Comparing resource use in Alzheimer’s disease across three European countries - 18-month results of the GERAS study

Mark Belger, 1 Josep Maria Argimon, 1 Richard Dodel, 1 Josep Maria Haro, 2 Anders Wimo, 1 Catherine Reed 1
1 Eli Lilly and Company Limited, Windlesham, UK; 2Servei Català de la Salut, Barcelona, Spain; 3Philips-University, Marburg, Germany; 4Parc Sant Joan Sant de Déu, CIERSAM, Universitat de Barcelona, Barcelona, Spain; 5Karolinska Institute, Stockholm, Sweden

BACKGROUND
- Studies from several European countries have shown that the total societal costs of caring for patients with Alzheimer’s disease (AD) vary across countries and regions. 1
- Differences between countries and regions in healthcare system structure and resource availability have a direct impact on resource utilization and costs. 1
- Some data on resource utilization in AD in Europe exist, but few studies have examined resource use in multiple countries, included a large sample size and prospective follow-up, used standardized measures of resource use, or included all categories of AD-related resource use. 2

GERAS was a prospective cohort study conducted in France, Germany, and the UK. 3
- Eligible patients were community-dwelling patients with probable AD 4 presenting during the course of normal clinical care.
- Other inclusion criteria were:
  - Age ≥65 years
  - Mini-Mental State Examination (MMSE) score ≥26 points
  - Having an informal (i.e., non-professional) caregiver who was willing to participate in the study and undertake responsibility for the patient for at least 6 months of the year

Patients and caregivers were stratified according to patient AD dementia severity at baseline:
- mild AD dementia (MMSE score 21–26 points)
- moderate AD dementia (MMSE score 15–20 points)
- moderately severe/severe (MSS) AD dementia (MMSE score <15 points)

OBJECTIVE
To compare drivers of societal costs for AD over 18 months in three European countries (France, Germany and the UK), using prospectively collected data from GERAS.

METHODS

Study Design
- GERAS was an 18-month, multicenter, prospective, non-interventional cohort study conducted in France, Germany and the UK. 3
- Eligible patients were community-dwelling patients with probable AD 4 presenting during the course of normal clinical care.
- Other inclusion criteria were:
  - Age ≥65 years
  - Mini-Mental State Examination (MMSE) score ≥26 points
  - Having an informal (i.e., non-professional) caregiver who was willing to participate in the study and undertake responsibility for the patient for at least 6 months of the year

Patients and caregivers were stratified according to patient AD dementia severity at baseline:
- mild AD dementia (MMSE score 21–26 points)
- moderate AD dementia (MMSE score 15–20 points)
- moderately severe/severe (MSS) AD dementia (MMSE score <15 points)

Resource Use Estimates
Data on patient and caregiver resource use were captured using the Resource Use in Demented Elderly (RUD) instrument. 3
- Caregiver time was recorded as time spent on assisting the patient with basic activities of daily living (ADL, e.g., eating, bathing, dressing, using the bathroom), instrumental activities of daily living (ADL, e.g., housework, shopping, medication use, financial management), and supervision (i.e., preventing dangerous situations, such as risks of falls, walking onto a road alone, walking outside without appropriate clothing).
- All baseline resource use was measured as activity in the previous month.

To enable cross-country comparisons, a weighted score for all community care services and all outpatient visits was calculated by multiplying the individual resource item by the average of the unit costs for the three countries, and then summing the weighted values.

Cost Estimates
- Monthly costs were estimated for each country by applying unit costs of services and products (2010 values) to the health and community care resource use data collected over the 18-month follow-up period. 3
  - Monthly costs included the cost of temporary or permanent institutionalization.
  - A zero cost value was applied to caregiver supervision time.
- UK costs in pounds sterling (£) were converted to Euros (€) using the exchange rate for 2011. 3

Statistical Models
- Models for differences in resource use between countries were analyzed for each resource use item, and adjusted for (in addition to country): patient age, patient gender, GERAS severity group (mild, moderate, MSS), number of patient comorbidities, baseline total ADL score, caregiver age, caregiver relationship (spouse, non-spouse), caregiver working for pay and baseline score for the resource use item.
- Country differences for each resource use item were analyzed by repeated measures (repeated 6 month visits).
- Least squares (LS) mean estimates and 95% confidence intervals (CI) are presented by country from each model.
- Data from generalized linear models (GLM) with gamma distribution and log-link function (caregiver time, 3 month weighted scores for community care services and outpatient visits) were presented as LS means.
- Data from logistic regression models (temporal accommodation, AD medication, financial support received) were presented as odds ratios (OR); an OR > 1 represented an increased likelihood of that outcome compared with the UK (reference country).
- Data from zero-inflated negative binomial distribution models (caregiver missing work days, patient hospital stays, individual items for community care services and outpatient visits) were presented as OR for having the event, and the LS means of the those having the event.
- Data from proportional hazards models (time to institutionalization) are presented as hazard ratios (HR).

