The influence of dementia on injury-related hospitalisations and outcomes in Australia: a linked data study

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People with dementia have significantly higher hospitalisation rates than people without dementia of similar age.

Injury has recently been shown to be most common reason for admission to hospital for people with dementia.

However, relatively little is known about hospitalisation for people with dementia who have sustained a fall-related injury.
Aims

• To compare the causes, characteristics and health outcomes for injury-related hospitalisations in people with and without dementia

• To examine temporal trends in injury-related hospitalisations in people with and without dementia
Methods

- Hospitalisation (APDC) and death data (RBDM) for 235,612 individuals, aged 65 years and over, admitted to hospital for a injury between 2003-2012 in NSW were probabilistically linked

- Statistical analysis
  - Age-standardised rates per 100,000 population
  - Impact of dementia modelled adjusting for age, sex, comorbidities and year of admission
  - Trends over time analysed using negative binomial regression
## Demographic characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>With dementia</th>
<th>Without dementia</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16,890</td>
<td>97,274</td>
<td>$\chi^2(1)= 898,$ $p&lt;0.0001$</td>
</tr>
<tr>
<td>Female</td>
<td>41,193</td>
<td>176,074</td>
<td>$p&lt;0.0001$</td>
</tr>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65-69</td>
<td>1074</td>
<td>39,369</td>
<td>$\chi^2(6)= 20,220,$ $p&lt;0.0001$</td>
</tr>
<tr>
<td>70-74</td>
<td>2,676</td>
<td>40,798</td>
<td></td>
</tr>
<tr>
<td>75-79</td>
<td>6,850</td>
<td>49,528</td>
<td></td>
</tr>
<tr>
<td>80-84</td>
<td>14,702</td>
<td>58,041</td>
<td></td>
</tr>
<tr>
<td>85-89</td>
<td>18,031</td>
<td>50,350</td>
<td></td>
</tr>
<tr>
<td>90-94</td>
<td>11,231</td>
<td>26,851</td>
<td></td>
</tr>
<tr>
<td>95+</td>
<td>3,519</td>
<td>8,411</td>
<td></td>
</tr>
<tr>
<td><strong>Categorised modified CCI score</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>34,080</td>
<td>179,068</td>
<td>$\chi^2(2)= 980,$ $p&lt;0.0001$</td>
</tr>
<tr>
<td>1-2</td>
<td>15,229</td>
<td>59,116</td>
<td></td>
</tr>
<tr>
<td>3+</td>
<td>8,774</td>
<td>35,165</td>
<td></td>
</tr>
</tbody>
</table>
Cause of injury

With Dementia
- Falls 91%
- Falls 75%

Without Dementia
- Falls
- Exposure to inanimate mechanical forces
- Intentional self harm
- Other/unspecified
- Transport accidents
- Poisoning
- Burns
Mechanism of fall

With dementia

- Same level 76%
- Involving furniture 19%

Without dementia

- Same level 77%
- Involving furniture 9%
Type of fall-related injury

Fractures
- Head and neck
- Arm
- Trunk
- Hip
- Leg

Non fracture injury
- TBI
- Head and neck
- Arm
- Trunk
- Leg
- Other

* Reference group: Without dementia

Adjusted RR* (95%CI)

Lower risk

Higher risk

Translating dementia research into practice
Length of stay (LOS)

Fractures
- Head and neck
- Arm
- Trunk
- Hip
- Leg

Non fracture injury
- TBI
- Head and neck
- Arm
- Trunk
- Leg
- Other

* Reference group: Without dementia

Adjusted HR* (95%CI)

Longer length of stay

Shorter length of stay

Longer length of stay

Shorter length of stay
30-day mortality

**Adjusted RR* (95%CI)**

- **Reference group**: Without dementia

<table>
<thead>
<tr>
<th>Injury Type</th>
<th>Adjusted RR*</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head and neck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trunk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non fracture injury</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TBI</td>
<td></td>
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</tr>
</tbody>
</table>

* Lower risk
* Higher risk
Trends - fractures

Fractures

- Number of Hospitalisations
- Rate per 100,000 population

<table>
<thead>
<tr>
<th>Year</th>
<th>With dementia (number)</th>
<th>Without dementia (number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>6,000</td>
<td>2,000</td>
</tr>
<tr>
<td>2004</td>
<td>5,800</td>
<td>1,800</td>
</tr>
<tr>
<td>2005</td>
<td>5,600</td>
<td>1,600</td>
</tr>
<tr>
<td>2006</td>
<td>5,400</td>
<td>1,400</td>
</tr>
<tr>
<td>2007</td>
<td>5,200</td>
<td>1,200</td>
</tr>
<tr>
<td>2008</td>
<td>5,000</td>
<td>1,000</td>
</tr>
<tr>
<td>2009</td>
<td>4,800</td>
<td>900</td>
</tr>
<tr>
<td>2010</td>
<td>4,600</td>
<td>800</td>
</tr>
<tr>
<td>2011</td>
<td>4,400</td>
<td>700</td>
</tr>
<tr>
<td>2012</td>
<td>4,200</td>
<td>600</td>
</tr>
</tbody>
</table>

With dementia (PAC -3.7; 95%CI -4.7 -2.9, p<0.0001)
Without dementia (PAC 1.7%; 95%CI 1.2 -2.1, p<0.0001)
Trends - hip fractures

Hip Fractures

Rate per 100,000 population

Number of Hospitalisations


With dementia (number)

Without dementia (number)

With dementia (PAC -4.9; 95%CI -6.2 -3.6, p<0.0001)

Without dementia (PAC 0.1%; 95%CI -0.6 -0.9, p=0.7000)
Trends- non-fracture injuries

Non-fracture injuries

Number of hospitalisations

Rate per 100,000 population

With dementia (number)
Without dementia (number)

With dementia (PAC 2.3%; 95%CI 0.5-4.1, p=0.0109)
Without dementia (PAC 6.1%; 95%CI 5.4-6.8, p<0.0001)
Limitations

- Potential for linkage errors
- Accuracy of coding for dementia and other comorbid conditions
Conclusions

- People with dementia contribute a disproportionately large proportion of injury-related hospitalisations.
- People with dementia are more likely to be admitted with hip fracture and head injuries (including TBI) but less likely to be admitted for other injuries, notably upper limb fractures.
- People with dementia have longer LOS for all injury types, with exception of hip fractures.
- People with dementia have higher 30-day mortality rates for all injury types.
- Hospitalisation trends over last 10 years differ between those with and without dementia.
Recommendations

• This study highlights the importance of developing and implementing effective fall-related preventive strategies for people with dementia

• Directions for future research
  – Investigate reasons for difference in trends in hospitalisations between people with dementia and without dementia
  – Investigate whether there are differences in type of care (acute, subacute, rehabilitation) provided for people with and without dementia
The authors would like to thank the NSW Ministry of Health and the NSW Registry of Birth Deaths and Marriages for the provision of the hospitalisation and death data extracts, and the Centre for Health Record Linkage (CHeReL) for the provision of the unique patient identifiers used to link the datasets.

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