

What should the Objective Function be?
or
Trust in Trust

Penelope M Mullen
University of Birmingham, UK
p.m.mullen@bham.ac.uk

Paper presented to the
5th IMA International Conference on
Quantitative Modelling in the Management of Healthcare
London, 2-4 April 2007

What should the Objective Function be?

Since the earliest days of OR involvement and quantitative modeling in health and health care the difficulty of determining the objective function has been noted. Whilst identifying the objectives in small-scale relatively focused studies may pose few difficulties, the situation is more complex at a wider system level.

It is widely accepted that most organisations have multiple and probably competing objectives and, historically, it has been recognised that healthcare systems are no exception. However, there is currently widespread advocacy of a single objective for healthcare systems - that of maximising population health or health gain. However, not only is it questioned whether curative/personal health services have a great impact on population health, but seeking to maximise health gain has a number of consequences which conflict with values such as equity and fairness.

This paper reviews other possible objectives, including equity of access, fair financing and responsiveness, and explores the less frequently cited objective of protection from catastrophic risks, uncertainty and insecurity - a need to trust and know that health services will be there when needed. Possibilities for, and the desirability of, incorporating these into an objective function are explored.

It is concluded that health gain maximisation is inappropriate as the sole or even principal objective of curative/personal health services. Despite its superficial attractions including being quantifiable, not only does it lead to many undesirable consequences, but it diverts attention from the possibly more important, but less quantifiable objectives of equity, fairness and the often neglected need for trust, security and certainty.

What are the objectives of public or publicly mandated HC systems?

Simple Question...but...

- Most organisations have multiple, competing objectives
- Healthcare systems are no exception.
- However,
 - widespread advocacy of a single objective - maximising population health or health gain

Maximising health or health gain

"... a principal objective of government expenditure on health care is to generate health."
(Dolan 2001 p.65)

"The principal objective of the NHS ought to be to maximise the aggregate improvement on the health status of the whole community"
(Culyer 1997 p.667)

"Health systems aim to maximise health gain"
(ISPOR Conference Issues Panel 2005)

"Better health is unquestionably the primary goal of a health system."
(WHO, 2000, p.21)

Maximising health (gain) intuitively attractive objective

Under NICE guidance

Treatments or drugs which have a cost per QALY (Quality Adjusted Life Year) greater than £30,000 are not made available on the publicly-funded National Health Service (NHS) in England's (except in exceptional circumstances)

Problems with Maximising health or health gain?

Adverse effects

Viewed as 'Gold Standard'

Health Care does not affect population health

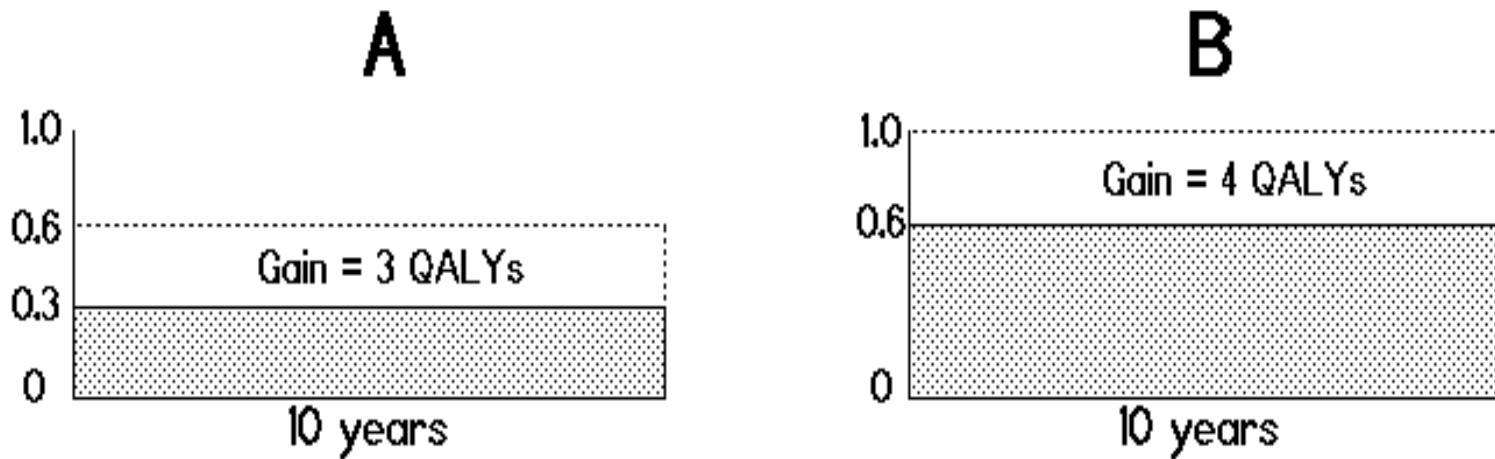
It ignores the (other) objectives of health care systems

