

Dr Natalie de Morton

## Measuring the mobility of older people across clinical settings

## Acknowledgements

- Professor Jenny Keating
- Dr Megan Davidson
- Dr David Berlowitz

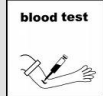
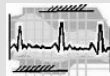
## Funding

- NH&MRC PhD scholarship (2004 - 07) and NH&MRC post doctoral fellowship (2008-12)
- Health Contributions Fund (HCF)
- Northern Clinical Research Center, Northern Health

## Background

- Approx 50% of hospital bed days are used by patients aged 65 years and older (Australian Institute of Health and Welfare 2004-05)
- 20-65% of older medical patients ↓ physical ability during hospital stay (Covinsky, KE et al, 2003; Hirsch et al, 1990; Sager et al. 1996; Mahoney et al. 1998)
- Poorer physical ability at hospital discharge associated with ↑:
  - transfer to nursing home
  - carer burden
  - mortality
  - healthcare costs (Covinsky, KE et al, 2003)

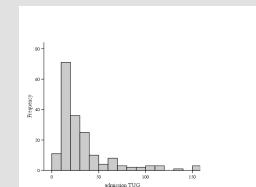
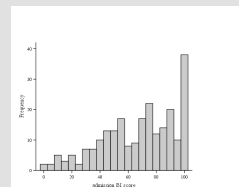
## Important indices of health



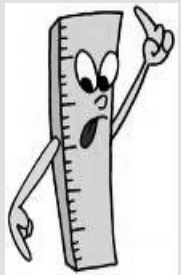
## Preliminary Studies.....

Barthel Index = ceiling effect

Timed Up and Go (TUG) = floor effect



de Morton, Jeffs & Keating. (2007). *Cochrane Library*, Issue 1  
 de Morton et al. (2007). *Australian Journal of Physiotherapy*, 53(2), 105-111.  
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.....the development  
of the

## DEMMI

(de Morton Mobility Index)

de Morton NA, Davidson M, Keating JL  
(2008). *Health and Quality of Life Outcomes*.  
6:63.

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## Aim

- To develop:
  - a practical
  - and high quality method
 for measuring the mobility of older people

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## Development of the DEMMI

- Item generation
  - Focus groups with clinicians from across disciplines
  - Patient interview
  - Existing mobility instruments
  - Clear and simple testing protocols
- Pilot testing items (51 items)
  - Identify items with practical limitations
- Item testing (42 items)
  - 89 older general medical patients assessed every 48 hrs
  - 215 mobility assessments
  - Item reduction = clinical criteria and Rasch analysis

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## Development of the DEMMI

- Testing clinimetric properties (17 items)
  - Reliability
  - Validity
  - MCID
  - Responsiveness to change
- Item refinement of reduced item set (17 items)
  - 14 clinicians from across disciplines
  - Clinician interviews
- Validated in an independent sample of patients
  - Independent physiotherapist
  - Evaluation of measurement properties
  - 15 item DEMMI

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## Participants

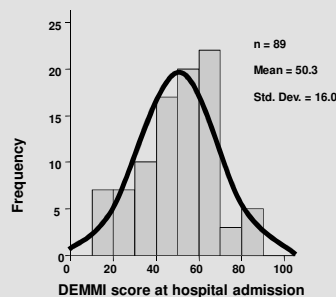
- Inclusion criteria:**
  - 65 years and older
  - Admitted under care of medical unit
  - Screened within 48 hours hospital admission
  - Written and informed consent
- Excluded:**
  - Severe dysphasia
  - Isolated for infection
  - Death imminent
  - Contra-indication to mobilisation
  - Planned admission < 48 hours

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## DEMMI scores at acute hospital admission



Frequency

DEMMI score at hospital admission

n = 89  
Mean = 50.3  
Std. Dev. = 16.0

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### The DEMMI items

EASIEST.....

- Sit unsupported
- Stand unsupported
- Sit to stand
- Bridge
- Roll
- Walking distance
- Lie to sit
- Stand with feet together

- Pick up pen from floor
- Backwards walking
- Walking independence
- Sit to stand no arms
- Stand on toes
- Jump
- Tandem stand eyes closed

HARDEST.....

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### Attributes of the DEMMI

- No floor or ceiling effects
- Quick to administer
- Minimal equipment requirements
- Can be administered at the patient's bedside
- Fits the Rasch model
  - hierarchical
  - unidimensional measure of mobility
  - interval level data

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### Ordinal measurement (e.g. Barthel Index)

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### Interval measurement (e.g. DEMMI)

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### The measurement properties of the DEMMI

- $MDC_{90} = 9$  points
- $MCID = 10$  points

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### The measurement properties of the DEMMI

- Evidence of discriminant, convergent and known groups validity
- More responsive to change than Barthel Index
- Validated in an independent sample ( $n = 112$ )

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## Validation in the subacute hospital and community settings

- Broad scale width
- Without practical limitations in the acute hospital setting
- Application in the community
  - Validation trial completed at NARI in 2008
  - Validation trials at Monash University completed in 2008
- Subacute setting
  - Reliability study completed in 2007
  - GEM validation study completed in 2008

## DEMMI across clinical settings

- The DEMMI is the first mobility instrument that can accurately measure and monitor changes in mobility across acute, subacute and community settings
- Enhancing continuity of care

## Where to from here for the DEMMI?

- Implementation into usual hospital care
- Studies currently underway to validate the DEMMI in specific diagnostic groups e.g. PD, #NOF
- Predictive validity for falls
- Global utility
  - Translation
  - Inexpensive
- Teaching the DEMMI into physiotherapy and medical undergraduate curricula

## Conclusion: DEMMI



- Given the ageing population, there has never been a greater need for this instrument

Thank you.....

