Prospects for Future Health and Health Care Spending Among the Elderly

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for Dana Goldman and the RAND group on medical care expenditure forecasting
Medicare is central to the U.S. health policy debate

- Largest insurer by far
- Spent US$300 billion in 2005
- Accounts for almost 20% of all medical spending
- 13% of government spending

We need to know what Medicare’s future looks like
Standard Forecasting Approach

Contains assumptions about prices, treatment, medical technology

Number of people \times \text{Amount each person spends} = \text{Total spending}
Standard Forecasting Approach

Contains assumptions about prices, treatment, medical technology

Number of people × Amount each person spends = Total spending
Government Does a Good Job Forecasting the Number of Medicare Beneficiaries…

Beneficiaries (in thousands)

Year


High estimate in 1983
Low estimate in 1983
Actual
Standard Forecasting Approach

Contains assumptions about prices, treatment, **medical technology**

\[ \text{Number of people} \times \text{Amount each person spends} = \text{Total spending} \]
...But Not Medicare Spending

Medicare Part A spending (hospital insurance)

Year


Billions of dollars (2005)

High estimate 1980

Low estimate 1980
...But Not Medicare Spending

Medicare Part A spending (hospital insurance)

Billions of dollars (2005)

Year

Actual

High estimate 1980

Low estimate 1980
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High estimate 1980
Low estimate 1980
Actual

Actual
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...But Not Medicare Spending

Medicare Part A spending (hospital insurance)

- **Actual**
- **High estimate 1980**
- **Low estimate 1980**

**Billions of dollars (2005)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual</th>
<th>High estimate 1980</th>
<th>Low estimate 1980</th>
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<td>1992</td>
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<td>1994</td>
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What Explains the Increase in Total Medical Spending over the Last Fifty Years?
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Aging
What Explains the Increase in Total Medical Spending over the Last Fifty Years?

- Aging
- Income
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- Aging
- Income
- Insurance
What Explains the Increase in Total Medical Spending over the Last Fifty Years?

- Aging
- Income
- Insurance
- Prices
What Explains the Increase in Total Medical Spending over the Last Fifty Years?

- Technology
- Income
- Aging
- Insurance
- Prices
The Problem Is Understanding the Effects of Medical Technology

The Left Ventricular Assist Device
Is There a Better Way to Forecast Total Medical Spending?

- Centers for Medicare and Medicaid Services requested this study
- Goal: Open the “black-box” of future medical technology
- Focus on the elderly
Our Approach

• Identify emerging technologies

• Build demographic-economic model

• Simulate effects of technology on:
  – Spending
  – Functional status
  – Disease
Identified Emerging Technologies Using Methods Pioneered at RAND and UCLA

• Step 1: Reviewed vast literature on emerging technologies
  – Devices, drugs, treatments, clinical practices
  – 21,400 articles screened

• Step 2: Convened panels of private sector and academic experts
  – Cardiovascular disease
  – Neurological disorders
  – Cancer / biology of aging
  – Geriatricians and social scientists

• Identified 34 key emerging technologies
Example: Intraventricular Defibrillators

Used to treat patients with life-threatening arrhythmias: shocks heart to restore natural rhythm.

Target:  
- 50% of patients with heart failure
- 50% of patients post heart attack
- 20% of patients with cardiomyopathy

Likelihood:  
- 30% in 10 yrs
- 30-40% in 20 yrs

Impact:  
- No effect on hospitalizations
- Life expectancy increases 6-10 months

Cost:  $35,000 - $40,000 per case

~3.5 million in 2004
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  – Disease
Our Model Tracks **Individuals Over Time**

- **100,000 Medicare beneficiaries (age 65+) in 2005**
  - Survivors → Health & functional status, 2006
  - Deceased → 2005 costs

- **New 65 year-olds in 2006**
  - Survivors → Health & functional status 2007
  - Deceased → 2006 costs

- **New 65 year-olds in 2007**
  - Survivors → Etc.
  - Deceased → 2007 costs
Our Forecast of Population Growth Matches Vital Statistics

<table>
<thead>
<tr>
<th>Year</th>
<th>Census</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>70.8 M</td>
<td>70.3 M</td>
</tr>
</tbody>
</table>
Predicted Prevalence of Disease in the Medicare Population