Adverse effects & Implications

- Life-saving or life-prolonging treatment may be denied, even where no alternative exists
- Some people or groups are deemed too expensive to treat
- The principle "to each according to what will generate the most QALYs" is potentially in conflict with "to each according to his need". (Lockwood 1988, p.45)
- Equity?
 - Equal cost treatments, different gain
 - Treatment for A costs more than B – but same Gain?
 - Double Jeopardy

Equity?

Equal cost treatments



Who should get priority? A or B?

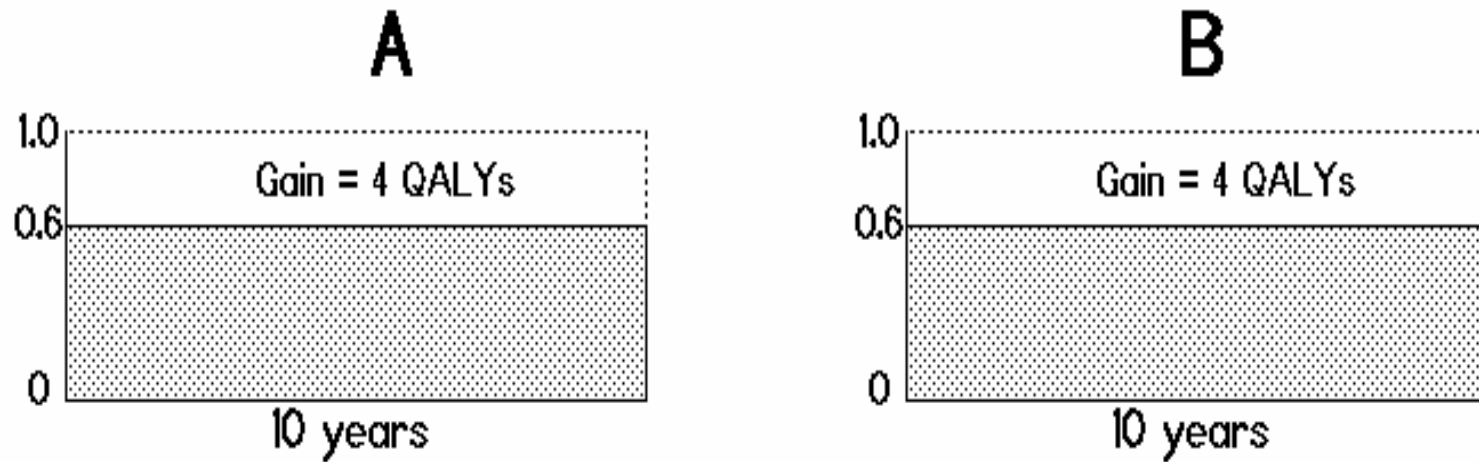
Treating B produces more **Health Gain**

A has a lower **Initial Health State** than B

Treating A would equalise **Health Status**

Equity?

A costs more than B – same Gain?



Who should get priority? A or B?

