type of dementia?

• Low numbers in highest age group
Limitations

Common pitfalls of centenarian research

• Low numbers in highest age group
• Healthy volunteer effect +
• Selective Attrition
• Non-ascertainment of all centenarians within a selected region
• Refusal of proxy-consent by ‘protective’ family members
Better understanding of individual study distributions

- Effects of sensorimotor impairment?
- Assess variability within and between studies
  - Role of meta-factors
- Alternative methods of determining dementia/impairment?

MMSE
- Language
- Administration
- Scoring procedures
- Measure equivalence
Next Steps (immediate)

- Individual study distributions
  - Forest plots
  - Kernel density plots?

- MMSE
  - Sensorimotor impairment
  - Administration & scoring procedures
  - Measure equivalence (item level analysis)

- Alternative dementia classifications
  - Delta (δ) latent dementia phenotype
  - Continuous levels of impairment
Next Steps (Longer term)

• Incidence of dementia & rates of decline

• Risk & Protective factors

• Further investigate ethno-racial differences & possible cohort effects

• Further collaboration
Thank you!

Catriona ‘Keenie’ Daly
Catriona.daly@unsw.edu.au

https://cheba.unsw.edu.au/group/icc-dementia
ICC Dementia Collaborators:

- Nir Barzilai
- Carol Brayne
- Karen Siu-Lan Cheung
- Maria M. Corrada
- John D. Crawford
- Yasuyuki Gondo
- Bo Hagberg
- Henne Holstege
- Daniela S. Jopp
- Claudia Kawas
- Jeffrey Kaye
- Ugo Lucca
- Gabriella Marcon
- Peter Martin
- Oscar Ribeiro
- Leonard W. Poon
- Ingmar Skoog
- Jan Szewieczek