Regional variation in health service use at the end of life

Regionale Unterschiede medizinischer Behandlungen am Lebensende» Ergebnisse aus dem Nationalen Forschungsprogramm NFP 67

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Definitions of EOLC

> “The period between the last 12 month of life of a person with a chronic and progressive diseases including last days to last hours of life” (Liverpool Care Pathway, UK)

> “The period of time when health care provider expects that the death is likely to occur within 6 months” (American Psychological Association)

> “Care provided to patients with incurable and progressive diseases to live as well as possible until they die” (The National Council for Palliative Care, UK)
Focus on individual and regional factors

- associated with costs in the last 12 months of life in Switzerland
- associated with dying in hospital versus in nursing homes in Switzerland
Causes of regional variation in EOLC

Are Regional Variations in End-of-Life Care Intensity Explained by Patient Preferences? A Study of the US Medicare Population

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Objective: We sought to test whether variations across regions in end-of-life (EOL) treatment intensity are associated with regional differences in patient preferences for EOL care.

Research Design: A dual-language (English/Spanish) survey was conducted March to October 2005, either by mail or computer-assisted telephone questionnaire, among a probability sample of 1,340 Medicare part A and/or B beneficiary enrollees in the 20% denominator file, aged 65 or older on July 1, 2003. Data collected included demographics, health status, and general preferences for medical care. In the event the respondent had a serious illness and less than 1 year to live, EOL concerns and preferences were reengaged on hospital referral region EOL spending, a validated measure of treatment intensity.

Results: A total of 2,074 Medicare beneficiaries completed the survey (66% response rate). In analyses adjusted for age, sex, race/ethnicity, education, financial strain, and health status, there were no differences by spending in concern about getting too little treatment (P = 0.50), by concerns about doing too much (P = 0.44), or by knowledge (22% Q1. 22.4% Q5. P = 0.870) or by week (12.1% Q1, 11.7%: P = 0.875).

Conclusions: Medicare beneficiaries generally prefer treatment focused on palliation rather than life-extension. Differences in preferences are unlikely to explain regional variations in EOL spending.

Key Words: Medicare, health care costs, physician’s practice patterns, terminal care, patient satisfaction.

(Med Care 2007;45: 386–393)

There are wide variations in health care expenditures across regions in the United States. For example, Medicare expenditures in the last 6 months of life vary dramatically across hospital referral regions in the United States, ranging from a low of $8,366 per beneficiary in Grand Junction, Colorado, to a high of $21,123 in McAllen, Texas. Variations (21% Q1, 22.4% Q5, P = 0.870) or by week (12.1% Q1, 11.7%: P = 0.875).

— Accepted warranted variation (individual characteristics of patients)
— Unwarranted variation (supply-sensitive care)
Data Sources

- Six health insurance providers and the BFS

Study population: Swiss residents 19 years or older deceased 2008-2010

- Health insurance claim data of 52,126 males & 59,167 females from 6 large health insurers
- In total 111,293 which are app. 60.2% of deceased
### EOLC costs - Males

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 - 30</td>
<td>467</td>
<td>(0.9%)</td>
</tr>
<tr>
<td>31 - 40</td>
<td>646</td>
<td>(1.2%)</td>
</tr>
<tr>
<td>41 - 50</td>
<td>1,782</td>
<td>(3.4%)</td>
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<tr>
<td>51 - 60</td>
<td>4,017</td>
<td>(7.7%)</td>
</tr>
<tr>
<td>61 - 70</td>
<td>8,256</td>
<td>(15.8%)</td>
</tr>
<tr>
<td>71 - 80</td>
<td>13,638</td>
<td>(26.2%)</td>
</tr>
<tr>
<td>81 - 90</td>
<td>17,900</td>
<td>(34.3%)</td>
</tr>
<tr>
<td>91+</td>
<td>5,411</td>
<td>(10.4%)</td>
</tr>
<tr>
<td><strong>Nationality</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swiss</td>
<td>46,768</td>
<td>(89.7%)</td>
</tr>
<tr>
<td>Foreigner</td>
<td>5,349</td>
<td>(10.3%)</td>
</tr>
<tr>
<td><strong>Civil status</strong></td>
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<td></td>
</tr>
<tr>
<td>Single</td>
<td>6,247</td>
<td>(12.0%)</td>
</tr>
<tr>
<td>Married</td>
<td>30,452</td>
<td>(58.4%)</td>
</tr>
<tr>
<td>Widowed</td>
<td>10,796</td>
<td>(20.7%)</td>
</tr>
<tr>
<td>Divorced</td>
<td>4,622</td>
<td>(8.9%)</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
<td></td>
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<tr>
<td>Protestant</td>
<td>24,249</td>
<td>(46.5%)</td>
</tr>
<tr>
<td>Catholic</td>
<td>18,137</td>
<td>(34.8%)</td>
</tr>
<tr>
<td>No affil.</td>
<td>3,230</td>
<td>(6.2%)</td>
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<tr>
<td>Other/Unknown</td>
<td>6,501</td>
<td>(12.5%)</td>
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<tr>
<td><strong>Cause of death</strong></td>
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<td></td>
</tr>
<tr>
<td>CVD</td>
<td>17,398</td>
<td>(33.4%)</td>
</tr>
<tr>
<td>Cancer</td>
<td>16,107</td>
<td>(30.9%)</td>
</tr>
<tr>
<td>Mental &amp; behav.</td>
<td>2,313</td>
<td>(4.4%)</td>
</tr>
<tr>
<td>Nervous system</td>
<td>2,178</td>
<td>(4.2%)</td>
</tr>
<tr>
<td>Respiratory</td>
<td>3,637</td>
<td>(7.0%)</td>
</tr>
<tr>
<td>Digestive</td>
<td>2,088</td>
<td>(4.0%)</td>
</tr>
<tr>
<td>External</td>
<td>3,272</td>
<td>(6.3%)</td>
</tr>
<tr>
<td>Other</td>
<td>5,124</td>
<td>(9.8%)</td>
</tr>
</tbody>
</table>