Female A **costs more** to treat than Male B for biological reasons

Non-English-speaking A **costs more** than B because they need an interpreter

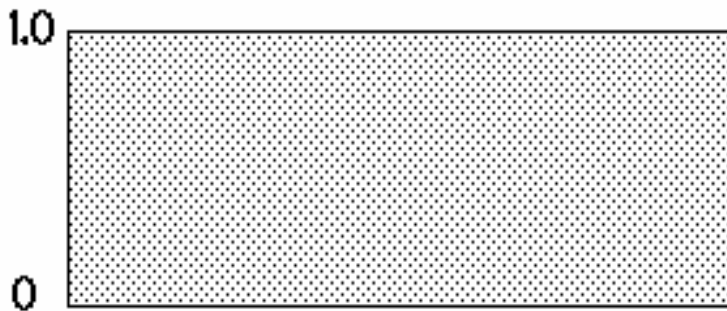
Double Jeopardy

Equal Cost Treatment to Save Life
(10 year life expectancy)

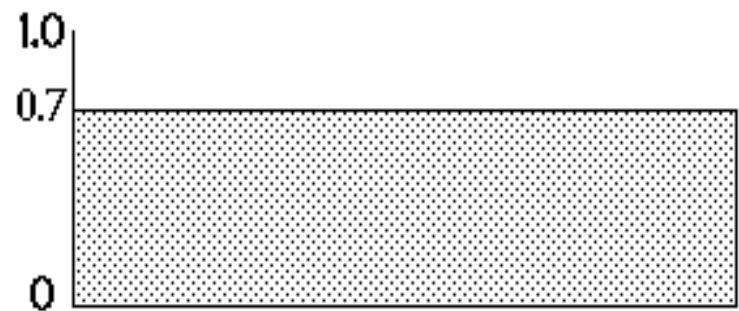
A has no pre-existing disability—maximum health status = 1.0

B has pre-existing disability which means that their maximum health status = 0.7

A



B



∴ Health Gain = 10 QALYs

∴ Health Gain = 7 QALYs

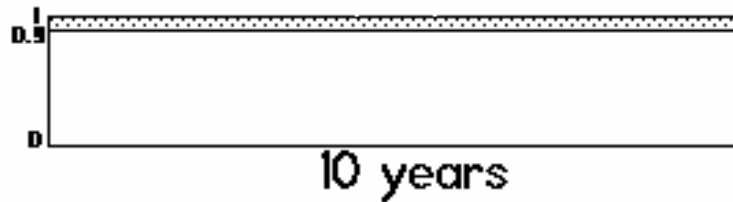
Adverse effects & Implications

- Life-saving or life-prolonging treatment may be denied, even where no alternative exists
- Some people or groups are deemed too expensive to treat
- The principle "to each according to what will generate the most QALYs" is potentially in conflict with "to each according to his need". (Lockwood 1988, p.45)
- Equity?
 - Equal cost treatments, different gain
 - Treatment for A costs more than B – but same Gain?
 - Double Jeopardy
- Sacrifice of the Individual to the Collective?
 - Small Gain to many > large gain to few
 - "Rule of Rescue"

Individual v Collective

Small Gain to many > large gain to few

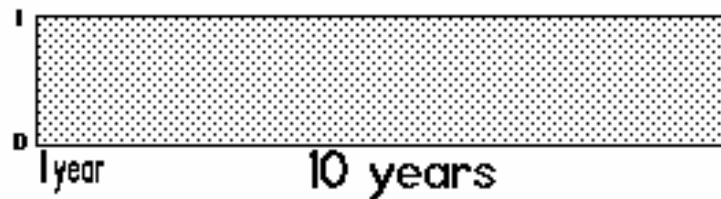
0.1 QALY increase
(eg from 0.9 to 1)
for 11 people



11
QALYs

is worth more than

1 QALY increase
(from 0 to 1)
for 1 person



10
QALYs

Problems with Maximising health or health gain?

Adverse effects

Viewed as 'Gold Standard'

Health Care does not affect population health

It ignores the (other) objectives of health care systems

Advocates of Health Gain concede may be other objectives- especially Equity?

“twin aims of health gain and reduced inequality” (SSS 1999:para 85)

But often seen as ‘modification’ of principal objective of health gain

Society “may be prepared to forgo efficient health gains in order to behave ‘fairly’”

...if “health gains are to be sacrificed to achieve fairness”

(Maynard 1996:1499)

“a concern for distribution implies a willingness to sacrifice some overall health gains”

(WHO, 2000, p.55)

Equity pursued at expense of health gain

Max Health Gain $\sum h_i$

How to incorporate equity?