RESULTS

Table 1. Patient and Caregiver Baselines at Characteristic

<table>
<thead>
<tr>
<th>Baseline characteristic</th>
<th>Country</th>
<th>France</th>
<th>Germany</th>
<th>UK</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients, N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, years</td>
<td></td>
<td>79.4 (8.61)</td>
<td>75.2 (5.75)</td>
<td>78.5 (7.79)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Gender (% female)</td>
<td></td>
<td>62.3</td>
<td>49.8</td>
<td>54.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Time since diagnosis, days</td>
<td></td>
<td>2.5 (0.41)</td>
<td>2.0 (0.24)</td>
<td>2.2 (0.23)</td>
<td>0.009</td>
</tr>
<tr>
<td>Living alone in home (%)</td>
<td></td>
<td>20.3</td>
<td>16.2</td>
<td>15.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>MMSE Baseline score (range 0–30)</td>
<td></td>
<td>17.2 (7.32)</td>
<td>17.8 (7.72)</td>
<td>17.3 (6.40)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Baseline total ADL score (range 0–99)</td>
<td></td>
<td>47.4 (18.16)</td>
<td>45.5 (21.92)</td>
<td>46.8 (17.69)</td>
<td>0.001</td>
</tr>
<tr>
<td>Number of patient comorbidities</td>
<td></td>
<td>1.8 (1.27)</td>
<td>1.4 (1.19)</td>
<td>1.3 (1.15)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Caregivers, N</td>
<td></td>
<td>419</td>
<td>550</td>
<td>526</td>
<td></td>
</tr>
<tr>
<td>Age, years</td>
<td></td>
<td>67.5 (12.93)</td>
<td>65.3 (11.78)</td>
<td>68.3 (11.90)</td>
<td>0.001</td>
</tr>
<tr>
<td>Gender (% female)</td>
<td></td>
<td>62.4</td>
<td>67.4</td>
<td>67.8</td>
<td>0.004</td>
</tr>
<tr>
<td>Caregiver relationship to patient (% spouse)</td>
<td></td>
<td>61.7</td>
<td>67.6</td>
<td>67.5</td>
<td>0.020</td>
</tr>
<tr>
<td>Caregiver working for pay (%)</td>
<td></td>
<td>21.5</td>
<td>28.6</td>
<td>20.5</td>
<td>0.460</td>
</tr>
</tbody>
</table>

Data are presented as means (SD) unless otherwise indicated. ADL: Activities of Daily Living; MMSE: Mini-Mental State Examination. p-values for comparison between countries derived from Cochran–Mantel–Haenszel tests for categorical variables and analysis of variance (ANOVA) with independent factors for MMSE severity and country for continuous variables.

Table 2. The Top Six Resource Use Items in Each Country Over the 18-Month Period

<table>
<thead>
<tr>
<th>Resource Use Item</th>
<th>France</th>
<th>Germany</th>
<th>UK</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Community care services (15.4%)</td>
<td>47.6 (13.93)</td>
<td>47.8 (13.93)</td>
<td>45.5 (13.93)</td>
<td>0.81 (0.50, 1.32)</td>
</tr>
<tr>
<td>2. AD medication (10.3%)</td>
<td>47.6 (13.93)</td>
<td>47.8 (13.93)</td>
<td>45.5 (13.93)</td>
<td>0.81 (0.50, 1.32)</td>
</tr>
<tr>
<td>3. AD medication (10.3%)</td>
<td>47.6 (13.93)</td>
<td>47.8 (13.93)</td>
<td>45.5 (13.93)</td>
<td>0.81 (0.50, 1.32)</td>
</tr>
<tr>
<td>4. Institutional care (8.5%)</td>
<td>47.6 (13.93)</td>
<td>47.8 (13.93)</td>
<td>45.5 (13.93)</td>
<td>0.81 (0.50, 1.32)</td>
</tr>
<tr>
<td>5. Institutional care (8.5%)</td>
<td>47.6 (13.93)</td>
<td>47.8 (13.93)</td>
<td>45.5 (13.93)</td>
<td>0.81 (0.50, 1.32)</td>
</tr>
<tr>
<td>6. Hospital stay (4.1%)</td>
<td>47.6 (13.93)</td>
<td>47.8 (13.93)</td>
<td>45.5 (13.93)</td>
<td>0.81 (0.50, 1.32)</td>
</tr>
</tbody>
</table>

Our analysis of resource use are only applicable to community-dwelling patients and cannot be extended to patients living permanently in long-term care.
- Resource use was collected at each visit via interview with the caregiver, so it may be subject to recall bias.
- Our calculated time spent providing informal care by the primary caregiver, which may result in the underestimation of informal caregiving time, as it is possible that AD patients receive care from several family members.

LIMITATIONS
- The 18-month GERAS study showed differences between France, Germany and the UK in resource utilization for AD. 3
- These differences in resource utilization could be explained by offering use of community care services and institutionalization.

CONCLUSIONS
- These differences in resource use across countries reflect country specific health and social care systems, but had limited influence on differences in total societal costs.

References

Acknowledgments
The authors would like to acknowledge Catherine Flesse and Sue Chambers (Rx Communications, Mold, UK) for medical writing assistance with the preparation of this poster, funded by Eli Lilly and Company.

ISPOR 20th Annual European Congress; Milan, Italy; Nov 7 – 11, 2015
Sponsored by Eli Lilly and Company