Medicare, Hospital Care Utilization and Mortality: Evidence from the Origins of the Federal Intervention

(Kenneth Chay, Daeho Kim, Shailender Swaminathan)
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Abstract:

The Medicare program came into effect in July of 1966. The four decades since have witnessed tremendous growth in the complexity of the health insurance market – including Medicare for the non-elderly disabled, Medicaid for the elderly poor, and multiple health insurance policies once one ages into Medicare eligibility. This complexity makes the interpretation of results on Medicare’s impact using recent data difficult. We examine the changes in hospital utilization and mortality rates that occurred after the original introduction of Medicare.

We bring together the most comprehensive data ever used to address this question, including: 1) hospital discharge data with age and cause of admission from 1962-on; 2) mortality rates by cause and narrowly-defined age categories for the United States, United Kingdom, and Canada; and 3) mortality microdata with cause and age for the United States. These data allow for an analysis that utilizes the “age discontinuity” design of one set of studies, while accounting for pre-existing trends as done in another set of more aggregated research.

We find: i) clear evidence that Medicare increased hospital care utilization and costs among the elderly (particularly for acute conditions), but at a lower rate than previously found; ii) significant reductions in the mortality of the eligible population that exhibit an age discontinuity only after the introduction of Medicare – patterns not found in countries that did not introduce a Medicare-style program in the 1960’s; and iii) the sharpest mortality reductions in acute causes of death (heart disease), with no change in cancer deaths. We estimate that Medicare’s introduction had a cost-benefit ratio of $200 (in 1982-84 dollars) for each one-year increase in life expectancy.

We also examine changes over time in the characteristics of the “marginal” person who benefitted from Medicare coverage. We find that the 65-and-over discontinuity in insurance coverage fell over time, and the rate of decline was highest among the chronically disabled, less-educated, poor and blacks. We also find a sharp increase during the 1980s in the use of coronary artery bypass graft (CABG) surgery on the Medicare eligible, which coincided with an increase in the relative Medicare reimbursement rate for this procedure. This provides preliminary evidence that an increase over time in the use of elective procedures has contributed to the rise in Medicare costs.

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**Medicare Legislation**
- Passed 1965; to take effect July 1966
- Approximately 19 million enrolled immediately
- Large bureaucratic effort between 1965 and 1966 to get *eligible* people enrolled.
- Extended to disabled in 1973
- Medicaid rolled out in States between 1966 and 1972

“No longer will older Americans be denied the healing miracle of modern medicine. No longer will illness crush and destroy the savings they have so carefully put away over a lifetime so that they might enjoy dignity in their later years. No longer will young families see their own incomes, and their own hopes, eaten away simply because they are carrying out their deep moral obligations.”
- President Lyndon B. Johnson, *at the signing of the Medicare legislation, July 1965.*
Motivation

- Evaluate effect of major health insurance program at time of introduction
- Vital statistics reports
  - In 1963 about 45% of individuals in age groups 45-64 and 65+ had hospital and surgical insurance
  - In 1967 similar numbers are 45% and 98%
- Cohort affected in 1966 spent large part of lives without any health insurance
- Allows for a much cleaner interpretation of results of impact of health insurance
Previous work on utilization and costs

- Early work in several volumes of *Social Security Bulletin* (1971, 1976)
- Recent work by Amy Finkelstein (2007)
- McWilliams and colleagues (2007)

Previous findings on Medicare effects on mortality/health

- Finkelstein (2008)
- Card, Dobkin and Maestas (2008)
- McWilliams and colleagues (2007)
- Friedman (1976)
New data on hospital insurance and utilization

- 1963-on *National Health Interview Surveys*
- 1970-on *National Hospital Discharge Surveys*
- Cross-checked NHIS against NHDS in 1970, etc. – NHIS discharge data reliable

**Advantages**

- Can calculate *age-specific* utilization (and costs) ⇒ utilized discontinuity in eligibility before and after Medicare changes.
- Finkelstein only able to use aggregate *AHA* data (and interaction with pre-existing health insurance by state). Could overstate increase in utilization and costs since many other things changing: i) hospital integration; ii) Medicaid; iii) increase in personnel costs due to extension of min. wage coverage ($9-10/hr in $2007) to hospital employees on Feb. 1, 1967 (esp. in South) – just charging increase in daily expenses to Medicare (daily service charge largest component of hospital costs growth).
- We mostly focus on *whites* to not confound Medicare effects with hospital integration.
Figure 1: Hospital Insurance rates in the United States, by age and year

A. White fraction insured

B. Black-white difference in fraction insured
C. Growth in fraction of whites with hospital insurance after 1963 fiscal year

D. Growth in hospital insurance for whites between 1963 and 1974, South versus North

Notes: Data come from the National Health Interview Surveys.
Table 1: Discontinuity in hospital insurance rates at ages 65-and-over, among individuals at ages 45 to 84
[absolute value of t-ratio]

