Assessing the Performance of Health Systems: The Concept of ‘Avoidable Mortality’

8th National Summit on Health Disparities / CBC Health Braintrust Meeting & Awards Dinner

Washington, 11 April 2011

Ellen Nolte
‘Avoidable mortality’ goes back to Florence Nightingale (1820-1910)

Source: http://www.Florence-Nightingale-Avenging-Angel.co.uk
The modern use of ‘avoidable’ mortality dates to the mid-1970s


- Conditions from which, in the presence of timely and effective medical care, premature death should not occur
  - Single case of death (illness/disability): Why did it happen?
  - Rate: not every single case preventable/ manageable  ⇒ reduction of incidence
The concept has been used widely, in particular in Europe

Mackenbach et al. (1988):

- Impact of specific treatments observable as accelerating falls in mortality from conditions they were intended to treat
- Between 1950 & 1984 changes in deaths from conditions responsive to medical treatment in the Netherlands added 2.9 years to life expectancy at birth in men (women: 3.9 years)

‘Avoidable deaths’ provide warning signals of potential shortcomings in healthcare delivery

There are different conceptualisations of ‘avoidable’ mortality...

**Amenable** (or *treatable*) mortality
- Deaths from causes sensitive to *healthcare* (primary & hospital care, collective health interventions eg screening)
  - selected cancers (breast, colorectal, testes, cervix), diabetes <50, hypertension/stroke, surgical conditions, maternal mortality, perinatal conditions etc.

**Preventable** mortality
- Deaths from causes sensitive to *inter-sectoral policies*
  - Lung cancer, liver cirrhosis, transport injuries
Amenable mortality fell more rapidly than mortality from other causes from the 1960s

- **Netherlands**: Average decline of 6% per year between 1950 and 1984 compared to 2% or no change (men)  
  *(Mackenbach et al. 1988)*

- **England & Wales**: Average decline of 2.7% per year in 1955/59 - 1970/74 accelerated to 3.6% per year in 1970/74 - 1985/89  
  *(Boys et al. 1991)*

- **Central & Eastern Europe**: Average decline of 1-2% per year during the 1970s and 1980s compared to no change or increase in mortality from other causes  
  *(Boys et al. 1991)*
Rates of amenable mortality have continued to fall during the 1990s...

Source: Nolte & McKee 2004
... and have done so through the early 2000s, generally at higher pace than mortality from other causes.

Source: Nolte & McKee 2008
There are consistent findings of inequalities in the measure of amenable mortality

- African-Americans vs. white Americans, USA
  - Excess mortality from hypertension, cervical cancer, diabetes, peptic ulcer (*Woolhander et al.* 1985)
  - 4.5 times higher death rates from amenable conditions (*Schwartz et al.* 1990)

- Maori vs. non-Maori in New Zealand
  - Little change over time with the mortality ratio at 2.3 in 1967 and 2.0 in 1987 (*Malcolm & Salmond* 1993)

- Low socio-economic status (SES) vs. high SES
- Health services can contribute to the reduction of health inequalities
Variation in amenable mortality by ethnicity in New Zealand, 1997-2001

Source: Page et al. 2006
Variation in amenable mortality by socioeconomic status in Australia, 1997-2001

Source: Page et al. 2006
**Variation in amenable mortality by race in the United States, 2004-05**

**HEALTHY LIVES**

**EXHIBIT 30**

Mortality Amenable to Health Care by Race, National Average and State Variation, 2004–05

Deaths* per 100,000 Population

- **White**
- **Black**
- Overall U. S. Average = 96

<table>
<thead>
<tr>
<th></th>
<th>White</th>
<th>Black</th>
<th>Overall U. S. Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>National average</td>
<td>86</td>
<td>183</td>
<td>96</td>
</tr>
<tr>
<td>Top 5 states average</td>
<td>72</td>
<td>92</td>
<td>96</td>
</tr>
<tr>
<td>All states median</td>
<td>82</td>
<td>173</td>
<td>96</td>
</tr>
<tr>
<td>Bottom 5 states average</td>
<td>96</td>
<td>219</td>
<td>96</td>
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*Age-standardized deaths before age 75 from select causes; includes ischemic heart disease.