Equity weights? $\sum e_j h_{ij}$

Add Equity? $\sum h_{ij} + e_j$

Subject to minimum level of health? $\sum h_i$

s.t. $h_i \geq h_{\min}$

Musgrove compares each 'criterion' with cost-effectiveness - health gain - as if that is the gold standard

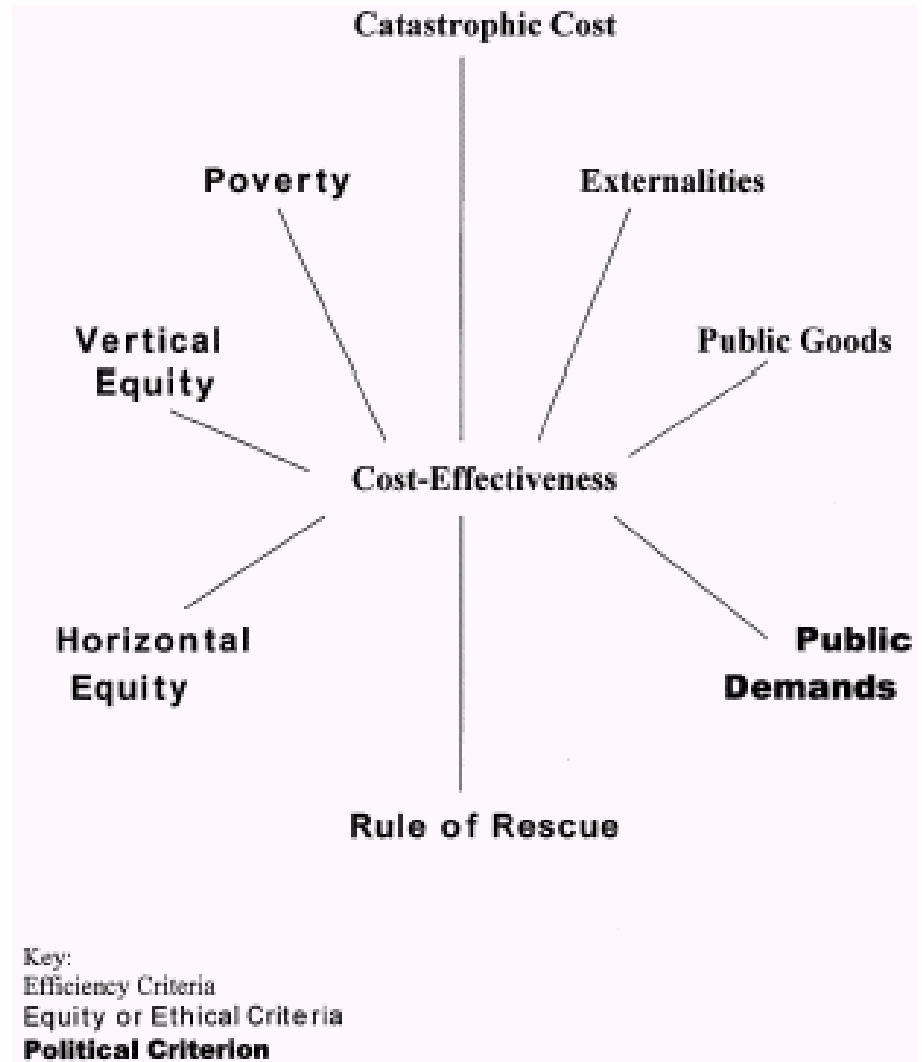


Fig. 1. Nine criteria for public spending on health care.

Problems with Maximising health or health gain?

Adverse effects

Viewed as 'Gold Standard'

Health Care does not affect population health

It ignores the (other) objectives of health care systems

Health Care does not affect population health

Apparent contradiction...

Widely accepted that (curative) personal health care is not a major determinant of population health

"investments in health care should never be confused with, or sold as, policies whose primary intent is to improve population health"

(Roos et al, 2006, p.125)

But - does this mean that health care is useless?