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[www.demmi.org.au](http://www.demmi.org.au)

(website will be completed in approximately 1-2 months time)



## References

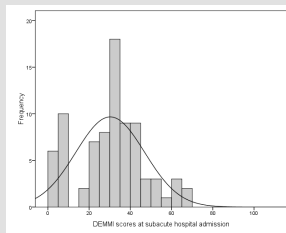
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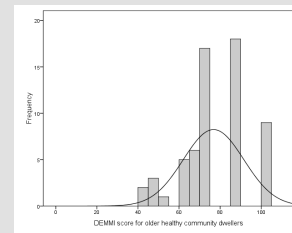
## Validation in the subacute hospital setting

- Subacute setting
  - 100 GEM patients
  - Reliability study completed in 2007
  - GEM validation study completed in 2008
- Mean DEMMI score = 30.2 (sd = 16.7)



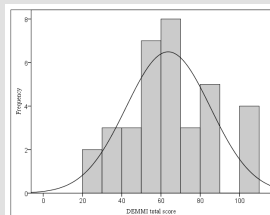
## Validation in the community

- Healthy community dwelling older persons
  - Retirement village
  - n = 61
- Mean DEMMI score = 76.9 (sd = 14.1)



## Validation in the community cont...

- Care recipients in the community
  - n = 35
- Mean DEMMI score = 64.5 (sd = 21.6)



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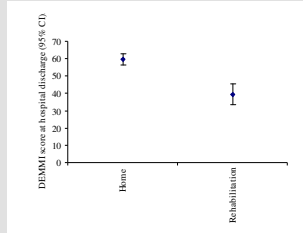
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## Discriminant validity of the DEMMI

Home = 59.61  
(95% CI 56.30 to 62.93)

Inpatient rehab = 39.55  
(95% CI 33.72 to 45.38)

t test:  $p < 0.05$



## TNH

- Implement into usual clinical care
- Healthcare professionals from across disciplines applying the DEMMI
- ?Validation in other clinical groups

## Baseline demographics

Age	79.2 (7.1)														
Gender (% female)	53%														
Place of prior residence	<table border="0"> <tr> <td>Home alone</td> <td>24 (27%)</td> </tr> <tr> <td>Home accompanied</td> <td>54 (61%)</td> </tr> <tr> <td>Hostel</td> <td>6 (7%)</td> </tr> <tr> <td>Nursing Home</td> <td>5 (6%)</td> </tr> </table>	Home alone	24 (27%)	Home accompanied	54 (61%)	Hostel	6 (7%)	Nursing Home	5 (6%)						
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Primary Diagnosis	<table border="0"> <tr> <td>Circulatory</td> <td>21 (23.6%)</td> </tr> <tr> <td>Respiratory</td> <td>13 (14.6%)</td> </tr> <tr> <td>Endocrine</td> <td>9 (10.1%)</td> </tr> <tr> <td>Digestive</td> <td>4 (4.5%)</td> </tr> <tr> <td>Genitourinary</td> <td>4 (4.5%)</td> </tr> <tr> <td>Musculoskeletal</td> <td>4 (4.5%)</td> </tr> <tr> <td>Other</td> <td>34 (38.2%)</td> </tr> </table>	Circulatory	21 (23.6%)	Respiratory	13 (14.6%)	Endocrine	9 (10.1%)	Digestive	4 (4.5%)	Genitourinary	4 (4.5%)	Musculoskeletal	4 (4.5%)	Other	34 (38.2%)
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## Evidence of validity for the DEMMI

- **Convergent validity**
  - High correlation with Barthel Index and HABAM scores
- **Discriminant validity**
  - Low correlation with MMSE, severity of illness, Charlson co-morbidity scores
- **Known groups validity**
  - Patients discharged to home scored significantly higher than patients discharged in inpatient rehabilitation

## Desirable features of the new instrument

- Physical performance measure of mobility
- Unidimensional
- Bed bound to high levels of independent ambulation
- Appropriate and safe for older acute medical patients
- Acceptable and feasible for patient and clinicians
- Less than 10 mins to administer
- Quick and simple scoring protocol
- Minimal equipment requirements
- Inexpensive
- Interpretable by clinicians from across disciplines
- Not condition specific
- More difficult items than stairs
- Reliable, valid and responsive to change

### Criteria for item reduction following item testing

- Practical limitations not identified
- Items redundancy minimised
- Item misfit not identified
- Equipment requirements minimised
- Time to administer < 10 mins
- Ease of administration likely
- Clinically relevant information obtained