Healthcare Expenditure in the Last Year of Life: The Experience of South African Medical Schemes

Matan Abraham, Kathryn Dreyer, Mario Giuricich and Shivani Ramjee

University of Cape Town
Research Objectives

• To investigate the costs incurred by medical schemes arising from the provision of benefits during the 12 months preceding a beneficiary’s death.

• To better understand the relationship between these costs and:
  • Age
  • Gender
  • Prescribed Minimum Benefits
  • Pre-identified clinical risk
Contextualising the research

• Significant body of international literature
• Topic receives much attention in the US
  • Medicare population largely over 65 so last-year-of-life costs account for a quarter of spend
• Only one prior study in South Africa
  • Moodley and McLeod (2001)
  • Small number of decedents and changes in the policy environment since then
• Our healthcare system has particular features (open enrolment, community rating and minimum benefits)
  • Important from a policy perspective to identify if last-year-of-life costs are structurally different to other places in the world
Why is this of interest?

- Potentially useful insights for medical schemes relating to benefit design
- Relates to the important issue of rationing of healthcare
  - Potential concern over limited medical resources being directed to health insurance beneficiaries in their last year of life (Scitovsky, 1994)
  - Difference between a retrospective study and prospective study
    - Cannot infer that healthcare has been provided in the anticipation of death. Such an inference can only be made when analysing terminally-ill patients (usually with a homogenous cause of death).
Data

- Data provided by Medscheme, with schemes and beneficiaries de-identified
- Four-year period (2008-2011)
- Robust conclusions can be drawn:
  - Approximately 3 million beneficiaries – around 38% of medical scheme beneficiaries
  - 36,711 decedents (as compared to 1,650 in Moodley and McLeod)
  - Demographic profile in line with industry
  - Data from 18 different medical schemes: wide range of benefit designs, open and restricted schemes
  - Possible peculiarities in terms of how data are captured
- 2 sets of data provided: summary data for the entire risk pool and detailed data for decedents
Additional Notes on Data

• We used “claim amount” (amount of the claim submitted by the beneficiary) and not “risk amount” (amount reimbursed by the scheme)
  • For the entire risk pool, total claimed amount during the period is approximately 10.6% higher than the risk amount. When looking at just decedents this falls to 4.2%.
  • Claim amount was used as it more closely represents the costs actually experienced by beneficiaries (not entirely as some claims are never submitted)
• Claims data are adjusted for inflation in order to obtain results in real terms
Clinical Groupers

• Data representing each decedent’s Resource Utilisation Band (RUB) were also provided.
• An indication of a beneficiary’s expected future healthcare utilisation and costs
• Values range from 0 to 5: the higher the value, the higher the predicted resource utilisation for the beneficiary.
• Determined using the (proprietary) Johns Hopkins Adjusted Clinical Groupings (ACGs) Case-Mix system
• Only provided for beneficiaries who have exposure greater than 6 months.
Methodology

Last year of life as compared to prior years

- Analyse the relationship that exists between the years prior to death (not calendar years)
- Age at death
- Only decedents are considered

Comparison of decedent and survivor costs

- Determine extent to which decedent costs vary from survivor costs within a particular calendar year
- Age at 1 Jan
- Both survivors and decedents are considered
Healthcare Costs in the Last Year of Life

1. Determine exposure period
2. Calculate aggregate exposure.
3. Calculate aggregate healthcare costs in each year prior to death.
4. Compare years by taking ratios.

This method is carried out for age at death, category of expenditure and RUB value.
Healthcare Costs in the Last Year of Life

Determine exposure period
Ascertain the latest date on which each beneficiary discontinued their medical scheme cover (date of death). Determine the date on which exposure began – later of 1 Jan 2008 and join date.
Calculate aggregate exposure. Divide exposure period into the respective years prior to death for each beneficiary. Computed using the end of the month of death. Aggregate exposure was calculated by summing all beneficiaries’ exposure months falling within each respective year prior to death.
Example of Allocating Exposure

Joins prior to 1 Jan 2008

2008

3 months exposure in the third last year of life

12 months exposure in the second last year of life

2009

6 months exposure in the second last year of life

12 months exposure in the last year of life

2010

Dies November 2009

12 months exposure in the last year of life

2011

Dies March 2010

2009

12 months exposure in the second last year of life

2010

12 months exposure in the last year of life
Note on Aggregate Exposure

- Calculated exposure is subject to overestimation of exposure period.
- End of exposure is end of the month, irrespective of when the beneficiary died or left the scheme.
- Start of exposure is assumed to be the start of the month. Vast majority of joining dates fall at the beginning of the month but there were some data points which had to be adjusted.
- These assumptions for consistency between claims and exposure as claim amounts are summarised by treatment month.
Healthcare Costs in the Last Year of Life

- Determine exposure period
- Calculate aggregate exposure.
- Calculate aggregate healthcare costs in each year prior to death.
- Compare years by taking ratios.

This method is carried out for age at death, category of expenditure, RUB value and gender.
The diagram illustrates the average claimed amount and the ratio between successive years.