Note: Top 5 states refer to states with smallest gaps between overall U.S. average and black.
Bottom 5 states refer to states with largest gaps between overall U.S. average and black.

DATA: Analysis of 2004–05 CDC Multiple Cause-of-Death data files using Nolte and McKee methodology, *BMJ* 2003

SOURCE: Commonwealth Fund State Scorecard on Health System Performance, 2009

Source: McCarthy et al 2009
There are several challenges to the concept of ‘amenable’ mortality

- Selection of amenable conditions
  - Which condition does reflect performance of healthcare?
  - ‘Avoidability’ of premature death through healthcare likely to change over time as developments in healthcare advance
    - Technology: eg early detection (cancer sites)
    - Organisation: eg stroke units
  - Influence of factors other than healthcare
Treatment or prevention?

- **Amenable** (treatable) conditions: it is reasonable to expect death to be averted even after the condition has developed
  - *Tuberculosis*: although acquisition is driven by socio-economic factors timely treatment is effective in preventing mortality
- **Preventable**: there are effective measures that prevent a given condition from occurring in the first place
  - *Lung cancer*: largely preventable through appropriate policies on smoking (others: liver cirrhosis; injuries caused by traffic accidents)
- *Ischaemic heart disease?*
- *HIV/AIDS? Suicide? Melanoma?*
The proportion of the decline in mortality from ischaemic heart disease attributable to treatment is around 50%

<table>
<thead>
<tr>
<th>Country</th>
<th>Period</th>
<th>Risk factors</th>
<th>Treatment</th>
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</thead>
<tbody>
<tr>
<td>Auckland, New Zealand</td>
<td>1974-1981</td>
<td>-</td>
<td>40%</td>
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<td>(Beaglehole, 1986)</td>
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<tr>
<td>Netherlands</td>
<td>1978-1985</td>
<td>44%</td>
<td>46%</td>
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<td>(Bots and Grobee, 1996)</td>
<td></td>
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<tr>
<td>USA</td>
<td>1980-1990</td>
<td>50%</td>
<td>43%</td>
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<tr>
<td>(Hunink et al., 1997)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Scotland</td>
<td>1975-1994</td>
<td>55%</td>
<td>35%</td>
</tr>
<tr>
<td>(Capewell et al., 1999)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>1982-1997</td>
<td>53%</td>
<td>23%</td>
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<tr>
<td>(Laatikainen et al., 2005)</td>
<td></td>
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</tr>
<tr>
<td>USA</td>
<td>1980-2000</td>
<td>44%</td>
<td>47%</td>
</tr>
<tr>
<td>(Ford et al., 2007)</td>
<td></td>
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<tr>
<td>Ireland</td>
<td>1985-2000</td>
<td>48%</td>
<td>44%</td>
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<td>(Bennett et al., 2006)</td>
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<tr>
<td>England &amp; Wales</td>
<td>1981-2000</td>
<td>58%</td>
<td>42%</td>
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<td>(Unal et al., 2007)</td>
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Source: Nolte, Bain, McKee 2009
Healthcare or intersectoral policies?

- Lethality of serious criminal assault in the USA has dropped substantially since 1960 despite a simultaneous increase in assault rates.
- Time-series data on criminological data on murder, manslaughter and assault along with health data and data on medical resources and facilities.
- Contemporary American homicide rates would be up to five times higher than they would have been in the absence of advances in medical technology and related healthcare support.

(Harris et al. 2002)
Contribution of amenable conditions to total mortality <75 years OECD, 2002/03

Source: Nolte & McKee 2008
The proportion of deaths under the age of 75 of all deaths is around 50% in most high income countries (2003)
Is ‘avoidable’ mortality a useful concept for health system performance assessment?

“[A]voidable deaths provide a valuable measure of quality [...] It has a valuable part to play in observing changes in performance over time [...] This technique can provide indicators of areas where future research is necessary.”

(Holland 1990)

‘avoidable’ deaths should not be interpreted as absolute measures of outcome, they “do not provide definitive evidence that a particular service is wrong”

(Holland & Breeze 1988)
Available at http://www.nuffieldtrust.org.uk/