"it is clear that individual patients benefit greatly from medical interventions"

(Roos et al, 2006, p.108)

"But paradoxically, the benefits than an individual receives from a specific treatment do not seem to be reflected in the benefits that populations receive from health care investments. "

(Roos et al, 2006,p.108)

Problems with Maximising health or health gain?

Adverse effects

Viewed as 'Gold Standard'

Health Care does not affect population health

It ignores the (other) objectives of health care systems

It ignores the (other) objectives of health care systems

Evidence that Health Gain not main objective

In response to criticism that the WHO country rankings were sensitive to the weights employed, Lauer *et al* (2004) ran sensitivity analyses of the rankings, allowing countries to 'choose' their weights

When "complete freedom to choose...vast majority of countries assign[ed] a weight in excess of 0.9 to either responsiveness distribution or fairness in financial contributions".

Lauer et al (2004) concluded this , "means they assign a low or zero weight to population health, the defining goal of the health system [which] does not have face validity".

It ignores the (other) objectives of health care systems

What are other Objectives of Health Care?

Health care Equality/Equity

Equity commonly defined as equal access for equal need

Social Solidarity

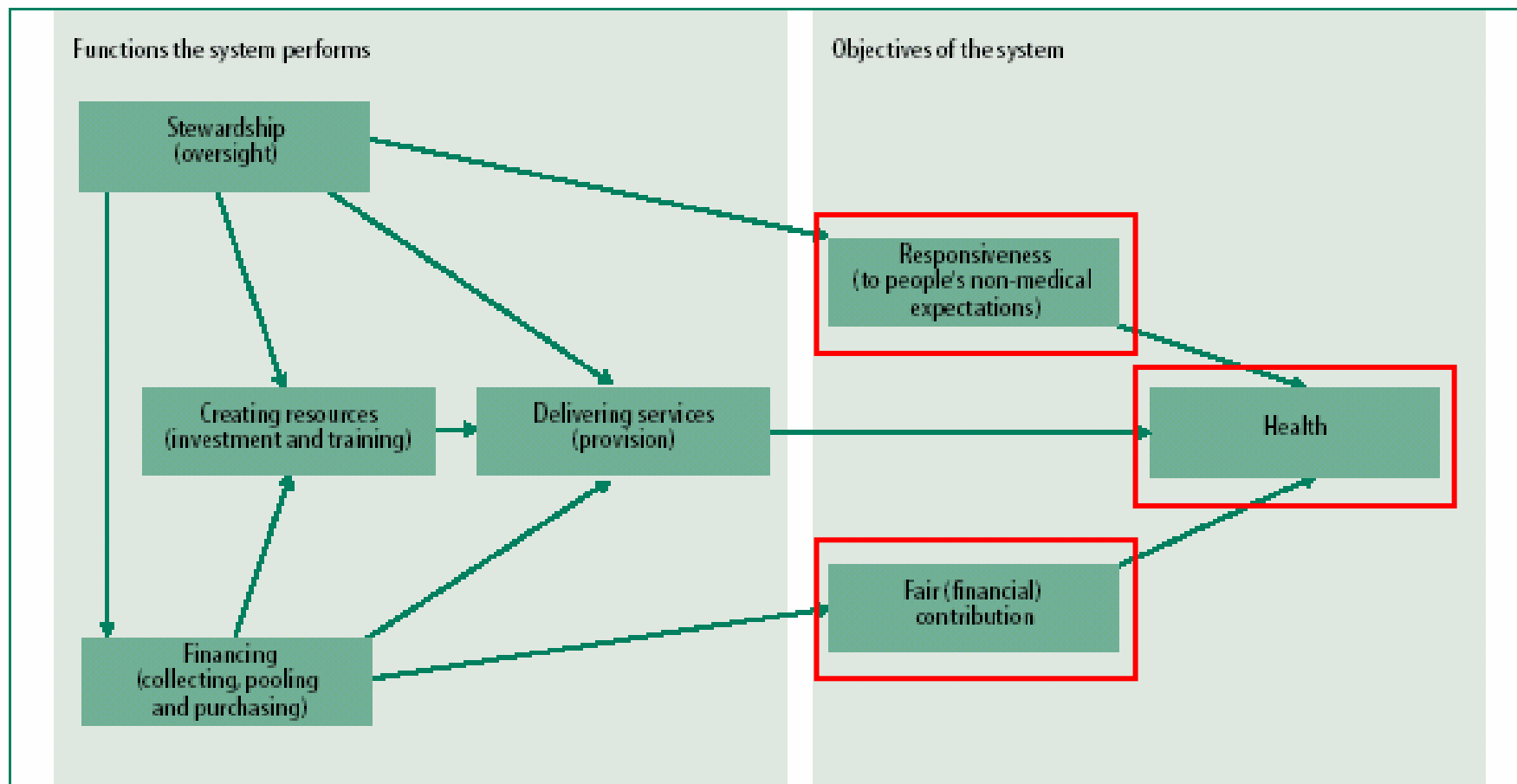
“Solidarity commonly refers to a type of social agreement between individuals and groups to share common risks, to take care of each other in times of hardship or illness, and so forth.”

