Mgmt 444

Value Based Health Care

Kellogg hosted a conference in the late 1990s that focused on the causes and consequences of healthcare technological change. One of the speakers was Jim Mortimer, then President of the Midwest Business Group on Health. An audience member put the following question to Mr. Mortimer:

- Did he feel that the high costs of medical technology were worth it?

- Specifically, was society better off with 1990s technology (and quality) at 1990s costs, or 1980s technology at 1980s costs?

The answer to this question, which is just as relevant today, has many implications

- At the macro level, it affects public policy towards the medical supply industry

- At the micro level, it lays the foundation for marketing innovations and for developing innovation strategy

Mr. Mortimer responded that new technology was not worth the cost.

This is not an isolated view. Here is an excerpt from a letter appearing in JAMA that questions the efficaciousness of spending on implantable cardiac defibrillators:

Total health care spending has doubled from 8% of the US economy in 1975 to 16% of gross domestic product in 2007. The bulk of the increase is attributed to greater spending on technology. At least some of the $2 trillion in health care expenditures buys services of little or no value.

Technology assessment may be the best way to increase value for health care spending and curb inappropriate use of technology. A value-based health policy would require evidence of benefit before coverage of new therapies or procedures. Reimbursement could be scaled to magnitude of expected benefit. Such an evidence-based coverage system would avoid the current undesirable situation of spending billions of dollars on technologies with little or no known benefit. The case of ICDs represents an expensive technology that was approved for coverage without quality-of-life data

Value-based health policy is not an ivory tower concept. It is practiced globally, particularly for pricing of pharmaceuticals. The following table, derived from the International Society for Pharmacoeconomics and Outcomes research, lists currently recommended guidelines for performing valuation studies.

Step 3 - Comparison of PE guidelines for selected countries on selected key features

	Canada	Germany	Spain	The Netherlands	England & Wales	United States of America
Perspective	Societal, transparently broken down into relevant viewpoints	Societal	Depends on the question that the evaluation is trying to answer	Societal	For reference case: NHS and PSS (personal social services). In non-reference case: societal not include the productivity costs	Societal
Preferred analytical technique	CUA and CBA	Any one of CMA, CEA, CUA, CBA, depends on study purpose	CEA, CUA	CEA, CUA	CEA or CUA	CEA or CUA
Costs to be included	All direct health care costs, social services costs, spillover costs on other sectors, and costs fall on the patient and family.	All direct and indirect costs	Depends on the question of the study. Direct costs. Indirect costs may or may not be included.	Direct costs both inside and outside the healthcare system. Future health care costs for unrelated disease in any additional life should be excluded. Productivity losses calculated using the friction cost method should be presented separately.	Potential direct and indirect resource costs for the NHS and PSS that would be expected.	All resources used that are relevant to the analysis and which are nontrivial in magnitude should be included in the reference case
Preferred method to derive utility	Should justify the selection	Both indication and/or non-specific instruments can be used	Generic measures	Direct methods or indirect methods	Choice-based method: TTO, SG (not rating scale), using representative sample of the public	Preference measures used should be generic, however, not endorsing any particular generic preference-weighted instrument
Discounting costs	Yes, standard: 5%; base 3%; minimum: 0%	Base:5%, SA:3%, 10%	Yes, 6%	Base:4%, SA needed	Base: 3.5%; SA: 0~6%	Base:3% and 5%; SA:0~7%
Discounting outcomes	Yes, standard: 5%; base 3%; minimum: 0%	Base:5%, SA:3%, 10%	Yes, 6%	Base:4%, SA needed	Base: 3.5%; SA: 0~6%	Base:3% and 5%; SA:0~7%

Here are two prominent examples of value-based purchasing:

- Australia's Pharmacy Benefit Scheme (PBS) established the Pharmacy Benefits Advisory Committee (PBAC) in 1994 to rule on the CE of all drugs.

    - Drugs that fall below a numerical threshold are rejected
    - One study found that threshold to be about $40,000 ($US) per year of life saved

- In 2001, the UK created the National Institutes for Clinical Excellence (NICE), which examines CE data for drugs, devices, and diagnostics, and releases "guidances" to help the National Health Service (NHS) allocate funds.