<table>
<thead>
<tr>
<th></th>
<th>Insurance rate (per 100) by age group, deviated from quadratic in age</th>
<th>Growth by 1968 Fiscal Year</th>
<th>Growth by 1974 Calendar Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1963 Fiscal Year</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>65 to 69</td>
<td>70 to 74</td>
<td>75 to 84</td>
</tr>
<tr>
<td></td>
<td>(1a)</td>
<td>(1b)</td>
<td>(1c)</td>
</tr>
<tr>
<td>All races</td>
<td>-2.36</td>
<td>-1.76</td>
<td>-4.38</td>
</tr>
<tr>
<td></td>
<td>[2.13]</td>
<td>[1.03]</td>
<td>[1.49]</td>
</tr>
<tr>
<td>Whites</td>
<td>-2.10</td>
<td>-1.29</td>
<td>-4.10</td>
</tr>
<tr>
<td></td>
<td>[1.84]</td>
<td>[0.73]</td>
<td>[1.34]</td>
</tr>
<tr>
<td>Blacks</td>
<td>-6.66</td>
<td>-14.21</td>
<td>-12.64</td>
</tr>
<tr>
<td></td>
<td>[1.75]</td>
<td>[2.58]</td>
<td>[1.32]</td>
</tr>
</tbody>
</table>
Figure 2: Hospital Discharge rates for whites, by age and year

A. Hospital discharge rate per 1,000 individuals (NHIS)

B. Growth in hospital discharge rate after July 1963 to June 1965 (NHIS)

Notes: Data in Panels A and B come from the National Health Interview Surveys
C. Hospital discharge rate from the *National Hospital Discharge Survey*

![Graph showing hospital discharge rate from the National Hospital Discharge Survey]

D. Hospital discharge rates for those 65-and-older, deviated from a quadratic polynomial in age

![Graph showing hospital discharge rates for those 65-and-older, deviated from a quadratic polynomial in age]

**Notes:** In Panel C, discharge rates are normalized to zero for 45 to 46 year olds. In Panel D, the estimates come from models that include year effects and year-specific, quadratic polynomials in age.
Table 2: Discontinuity in hospital discharge rates at ages 65-and-over, among individuals at ages 45 to 84
[absolute value of t-ratio]

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td></td>
<td>65 to 69</td>
<td>70 to 74</td>
<td>75 to 84</td>
</tr>
<tr>
<td>All races</td>
<td>(1a)</td>
<td>(1b)</td>
<td>(1c)</td>
</tr>
<tr>
<td></td>
<td>0.48</td>
<td>0.37</td>
<td>-6.08</td>
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<tr>
<td></td>
<td>[0.06]</td>
<td>[0.03]</td>
<td>[0.46]</td>
</tr>
<tr>
<td>Whites</td>
<td>-1.61</td>
<td>-4.22</td>
<td>-11.25</td>
</tr>
<tr>
<td></td>
<td>[0.17]</td>
<td>[0.36]</td>
<td>[0.80]</td>
</tr>
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</table>
Figure 3: Length-of-stay and Costs per hospital discharge for whites, by year and age

A. Average length-of-stay (in days) per hospital discharge

B. Average costs (in 1982-1984 dollars) per hospital discharge

Notes: Data come from the National Health Interview Surveys.
“New” data on age-specific mortality

- International comparisons using WHO data: by 5-year age category and cause-of-death.
- Many advantages over previous studies.
Figure 4: Mortality rates over time in the United States, 65-to-69 versus 60-to-64 year olds

A. Age group differences in all-cause mortality rates (per 10,000 individuals)

- (65-69) - (60-64)
- (60-64) - (55-59)

B. Mortality rate differences between 65-69 and 60-64 year olds, by cause of death

- All Causes
- Heart Diseases
- Malignant Neoplasms
- Cerebrovascular
- Diabetes
C. Mortality rate differences between 65-69 and 60-64 year olds, by cause of death

Notes: Data come from the *World Health Organization Mortality Files*. The mortality rates are for the entire United States population – that is, it includes blacks and whites, as well as other races.
Figure 5: Between age-group differences in heart disease mortality rates, U.S.A., Canada and United Kingdom

A. Difference between 65-to-69 and 60-to-64 year olds

B. Difference between 60-to-64 and 55-to-59 year olds

Notes: Data come from the World Health Organization Mortality Files.
Issues with Census population counts by age

- Unrevised (Postcensal)
- Revised (Intercensal)
- Revision in the 1960s because of Medicare
  - even before Medicare came into effect
    “Impact of Medicare on Demography” (Myers 1966)
Figure A1: Difference between Intercensal (Revised) and WHO population counts

Notes: Data come from U.S. Census Bureau (Intercensal counts) and World Health Organization (WHO) mortality database.