- **1st Year**: Average Claimed Amount = 187,388
- **2nd Year**: Average Claimed Amount = 53,159
- **3rd Year**: Average Claimed Amount = 41,391
- **4th Year**: Average Claimed Amount = 36,311

The ratio between successive years is indicated by the following values:

- Ratio 1st to 2nd Year = 3.53
- Ratio 2nd to 3rd Year = 1.28
- Ratio 3rd to 4th Year = 1.14

The graph visually represents these values, with bars for average claimed amounts and markers for the ratios.
Average Cost (in ZAR) by Quarter Prior to Death

- 1st Quarter: 2011 (light blue), 2010 (light blue), 2009 (light blue), 2008 (dark blue)
- 2nd Quarter: 2011 (light blue), 2010 (light blue), 2009 (light blue), 2008 (dark blue)
- 3rd Quarter: 2011 (light blue), 2010 (light blue), 2009 (light blue), 2008 (dark blue)
- 4th Quarter: 2011 (light blue), 2010 (light blue), 2009 (light blue), 2008 (dark blue)
Average Costs in the Last Year of Life According to Age at Death

Average Claimed Amount Per Person Per Year

| Age    | 0  | 50000 | 100000 | 150000 | 200000 | 250000 | 1-5  | 6-10 | 11-15 | 16-20 | 21-25 | 26-30 | 31-35 | 36-40 | 41-45 | 46-50 | 51-55 | 56-60 | 61-66 | 66-70 | 71-75 | 76-80 | 81-85 | 86-90 | 91+  |
|--------|----|-------|--------|--------|--------|--------|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
Average Costs in the Last Year of Life According to Age at Death

- Very high cost for neonates (R740,000 pbpy)
  - Less than a full year of exposure: comparison over the last 6 months of life may decrease differences in average costs between neonates and other ages
  - Complex ethical and emotional issues
  - Strict rationing guidelines in the public sector (<0.9kg) (Econex, 2012)
- Sharp drop-off after age 70
  - Low levels of benefits for nursing homes, frail care and hospice – possibility of costs that are not visible to medical schemes. Similar findings elsewhere in the world (Scitovsky, 2005)
  - Choice of “place of dying” can impact on costs—elderly patients may choose to go into frail care rather than a private hospital.
  - Implicit age-based rationing already occurring. Levinsky et al (2001) suggested that it may be as a result of the elderly patients avoiding aggressive healthcare procedures.
  - Those that survive to older ages often stable on chronic medication – has an impact on the costs arising from co-morbidities/clinical complications
## Average Costs in the Last Year of Life According to Category of Expenditure

<table>
<thead>
<tr>
<th>Category of Expenditure</th>
<th>Proportion of Average Claimed Amounts Years Prior to Death</th>
<th>Ratio (1\textsuperscript{st}/2\textsuperscript{nd} last year of life)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Medicines</td>
<td>1.59% / 5.00%</td>
<td>1.12</td>
</tr>
<tr>
<td>Anti-Retroviral Therapy</td>
<td>0.27% / 0.66%</td>
<td>1.42</td>
</tr>
<tr>
<td><strong>Auxiliary</strong></td>
<td><strong>7.84% / 6.49%</strong></td>
<td><strong>4.24</strong></td>
</tr>
<tr>
<td>Chronic Medicines</td>
<td>1.20% / 4.78%</td>
<td>0.88</td>
</tr>
<tr>
<td>Dental</td>
<td>0.15% / 0.67%</td>
<td>0.77</td>
</tr>
<tr>
<td>General Practitioner</td>
<td>1.33% / 2.79%</td>
<td>1.68</td>
</tr>
<tr>
<td><strong>Hospital</strong></td>
<td><strong>59.47% / 42.28%</strong></td>
<td><strong>4.96</strong></td>
</tr>
<tr>
<td>Medical Specialist</td>
<td>8.27% / 8.97%</td>
<td>3.25</td>
</tr>
<tr>
<td>Optical</td>
<td>0.17% / 0.82%</td>
<td>0.75</td>
</tr>
<tr>
<td>Pathology</td>
<td>5.45% / 4.55%</td>
<td>4.23</td>
</tr>
<tr>
<td><strong>Radiation/Oncology</strong></td>
<td><strong>6.46% / 12.03%</strong></td>
<td><strong>1.89</strong></td>
</tr>
<tr>
<td>Radiology</td>
<td>4.12% / 5.17%</td>
<td>2.81</td>
</tr>
<tr>
<td>Special Benefits</td>
<td>3.68% / 5.79%</td>
<td>2.24</td>
</tr>
<tr>
<td>Unknown</td>
<td>0.00% / 0.01%</td>
<td>0.72</td>
</tr>
</tbody>
</table>
Average cost pbpy in 2nd last year of life

Average cost pbpy in last year of life
Comparison of decedent and survivor costs

Decedents’ costs and exposure periods aggregated by summing all decedents’ costs and exposures respectively, within each calendar year.

In the same way, aggregate survivor costs and exposure are calculated.

Ratios are calculated to compare the average survivor and decedent costs within each calendar year.