    - In over 100 guidances issued to date, NICE mentions specific CE values of interventions in question

    - Implicit threshold for acceptance is comparable to that used by PBAC when it advises the PBS

- In the U.S., the guidelines remain voluntary.

    . A June 2006 report by the body that oversees Medicare recommended adopting these guidelines for drugs under Medicare Part D
    . The US Academy of Managed Care Pharmacy has an initiative to formalize and standardize the reporting of CE information. This may be used for marketing drugs to private insurers.

Oregon's Plan

The most famous U.S. application of valuation methods began in Oregon over a decade ago

- Limited funding of transplants within the Medicaid program provoked controversy when a young boy, Coby Howard, died because he could not get a bone marrow transplant

- State Senate President, Dr. John Kitzhaber, deflected accusations of rationing by observing that state was already rationing care and that the goal was to do the most good with the available dollars

- He pushed through legislation that resulted in a scientifically-based prioritization of health care spending

    - Overhead shows some of the rankings
    - We will discuss the methods used to develop the rankings

- The response?

    - Initial protests led to re-rankings
    - National media attention labeled Oregon as the rationing state
    - Ultimate acceptance by state residents
    - 100,000 added to Medicaid rolls, and new services covered

The PBS, NICE and Oregon experiments show that despite its intuitive appeal, full implementation of value-based healthcare requires drawing a line and stating "these services are not worth the cost." This requires valuing the seemingly intangible – our health

The Value of Health

Begin with the seemingly simple question: Why are we willing to pay to improve our health?

- Reason #1: We like being healthy

  . Health is a "consumption good"
  . Think of this as the *intrinsic value* of good health

- Reason #2: Health allows us to work and buy more of everything else that we like.

  . Health is a source of *human capital*

In theory, one can put a dollar value on both the consumption value and human capital value of health. These will vary in absolute levels from person to person, and their relative levels will vary from person to person.

Interesting thought experiment: which is relatively greater for most people, the intrinsic value of health or the human capital value?

The notion of quantifying the value of life and limb is not confined to the ivory tower. It is put into practice every day. Let's see how

1) Courts

- In conjunction with wrongful death/injury cases

- Jury awards have several components

  - Medical costs (not part of the value of health)
  - Lost income (human capital component)
  - Sometimes: pain and suffering (a specific component of health, independent of life and death) and loss of consortium

- Bottom line: Courts do not ask juries to quantify the intrinsic value of health

2) National Institutes of Health

- In its annual requests for funding of medical research, NIH reports to Congress on the "cost of illness" for a wide range of conditions, using these measures to help allocate R&D spending

- The NIH explicitly examines medical costs and lost wages. It acknowledges but does not measure the intrinsic value of life

. In case of heart disease, for example, the cost of each death is about $200,000.
. Is this what a life is worth?

3) Survey methods

Q: How do firms figure out the dollar value of their "traditional" consumer goods and services?

A: They conduct surveys or examine market data to measure consumer "willingness to pay" (WTP)

Survey researchers take the same approach to measuring WTP for health

- The EPA has performed cost-benefit studies of pollution controls, as required by the executive branch. Here is a modified example

Sinus Problems: You will have congestion and pain in your sinuses and forehead all day. You will be bothered by a feeling of stuffiness in your head. You will need to blow your nose every few minutes. You will have to breathe through your mouth most of the time.

If your health symptoms in the next 12 months were the same as in the last 12 months, except that you would be faced with one additional day of sinus problems, how much would it be worth to you to completely get rid of this day of symptoms? _____

Good surveys require careful attention to market research methods that are beyond the scope of this course

Surveys have even been conducted to put a dollar value on life. This one is kind of fun:

Value of Life Survey

Based on current epidemiological data, you can expect to live until age 80. Suppose that a new health program would offer an 10 percent chance of extending your life expectancy to 85. How much would you be willing to pay to devise such a program? _____

Note that the expected gain in longevity is only 0.5 years. Thus, to obtain your WTP for a full year of life, you need to multiply your response by 2. Enter this amount here _____ .

