Can home care reduce the risk of emergency readmissions of older people?
Evidence from the linked health and social care data in Scotland

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Introduction
Backgrounds: Population Ageing

In Scotland, it is projected the number of older people aged 65 or over will increase by 53% from 2014 to 2039 and those aged 80 or over will be doubled over the same period of time (National Records of Scotland, 2015).
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Backgrounds: Health and Social Care Integration

- Policy reform to integrate health and social care provision to gain efficiencies and better outcomes for patients
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- An effective understanding of how the health and social care systems interact at the present
Pathways through Health and Social Care Project
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- To understand the interaction of health and social care services using population administrative data
Pathways through Health and Social Care Project

- To understand the interaction of health and social care services using population administrative data
- To develop an understanding of the practicalities and challenges in working with linked health and social care data
Research Questions

- Does home care play a role in reducing the risk of hospital emergency readmission for older people?
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• Is there any difference between older people with and without dementia?
Data & Method
Linked Health and Social Care Data

- The Scottish Government, in collaboration with Information Services Division (ISD) Scotland, Scottish health boards and Scottish local authorities have developed a linkage of specific social care, housing support and health data in order to produce improved analytical evidence to enhance the delivery of these services.
- Further information about the project can be found: http://www.gov.scot_Topics/Statistics/Browse/Health/Datalinking/HealthSocialCareandHousing
Data Components

Hospital Admission Data
Hospital episode data for 2010/11 from SMR01 & SMR04

Social Care Data
Home care and self-directed support data for 2010 & 2011

Prescribing Data
Dataset containing counts of items dispensed in 2010/11

Demographics Data
Demographics & deaths data

Personal ID
allows data to be linked across all datasets

Flags Data
Service contacts for all clients across all datasets

Data linkage is available for five local authorities:
• Edinburgh
• Stirling
• Clackmannanshire
• South Ayrshire
• South Lanarkshire
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Method: Survival Analysis

- Conditional risk set model, also known as the Prentice, Williams and Perterson model (Prentice et al., 1981)

\[ h_k(t, x, \beta) = h_{0k}(t) \exp(x' \beta) \] (1)
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(1)

- Cause-specific hazard model (competing risks)

\[ h_{ik}(t, x, \beta) = h_{0ik}(t)\exp(x'\beta^t_i) \]  

(2)
Results
Heath Care Pathway Comparison

Patients with dementia

Patients without dementia
## Results from Survival Analysis

<table>
<thead>
<tr>
<th></th>
<th>Coef.</th>
<th>SE</th>
<th>Haz. R</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dementia</td>
<td>0.42***</td>
<td>0.03</td>
<td>1.52</td>
<td>1.42</td>
<td>1.62</td>
</tr>
<tr>
<td>Live alone</td>
<td>0.37***</td>
<td>0.05</td>
<td>1.45</td>
<td>1.31</td>
<td>1.60</td>
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<tr>
<td>Home care</td>
<td>0.07</td>
<td>0.04</td>
<td>1.08</td>
<td>1.00</td>
<td>1.14</td>
</tr>
<tr>
<td>Dementia*home care</td>
<td>−0.37***</td>
<td>0.07</td>
<td>0.69</td>
<td>0.61</td>
<td>0.79</td>
</tr>
<tr>
<td>Live alone*home care</td>
<td>−0.31***</td>
<td>0.11</td>
<td>0.74</td>
<td>0.59</td>
<td>0.92</td>
</tr>
<tr>
<td>Other control variables omitted †</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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</tbody>
</table>

<table>
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</tr>
</thead>
</table>

Notes: † Other control variables include: gender, age, dependent level (IoRN), health condition (CCI), deprivation level (SIMD) and local authority.
Estimated Cumulative Hazard Functions: 1
Estimated Cumulative Hazard Functions: II
Heath Care Pathway Comparison (Revisited)
### Competing Risks: Injury vs. Non-injury

<table>
<thead>
<tr>
<th></th>
<th>Injury readmission</th>
<th>Non-jury readmission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>SE</td>
</tr>
<tr>
<td>Dementia</td>
<td>1.05***</td>
<td>(0.10)</td>
</tr>
<tr>
<td>Home care</td>
<td>0.01</td>
<td>(0.12)</td>
</tr>
<tr>
<td>Dementia*Social care</td>
<td>−0.85***</td>
<td>(0.23)</td>
</tr>
<tr>
<td>Live alone</td>
<td>0.61***</td>
<td>(0.16)</td>
</tr>
<tr>
<td>Other control variables omitted(^\d)</td>
<td>−</td>
<td>−</td>
</tr>
</tbody>
</table>

\(^\d\) Other control variables include: gender, age, dependent level (IoRN), health condition (CCI), deprivation level (SIMD) and local authority.
Conclusion
To Conclude

- We find no evidence that home care reduces the rate of hospital emergency readmission for older people without dementia.
- However, home care significantly reduces the rate of hospital emergency readmission for dementia patients.
- Without home care, dementia patients are at a significantly higher rate of emergency readmission, injury-related or not.
- For dementia patients, home care reduces the rate of both injury and non-injury readmission, but the effect appears to be stronger for injury-related readmissions.
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Thank you!
Note: In the last week in March 2010, there were 66,222 home care clients in Scotland (7% of the 65+); and round 79% of them received personal care services (The Scottish Government, 2010).
• The number of emergency patients is around 2.5 times higher than the number of elective patients (ISD Scotland, 2015)
• From 2005 to 2015, the emergency admission rate has increased by 18% in Scotland