This method is carried out for age at 1 Jan, category of expenditure and for PMB/non-PMB costs.
Comparison of Decedent and Survivor Costs

- The last year of life is as defined previously (i.e. overestimation of decedent exposure)
- There are three scenarios for allocating costs

<table>
<thead>
<tr>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dies in the year being analysed</td>
<td>Dies in the calendar year subsequent to the year being analysed</td>
<td>Survives the calendar year being analysed and the subsequent year</td>
</tr>
</tbody>
</table>
Scenario 1

10 months of exposure, all assigned to decedent exposure.
No contribution to survivor exposure.
Claims for January to October are included under decedent costs.

Last year of life

Deaths in October of the year being analysed

Year being analysed
Scenario 2

- Year being analysed:
  - Last year of life
  - 5 months exposure allocated to survivor exposure.
  - Costs occurring in Jan to May are allocated to survivor costs.

- 7 months exposure allocated to decedent exposure.
- Costs occurring June to December are allocated to decedent costs.
- Dies in May in the calendar year subsequent to the year being analysed.
Scenario 3

Whole period allocated to survivor exposure
All costs allocated to survivor costs

Year being analysed

Dies in September - Survives the calendar year being analysed and the subsequent year
The Problem with 2011

Problem 2: Beneficiaries dying in 2011 are, on average, closer to death than that of beneficiaries dying in 2012. So aggregate decedent costs are substantially higher than for other calendar years.

Assumption: everyone who survives to 31 December 2011 is classified as a survivor

RESULT: significant overestimation of average decedent costs in 2011.

### Analysis of Survivor and Decedent Costs

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>3.92%</td>
<td>5.23%</td>
<td>6.57%</td>
<td>5.39%</td>
</tr>
<tr>
<td>Risk-Adjusted Average Decedent Claim Amount (in ZAR)</td>
<td>120,890</td>
<td>149,189</td>
<td>157,760</td>
<td>213,856</td>
</tr>
<tr>
<td>Risk-Adjusted Average Survivor Claim Amount (in ZAR)</td>
<td>9,711</td>
<td>10,299</td>
<td>10,072</td>
<td>10,287</td>
</tr>
<tr>
<td>Ratio</td>
<td>12.45</td>
<td>14.49</td>
<td>15.66</td>
<td>20.79</td>
</tr>
</tbody>
</table>
## Last year of life and PMBs

<table>
<thead>
<tr>
<th></th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>that are PMB related</td>
<td>73.95%</td>
<td>58.18%</td>
<td>53.59%</td>
<td>48.61%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>decedent costs that</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>are PMB related</td>
<td>61.44%</td>
<td>69.30%</td>
<td>73.70%</td>
<td>80.10%</td>
</tr>
<tr>
<td>Percentage of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>survivor costs that</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>are PMB related</td>
<td>32.99%</td>
<td>37.73%</td>
<td>39.02%</td>
<td>42.83%</td>
</tr>
</tbody>
</table>
Conclusions: Key Factors Influencing Last-Year-of-Life Costs

The three main factors that have the most notable impact on costs:

1. Dominance of hospital costs
2. Impact that young beneficiaries have on costs in the last year of life
3. Vital to constantly monitor the number of beneficiaries who have a RUB value of 5.
Conclusions: Rationing

• On a per beneficiary basis medical schemes incur significant costs in the last year of life
• But, these costs only constitute between 3.92% and 6.57% of total yearly expenditure
• And the majority of costs are incurred in the treatment of PMBs
• In 2010 only 1.7% of costs would have been affected by an attempt to ration last-year-of-life costs
• Potentially some merit in managed care interventions focussing on high-risk beneficiaries
• Require prospective research to better understand decision making in advance of death
Conclusions: Benefit Design

- Thinking about the “place of dying”
- Possible benefits from greater co-ordination of care for the frail and chronically ill
- Trends in last-year-of-life expenditure may be revealing in terms of technological advances (Stearns & Norton, 2004), for example, new cancer treatments
Conclusions: Policy Implications

• Useful to compare results to Moodley and McLeod (2001)
  • Average last-year-of-life costs were 3.2 times greater than those in the second last year of life (as compared to 3.53)
  • Ratio of decedent to survivor costs obtained in Moodley and McLeod (2001) were similar to results in this study
• Increased impact of last-year-of-life costs likely to be the combined result of anti-selection (in a voluntary, community-rated, open enrolment environment) and PMBs
• Late-jointer penalties insufficiently high to protect schemes
• Can be argued that PMBs are achieving aim of protecting the public sector from “dumping” at the end of life
Further Research

- Prospective study
- Further analysis to understand potential anti-selection
- Growth rate projection of the number of beneficiaries in their last year of life
- Analysis of out-of-pocket expenses, such as frail care and nursing care.
- Investigate the reasons for decline in the costs after the age of 70
- Collection of data on the cause of death
- Detailed investigation into clinical grouper systems which allows for better monitoring of high-risk beneficiaries
JOEL PETT  
LEXINGTON HERALD-LEADER

"So, any minute now, things should be looking up!"

Social Security  
Medicare

Most health spending comes near the end.