(*Can see if Medicare claims due to behavioral response*

- Incomplete birth records (and Social Security Numbers) in United States before 1930’s. Implies many people aged in their 50s and 60s during the 1960’s didn’t have birth documents/certificates or SSN’s, especially in poorer areas/states.
- Have incentive to claim they are aged 65 or older when in truth they are 60-64 years old.
- Incentive should be stronger in areas/states where there is less health insurance for 60-64 year olds.
- We can test this after collecting unrevised Census population counts by state.*
Figure 6: Mortality rate changes by age and year, Whites in U.S.A.

A. Change in all-causes mortality rates relative to 1963-1964

B. Change in all-causes mortality rates relative to 1965-1966

D. Average number of restricted-activity days in past two weeks

Notes: For Panels A, B and C, mortality counts come from the Mortality Detail Files and age-specific, population sizes come from the (unrevised) Census counts. For Panel D, data come from the National Health Interview Surveys.
Cost-Benefit Analysis

1. Construct *birth cohort-specific* survival curves
   - Know Birth year from mortality microdata from 1960-on
   - 1896 cohort only eligible for Medicare at age 70
   - 1899 cohort eligible at age 67; 1902 cohort eligible at 65

2. Life expectancy if survive to age 64
   - Median life expectancy: 79.3 for 1896 cohort; 80.3 for 1899 cohort; 80.7 for 1904 cohort

3. Hospital Discharge Rate due to Medicare
   - Ages 67-69 = 218-per-1,000
   - Ages 65-69 = 275-per-1,000

4. Average costs per discharge: $1,250 (in $1982-84)

**Cost-Benefit ratio = $245-per-year of extended life**

   - Also reduction in limited-activity days ➔ understatement of cost-per-QALY
   - Britain’s Natl. Inst. For Health & Clinical Excellence (NICE): limit of £30,000 cost of extending life 1-year.

Changes in Marginal Beneficiary
Table 4: Discontinuity in the probability insured at age 65-and-over across time (individuals at ages 45-and-over)

<table>
<thead>
<tr>
<th></th>
<th>Insurance rate at age 65 (per 100), deviated from quadratic in age</th>
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<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>A. Whites</td>
<td></td>
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<tr>
<td>Overall</td>
<td>-1.12</td>
</tr>
<tr>
<td>(standard error)</td>
<td>(0.97)</td>
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<tr>
<td>{ages 60-64 insure rate}</td>
<td>{74.3}</td>
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<tr>
<td>HS graduate or less</td>
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<td>(1.09)</td>
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<tr>
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<tr>
<td>Some college or more</td>
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<tr>
<td>(2.50)</td>
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<td>(2.00)</td>
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<tr>
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<td>{ages 60-64 insure rate}</td>
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<tr>
<td>Chronically disabled</td>
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<td>{ages 60-64 insure rate}</td>
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<td>B. Blacks</td>
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<td>{ages 60-64 insure rate}</td>
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<td>{ages 60-64 insure rate}</td>
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<td>No chronic disability</td>
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<td>(3.69)</td>
<td>(3.14)</td>
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<tr>
<td>{ages 60-64 insure rate}</td>
<td>{48.5}</td>
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Coronary Artery Bypass Graft (CABG)

Large discontinuities in CABG in Card, Dobkin, Maestas

CABG first developed in 1968
- Discontinuity in discharge rates high in early 70’s – even though there is no discontinuity in CABG among discharges, implies CABG use increased for eligibles ➔ being used when necessary.
- Discontinuity in discharge rates fell substantially by late 1980’s and more so for disadvantaged. Even so, among discharges, large discontinuity in CABG use. Arguably using CABG more on relatively less disadvantaged admits eligible for Medicare ➔ possibly being used when unnecessary.

- 1984 Medicare reimbursement for CABG = $24,000
- 1984 cusp of "selective contracting" era: insurance companies begin to "shop" for CABG surgery providers with lowest price. The reimbursement for a CABG under this contract = $10-12K.
- Medicare inability to lower reimbursement due to "downward sticky prices". 
Figure 7: Age 65-and-over discontinuity in coronary artery bypass graft (CABG) surgery rate, Among hospital discharges over time

A. Age 65-and-over CABG discontinuity deviated from age trend (ages 50-and-over)

B. Ages 65-to-69 versus 70-and-over CABG discontinuity

Notes: Data come from the National Hospital Discharge Surveys. Results are from year-specific, linear probability regressions that include age trends and use samples of discharges aged 50 and over. Vertical lines in Panel A represent (±) twice the standard error of the estimate, corrected for heteroskedasticity.
Figure 8: Fractions of hospital discharges for whom primary source of coverage is Medicare or private insurance.

Notes: Data come from the National Hospital Discharge Surveys.
Current Discussion

Atul Gawande (New Yorker)

Peter Singer (NY Times Magazine)