The benefits of this program will not be enjoyed until you reach age 80. Most people discount events in the future, and younger people will discount more than older people. To account for discounting, complete the following table. This will give your **age-adjusted value of an immediate life-year.**

(1)	(2)	(3)	(4)
Your age	WTP for a full year of life	Multiplication factor	Age-adjusted WTP for a year of life
35		8	
30		10	
25		12	

An important critique of surveys is that they often yield predictions that do not measure up to real world behavior

- E.g. recent publications about selling property to make way for a public good (E.g. a public park.)

. Stated public spirited behavior did not match real world actions

- If possible, one should measure WTP by observing real world purchase behavior

How does one use world behavior to measure the value of a human life?

- We don't exactly buy and sell our health - or do we?

- Economists argue that individuals often make trade offs between money and health, much as they trade off money and electronics gear

    - E.g., union contracts stipulate bonuses for workers who take on riskier activities

- The economic implication is as follows:

    - There is some tradeoff between job risks and wages
    - If we can measure that tradeoff (controlling for other sources of variation in wages) we can infer the dollar value that people place on their own lives (or on incremental changes in the probability of living and dying)

The following graph captures the tradeoff: **(Show graph with wages and risk)**

- The slope of the wage/risk line is the value of a life

Both the theoretical and statistical methods for estimating the value of a life from labor market data was pioneered by *Richard Thaler* and *Sherwin Rosen*

- Theory

    - Suppose you have data on the wages and job risks for different individuals working at different jobs, and you can compute the slope
    - You want to know the amount that one individual would be willing to pay (i.e., give up in wages) to improve the safety of his/her own job
    - Thaler and Rosen show (as we will soon see) that the slope of the former equals the WTP you are seeking

- Statistics

    - The methodology they pioneered is called *hedonic pricing*
    - Hedonic pricing models are used to infer the value of specific components of a product package (in this case, the package is a "job") based only on the package characteristics and package price
    - Hedonic pricing models are used in many markets, such as determining the value of faster computers, better auto brakes, or reduced side effects in drugs
    - We will see how T/R and others use this model to infer the value of a life from labor market data

Thaler and Rosen's model works as follows:

- They posit an individual choice model in which all workers are identical except for their preferences for wealth versus health.

- This variety of preferences will cause some workers to accept high risk jobs, others a quiet life

- Workers face a variety of jobs offering an array of wage/risk combinations. Workers know the risks of each available job

- Workers find out about the different offerings and select the job that best suits their preferences

These assumptions can be captured by drawing a "budget line" and "indifference curves" showing the job offerings and worker preferences[1]

A worker has chosen the job that best balances wages and risk if the indifference curve is tangent to the market (budget) line.

Thaler and Rosen also discuss how firms choose wages and risk

- They assume that firms seek to maximize profits.

- It is costly for firms to reduce risk, but firms understand that if they offer risky jobs, they will have to pay higher wages. That is, firms must compete for labor in a competitive labor market.

- Firms have different abilities to reduce job risk - it is cheaper for some firms to offer low risk work sites than others. This generates "isocost" curves

1 I will spend a few minutes in class reviewing the basic microeconomic concepts of indifferences curves, budget lines, isocost curves, isoprofit curves, and optimal behavior. These used to be covered in all micro classes, but not any more!

- Firms maximize profits when the isocost curve is tangent to the market line

- At this tangency, firms have cut back on safety (i.e., increased job risk) until the savings are offset by the higher wage required to induce workers to take their risky jobs

It is a simple matter to put demand and supply together to show how the market allocates jobs to workers

- All job/firm combinations represent pairings of workers who prefer a particular wage/risk combination and firms who prefer to offer that combination

The Thaler/Rosen model has two key implications:

- The slope of the observed market line equals the slope of individual indifference curves

    - Thus, the market reveals each individuals marginal rate of substitution between health and wealth. This is exactly the information we are seeking

    - If we can estimate the market relationship, controlling for other determinants of wages, we can estimate the market value of a life

- The slope of the observed market line also represents the cost to firms to reduce job site risk

Important Implication: Regulations to improve safety/reduce risk may be cost more than they are worth

Application to Labor Market Regulation:

Returning to empirical estimation of the market value of a life. We would like to compute the "value of a life". Such estimates are finding their way into practice, so let's review the empirical literature

T/R show that we must estimate the slope of the market "wage/risk" line

- The basic idea behind the empirical estimation is very simple

- Begin with data on the jobs held by different workers

  . This would include wages and risks, as well as other predictors of wages (to use as controls)
  . Regress wages on risks, controlling for other factors that affect wages (e.g., work experience and education). The coefficient on job mortality is the value of a statistical life, or "VSL"

- There have been over two dozen studies

  . The most recent work by Harvard's Kip Viscusi (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=416600) includes a large set of control variables, including workplace injury rates as well as mortality rates

  . Q: Why is it important to control for injury rates?