Mean EOLC cost per insured [x1,000 CHF]

### EOLC costs - Females

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 - 30</td>
<td>231</td>
<td>(0.4%)</td>
</tr>
<tr>
<td>31 - 40</td>
<td>405</td>
<td>(0.7%)</td>
</tr>
<tr>
<td>41 - 50</td>
<td>1,093</td>
<td>(1.8%)</td>
</tr>
<tr>
<td>51 - 60</td>
<td>2,516</td>
<td>(4.3%)</td>
</tr>
<tr>
<td>61 - 70</td>
<td>4,992</td>
<td>(8.4%)</td>
</tr>
<tr>
<td>71 - 80</td>
<td>10,760</td>
<td>(18.2%)</td>
</tr>
<tr>
<td>81 - 90</td>
<td>24,795</td>
<td>(41.9%)</td>
</tr>
<tr>
<td>91+</td>
<td>14,366</td>
<td>(24.3%)</td>
</tr>
<tr>
<td><strong>Nationality</strong></td>
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<tr>
<td>Swiss</td>
<td>55,671</td>
<td>(94.1%)</td>
</tr>
<tr>
<td>Foreigner</td>
<td>3,487</td>
<td>(5.9%)</td>
</tr>
<tr>
<td><strong>Civil status</strong></td>
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<td></td>
</tr>
<tr>
<td>Single</td>
<td>6,978</td>
<td>(11.8%)</td>
</tr>
<tr>
<td>Married</td>
<td>13,064</td>
<td>(22.1%)</td>
</tr>
<tr>
<td>Widowed</td>
<td>33,875</td>
<td>(57.3%)</td>
</tr>
<tr>
<td>Divorced</td>
<td>5,241</td>
<td>(8.9%)</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
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</tr>
<tr>
<td>Protestant</td>
<td>30,046</td>
<td>(50.8%)</td>
</tr>
<tr>
<td>Catholic</td>
<td>28,432</td>
<td>(43.5%)</td>
</tr>
<tr>
<td>No affil.</td>
<td>2,281</td>
<td>(3.9%)</td>
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<tr>
<td>Other/Unknown</td>
<td>6,399</td>
<td>(10.8%)</td>
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<tr>
<td><strong>Cause of death</strong></td>
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</tr>
<tr>
<td>CVD</td>
<td>22,858</td>
<td>(36.6%)</td>
</tr>
<tr>
<td>Cancer</td>
<td>13,250</td>
<td>(22.4%)</td>
</tr>
<tr>
<td>Mental &amp; behav.</td>
<td>4,670</td>
<td>(7.9%)</td>
</tr>
<tr>
<td>Nervous system</td>
<td>3,256</td>
<td>(5.5%)</td>
</tr>
<tr>
<td>Respiratory</td>
<td>3,360</td>
<td>(5.7%)</td>
</tr>
<tr>
<td>Digestive</td>
<td>2,419</td>
<td>(4.1%)</td>
</tr>
<tr>
<td>External</td>
<td>2,594</td>
<td>(4.4%)</td>
</tr>
<tr>
<td>Other</td>
<td>6,751</td>
<td>(11.4%)</td>
</tr>
</tbody>
</table>

