Heterogeneity in Multimorbidity and Dementia Trajectories in Old Age in Germany
A Study Based on Health Claims Data

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Introduction

• Ageing populations: occurrence of multiple diseases and progression of multimorbidity over time (Souza et al. 2021)
• Expected increase of the number of people with dementia (GED 2022)
• Dementia coexists with comorbidities (Bunn et al. 2014, Clague et al. 2017)

Data and Methods

Data
• Health claims data of the largest health insurer in Germany (AOK Allgemeine Ortskrankenkasse) 2005-2019
• Cohort of 70-74 year-olds at baseline (2007)

Methods
• Dementia diagnosis following ICD-10 (F00, F01, F02, F03, F05.1, G30, G31.0, G31.82, G23.1) and a validation strategy
• Categorization of the Weighted Charlson Comorbidity Index (dementia excluded): Low (0-1), Medium (2-5), High (6-9), Very high (>=10)
• Accumulation of diseases from 2005-2008
• Sequence analysis
  • Alphabet: Low, Medium, High, Very High, Dementia + Low, Dementia + Medium, Dementia + High, Dementia + Very High, Death
  • Sequence length: 1st quarter of 2007 - 4th quarter of 2019
  • Distance measure: Longest common subsequence (LCS)
• Cluster analysis
  • Ward’s algorithm
• Regression analysis
  • Multinomial logistic regression model to describe identified clusters
  • Controlling for sex and age at baseline (1st quarter of 2007)
  • Marginal means (probability) of being in cluster x by sex and age at baseline

Results

• Identification of seven distinct clusters (Figure 1) after evaluation of cluster quality measures
• Majority in morbidity clusters (60.2%, Table 1)
• 12.7% in dementia clusters with most individuals in the ‘Transition to dementia with high to very high morbidity’ cluster (64.8%)
• 27.1% in ‘Rapid deterioration to death’ cluster (55.9% men and 44.1% women)

Figure 1: Clusters of multimorbidity and dementia trajectories. Distribution plot, n=29,457. Source: AOK 2005-2019

Table 1: Proportion of the identified clusters. n=29,457. Source: AOK 2005-2019

<table>
<thead>
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<td>Low morbidity</td>
<td>17.4</td>
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<tr>
<td>Medium morbidity</td>
<td>28.6</td>
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<tr>
<td>Transition to high morbidity</td>
<td>6.5</td>
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<tr>
<td>Transition to very high morbidity</td>
<td>7.3</td>
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<tr>
<td>Transition to dementia with medium morbidity</td>
<td>4.5</td>
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<tr>
<td>Transition to dementia with high to very high morbidity</td>
<td>8.2</td>
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<tr>
<td>Rapid deterioration to death</td>
<td>27.1</td>
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<tr>
<th></th>
<th>Total</th>
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<td>17.4</td>
<td>33.9</td>
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<tr>
<td>Medium morbidity</td>
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<td>55.9</td>
<td>44.1</td>
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Conclusion and next steps

• Despite large heterogeneity in individual multimorbidity and dementia trajectories in a cohort of 70-74 year-olds, a limited number of clusters was identified
• More individuals died in the dementia clusters compared to the morbidity clusters
• Two distinct dementia clusters, with almost twice as many 70-74 year-olds progressing to dementia with high to very high morbidity than to dementia with medium morbidity
• Faster progression to very high multimorbidity for men vs. slow progression to lower multimorbidity for women

Next steps:
• Multichannel sequence analysis with dementia and multimorbidity representing single dimensions
• Comparison with other populations (clusters of multimorbidity trajectories and their demographic characteristics)

References

• Souza, D. et al. (2021): BMC Public Health. 21(1), 76.
• Bunn, F. et al. (2014): BMC Medicine 12, 192.