Maarse & Paulus 2003)

Is Social Solidarity Under threat?

WHO Objectives of Health Systems

Figure 2.1 Relations between functions and objectives of a health system



Health

“Better health is of course the *raison d’être* of a health system, and unquestionably its primary or defining goal: if health systems did nothing to protect or improve health there would be no reason for them”

“the overall level of health; the distribution of health in the population;”

(WHO 2000:23 & 27)

Responsiveness

responsiveness to people’s expectations in regard to non-health matters - reflects the importance of respecting people’s dignity, autonomy and the confidentiality of information. (WHO, 2000, p. 21)

“...not a measure of how the system responds to health needs...but of how the system performs relative to non-health aspects, meeting or not meeting a population’s expectations of how it should be treated by providers of prevention, care or non-personal services.

(WHO, 2000, p.31)

Fair Financing

"Fair financing in health systems means that the risks each household faces due to the costs of the health system are distributed according to ability to pay rather than to the risk of illness"
(WHO, 2000, p.35)

"the ideal is largely to disconnect a household's financial contribution to the health system from its health risks, and separate it almost entirely from the use of needed services"
(WHO, 2000, p.36)

'Fair Financing' and Insurance –

Sharing the "fiscal burden of ill-health" (Reinhardt, 1997, p.56)

basically two aspects:

- **Insurance against the unexpected (the catastrophic risk)**
Effectively, healthy supporting the sick
- **Redistribution**
Effectively, rich and healthy supporting the poor and sick

Are there other objectives?

Risk, Uncertainty and Catastrophe? Security, Trust and Confidence?

"health care can be catastrophically costly. Much of the need for care is unpredictable" (WHO, 2000, p.24)

"because health care can be catastrophically costly and the need for it unpredictable, mechanisms for sharing risk and providing financial protection are important" (WHO, 2000, p.21)

Risk - usually considered in respect of financing

Insurance classic way to deal with Uncertainty...*but...*

"health insurance is more complex than any other kind of insurance. If a car worth US\$ 10 000 would cost \$15 000 to repair after an accident, an insurer would only pay \$10 000. The impossibility of replacing the body, and the consequent absence of a market value for it, precludes any such ceiling on health costs" (WHO, 2000)

Need Security - from financial risks and catastrophic health losses

Debate on risk usually stops at Health Care insurance

Contradiction between

objective of 'insuring against catastrophic financial risk'

and

denying care because (expensive and) not cost-effective (from a population health point of view)

But also need Security/Trust/Confidence –
that health services will be there when needed

But appears little focus on this – exception **Vision ROI**
*A health system that is there when you need it, that is fair,
and that you can trust* (Department of Health and Children, 2001, p.18)

Security, Trust and Confidence

“Trust is the expectation that individuals and institutions will meet their responsibilities to us.”

(Mechanic, 1998)

Trust usually Patient-Doctor relationship

But, in US Managed care Trust challenged by

- “growth of for-profit medicine”
- seeking to be “more efficient and... reduce expenditures”
- “professional rewards dependent on withholding care”
- “ doctor’s income depend on meeting goals of reduced utilization”

“...between members (or patients) and plans...object of trust...but will be heavily weighted toward “being there” in the event of a catastrophic event...”