Mean EOLC cost per insured [x1,000 CHF]
564 MedStat regions in 71 Hospital service areas (HSA)

Boundary of hospital service area (HSA)
White lines are boundaries of MedStat regions

564 MedStat regions in 71 Hospital service areas (HSA)

Boundary of hospital service area (HSA)

Language region [564]
- French [134]
- German [402]
- Italian [28]
C - urbanicity

Urbanicity [564]
- Urban [57]
- Peri-urban [274]
- Rural [233]
Cost of care in the last 12 months of life

Mean cost [thousands CHF]

- [ 8.14,26.60]
- (26.60,29.13]
- (29.13,32.48]
- (32.48,36.41]
- (36.41,57.10]

No. of regions (N=564)

- 113
- 113
- 112
- 113
- 113

- French speaking
- Italian speaking

- HSA
- Lake
Statistical Analysis

- Multi-level linear regression models on \( \ln(\text{cost}) \)

- Sequence of models gradually more complex
  - 1) only HSA (hospital service area) and medstat region
  - 2) plus individual factors: age, cause of death, civil status, nationality, religion
  - 3) plus regional factors: urbanicity, language region, SwissSEP
  - 4) plus supply measures: density of physicians, of nursing home beds, of hospital beds
Cost flow according to age, providers & cause of death
Distribution according to hospital service area

Mean cost [thousand CHF]  No. of HSAs (N=63)

- (48.04,63.88)  13
- (41.95,48.04)  12
- (37.41,41.95)  13
- (34.14,37.41)  12
- [26.67,34.14]  13

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Adjusted cost ratios of inpatient hospital care
Adjusted cost ratios of outpatient hospital care

Cost ratio

- (1.50, 3.85]
- (1.30, 1.50]
- (1.10, 1.30]
- (1.00, 1.10]
- (0.91, 1.00]
- (0.77, 0.91]
- (0.66, 0.77]
- (0.45, 0.66]

No. of HSAs (N=63)

- 12
- 0
- 4
- 3
- 4
- 13
- 20
- 7
Adjusted cost ratios of GP care

Cost ratio

- (1.50, 3.85]
- (1.30, 1.50]
- (1.10, 1.30]
- (1.00, 1.10]
- (0.91, 1.00]
- (0.77, 0.91]
- (0.66, 0.77]
- (0.45, 0.66]

No. of HSAs (N=63)

- 0
- 7
- 12
- 12
- 12
- 16
- 4
- 0
Adjusted cost ratios of specialist care
Aims of the second study

> To describe regional differences in the proportion of deaths in hospitals versus in nursing homes

> To identify patient (e.g. age, gender), regional (e.g. urbanicity, language region, Swiss-SEP) and supply of health care (e.g. density of hospitals beds, nursing homes) associated with place of death
A total of 52,037 deaths occurred in 2010 among patients aged 66 or older

- 41,275 people died in institutions (79% of total deaths in 2010)
- 54% of deaths occurred in nursing homes
- 46% in hospital setting
- 57% females
Crude regional variation in the ratio of dying in hospital versus in nursing homes

* Actually deviation on the ln(ratio) is shown
Age and sex-adjusted regional variation in the ratio of dying in hospital versus in nursing homes

Taken from Luta et al 2016. Dying among the elderly in Switzerland: who dies in hospital, who dies in a nursing home? BMC Palliative Care
• Higher probability of nursing home deaths in rural areas.

• Higher probability of hospital death in French and Italian speaking region.

• No association with Swiss SEP.

• Density of physicians, and hospitals beds were not associated with dying in an institution.

• Density of ambulatory care physicians and nursing homes beds negatively associated with death in hospital.
Conclusions

> Basic health insurance EOL care cost depend mainly on the cause of death and age at death.
> Supply measures weakly associated with costs and somewhat associated with dying in hospital versus nursing homes.
> The observed geographical variation might indicate that care processes at the end of life are organized differently between (linguistic) regions
Strengths

> The first studies in Switzerland which examine regional variation across HSAs and Medstat regions
> Inclusion of individual and ecological-level characteristics

Limitations

> Our study is based on retrospective data collected for administrative purposes.
> Study reflects situation of the years 2008-2010
> Data on patient and caregiver preference was not available.
> Costs recorded in health insurance do not cover all costs (not the full hospital costs, nursing home costs & Spitex costs incompletely captured)
EOLC or care in the last year of life involves more than costs and where persons die

- Pain management
- Relief of symptoms
- Avoiding inappropriate prolongation of dying

- Anxiety
- Depression
- Fear of death
- Emotional distress

- Praying
- Talking with someone from religious community
- Resolving unsettled issues with others

- Respect preferences of the dying patients/families
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