  . Viscusi puts the VSL at about $5 million

What do these results mean, pragmatically?

- Take the median estimate of a VSL of $5 million

- Firms do not pay this out of the goodness of their hearts; workers demand it of them.

- If there are 1000 workers facing a heightened morality risk of .001, then one additional worker can be expected to die. The workers will collectively require $5 million in additional wages to take on this risk

- Alternatively, workers are collectively willing to give up $5 million to save one life (hedonic methods do not address the framing issue!)

- These figures exceed by 20-30 fold the human capital/medical costs component of the cost of illness reported by the NIH

- The figures are also higher than results from WTP surveys

- Similar studies have been used to peg the value of a year of life

    - The going rate is about $200,000

- In some of the following valuation applications, economists have used conservative valuations

    . A year of life = $100,000, a life = $1,000,000.
    . These values are sufficient to demonstrate cost-effectiveness of many seemingly costly interventions, as we shall see

Application of Value of Life Methods I: The marketing of tPA in Europe

- Developed by Genentech in late 1980s, tPA reduces the threat of clotting post heart attack
- The existing drug, Streptokinase, cost $200 per dose and had a mortality rate of 7/100
- Genentech charged $2200 per dose for tPA. How could they convince skeptical purchasers in Canada and Europe to pay the difference?
- The GUSTO trials reported a tPA mortality rate of just 6/100. Thus, the question was posed, is it worth $2000 to reduce the mortality rate by 1/100?

Application of Value of Life Methods II: Social Benefits and Costs of Defibrillators

- Public health experts have recently called for placing defibrillators throughout airports.

  - Let's use our methods to assess the benefit/cost ratio

  - Suppose that placing 90 defibrillators throughout O'Hare can be expected to save one life every four years

  - Each machine costs $3000

  - In addition, training costs will equal $100,000

- Total costs of $370,000; Say this is fully depreciated after four years.

  - Then the cost per life saved is $370,000. From a pure human capital perspective, this is not worthwhile.

  - But compared with marketplace expenditures to make worksites safer, and the implied willingness to pay for safety by workers, this is a bargain

Application of Value of Life Methods III: Adjusting CPI for Quality Changes

- Technological change has boosted longevity for heart attack victims

    - New treatments include cardiac catheterization and balloon therapy, and drugs such as aspirin therapy and beta blockers

    - Result: post-heart attack life expectancy was 5.2 years in 1984, rose to 5.9 years by 1991. Half of this increase is directly attributable to new technology

- But technological change is costly

    - In inflation-adjusted 1991 dollars, avg. cost of treatment increased from $11,000 to $15,000. This is an annual *increase* of 4.5% that shows up in the medical component of the CPI

    - Has health care really gotten more expensive? Or should we pay more attention to the "quality-adjusted" price?

- To get full picture of what has happened, we can subtract the value of the quality improvement. This will give us a quality-adjusted price

    - Use a conservative value of $25,000 per life year
    - Use a conservative estimate that technology adds four months
    - Conclusion: (using 1991 dollars), costs of treating heart attack *fell* by 1% annually

Application IV: Responding to Mr. Mortimer

When Mr. Mortimer claimed that technological change was not worth the cost, he must have had in mind some dollar valuation of the improvements in health brought about by that change. Otherwise, his claim would make no sense.

The article by Cutler and McClellan puts this claim to the test

The article is clear enough and, by this point, you should not need me to review the methods. You need only note that they use a "conservative" estimate of the value of a year of life of $100,000, and a discount rate of 5 percent.

Their conclusions:

- The benefits of technological change for treating heart attack and low-birthweight babies exceed the cost by a substantial amount.

- Treatment of depression and cataracts have been win-win situations (better outcomes and no additional cost, or even cost savings.)

- Only breast cancer has been a "wash"