Year


% of +65 population

Heart
Disability
Diabetes
Lung
Stroke

A6654C-25 3/06

RAND
Forecast of Real Health Care Spending by Elderly

Assumes no change in technology
Our Approach

• Identify emerging technologies

• Build demographic-economic model

• Simulate effects of technology on:
  – Spending
  – Functional status
  – Disease
Our Panel Predicted a Dramatic Expansion of ICD Use

Number of procedures

Year

0 100,000 200,000 300,000 400,000 500,000 600,000
2005 2010 2015 2020 2025 2030

550,000
Our Panel Predicted a Dramatic Expansion of ICD Use

Number of procedures

Year

2005
2010
2015
2020
2025
2030

550,000

550,000 x $35,000 = ~$19B
Will Add About $30 Billion Annually to Health Spending in Steady State

Total health care spending by elderly

- Current medical practice
- With ICD expansion

Billions of dollars (2005)

Year


800 B 830 B
But Will Not Substantially Improve Functional Status of Elderly Population

% of elderly with any functional impairment

- Current medical practice
- With ICD expansion
We Evaluated the Technologies Most Likely to Enter Clinical Practice

<table>
<thead>
<tr>
<th>Technology</th>
<th>Increase in medical spending* (%)</th>
<th>Cost per additional life-year</th>
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<tr>
<td>Implantable cardio-defibrillators</td>
<td>3.7</td>
<td>103,000</td>
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*Increase in 2030 health care spending relative to status quo without the technology.
## Technology Will Put Substantial Pressure on Medical Spending by the Elderly

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<th>Technology</th>
<th>Increase in medical spending* (%)</th>
<th>Cost per additional life-year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-aging compound (healthy)</td>
<td>13.8</td>
<td>9,000</td>
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<tr>
<td>Cancer vaccines</td>
<td>0.4</td>
<td>18,000</td>
</tr>
<tr>
<td>Treatment of acute stroke</td>
<td>0.4</td>
<td>22,000</td>
</tr>
<tr>
<td>Anti-aging compound (unhealthy)</td>
<td>70.4</td>
<td>30,000</td>
</tr>
<tr>
<td>Telomerase inhibitors (cancer)</td>
<td>0.5</td>
<td>62,000</td>
</tr>
<tr>
<td><strong>Implantable cardio-defibrillators</strong></td>
<td><strong>3.7</strong></td>
<td><strong>103,000</strong></td>
</tr>
<tr>
<td>Antiangiogenesis (cancer)</td>
<td>8.0</td>
<td>500,000</td>
</tr>
<tr>
<td>Left ventricular assist devices</td>
<td>2.3</td>
<td>500,000</td>
</tr>
<tr>
<td>Pacemaker for atrial fibrillation</td>
<td>2.3</td>
<td>1,400,000</td>
</tr>
</tbody>
</table>

*Increase in 2030 health care spending relative to status quo without the technology.
No Magic Bullet for Medicare

• Much attention has been focused on the emerging demographic crisis

• But medical technology is perhaps more important
  – Just one technology could increase elderly health care spending by 14% to 70% annually
  – But it could also generate substantial social value

• Our model makes the tradeoffs explicit
What Can We Do About Technology?

• “Upstream” rationing
  – Only allow cost-effective treatments into practice
  – Britain, Australia are examples
  – No precedent in U.S. system

• “Downstream” rationing
  – Markets (prices) determine who gets services
  – Insurers play a key role
    – Source of contention in HMOs
    – Medicare not even allowed to consider costs when making coverage decisions

• Policy alternatives
  – Let Medicare explicitly take costs into consideration
  – Change the R&D incentives
  – Buy out innovators
**Disseminating this Research**

- Subject of special issue of *Health Affairs*
- Featured at an Alliance for Health Reform forum in Washington D.C.
- Extensive media coverage, including featured story in the Money section of USA Today
- Key component of NIH-funded conference on biomedical research, attended by NIH Director and heads of many of the Institutes
- Technical advisors to the Medicare Trustees recommended they consider adopting this approach
What’s Next?

• Expanding the model to add younger cohorts
  – Funded by a 5-year grant from National Institute on Aging

• Developing a version for Europe
  – Funded by Pfizer