(Goold, 2007)

Security, Trust and Confidence

"The health care system supposedly influences public trust in two ways: through institutional guarantees and through the actual availability of good quality health care" (van der Schee et al ,2007, p.57)

Study in Germany, Netherlands and UK

Found

Trust/Confidence in "Macro level policies"

(relating to restricted supply of health care facilities, long waiting lists and other forms of rationing)

about half

Trust/Confidence in any other aspect

(relating to individual providers etc)

The need for Trust, Confidence, Security that Health Care will be there when needed too often ignored

Challenge

Fatal disease but totally curable at cost of €1,000,000

Each member of population has 1:1,000,000 probability of contracting it in any year

Each member of population pays €1 per year into 'pool' (insurance)

If someone else gets disease, do you:

Deny treatment because it is not cost-effective (not worth €1,000,000)?

OR

Say I'm glad it wasn't me, but I am happy the sufferer has been treated and I am reassured that had it been me I would have been treated?

Possible 'objective set'

- To relieve suffering and promote health and security of individuals
- To minimize (catastrophic) risk
- To promote trust and provide security and certainty healthcare will be there when needed
- To ensure equity and fairness in access to healthcare
- To be responsive (as defined by the WHO)

But

personal, curative Health Services are not/cannot be:

- A tool for promoting population health
- A tool for promoting equity in health

Possible objective function?

- To relieve suffering and promote health and security of individuals (ih)
- To minimize (catastrophic) risk (mr)
- To promote trust and provide security and certainty healthcare will be there when needed (tsc)
- To ensure equity and fairness in access to healthcare (ef)
- To be responsive (as defined by the WHO) (cr)

$$\text{Max } f(\text{ih}, \text{mr}, \text{tsc}, \text{ef}, \text{cr})$$

Exclude Maximising (population) health or health gain as an objective for (except possibly for alternative treatments for same group)



Avoid using Maximising population health or health gain as the 'Gold Standard', and trading other objectives against it - for example, asking how much health gain you are prepared to sacrifice in favour of equity



Possible objective function?

- To relieve suffering and promote health and security of individuals (ih)
- To minimize (catastrophic) risk (mr)
- To promote trust and provide security and certainty healthcare will be there when needed (tsc)
- To ensure equity and fairness in access to healthcare (ef)
- To be responsive (as defined by the WHO) (cr)

$$\text{Max } f(\text{ih}, \text{mr}, \text{tsc}, \text{ef}, \text{cr})$$

- Functional form...?
- How to measure...?
- Danger of being pseudo-scientific and pseudo-objective
- Perhaps safer as conceptual 'objective set'
- The easily quantifiable objective of health gain is not allowed to dominate

Franklin J (ed) (1998) *Social Policy and Social Justice*, Polity Press, Cambridge
Money and trust: Relationships between patients, physicians, and health plans

Susan Dorr Goold

Journal of Health Politics, Policy and Law; Aug 1998; 23, 4; ABI/INFORM Global
pg. 687

Hadorn DC (1992) The problem of discrimination in health care priority setting, *JAMA* 268(11) 1454-1458.

Harris J (1985) *The Value of Life*, Routledge, London.

Harris J (1987) QALYfying the value of life, *Journal of Medical Ethics*, 13(3) 117-23

Harris J (1997) The case against: what the principal objective of the NHS should really be, *BMJ* 314(7081) 669-672

Hart JT (2006) *The political economy of health care*, The Policy Press, Bristol

Haugejorden O (1979) Proposal of a hierarchical classification of health service objectives, activities and resources, *Public Health*, 93(6) 358-62

ISPOR Conference (2005) *Evaluation of Drug Safety: can the use of QALYs produce better decisions?* Issues Panel - Florence, 6-8 November 2005

Jacobs R, Smith PC & Street A (2006) *Measuring Efficiency in Health Care*, Cambridge University Press

Jenni KE & Loewenstein G (1997) Explaining the 'Identifiable Victim Effect', *Journal of Risk and Uncertainty* 14(3) 235-257.

Lancet (2006) Rationing is essential in tax-funded health systems, Editorial, *The Lancet*, 368(9545) 1394

Lauer JA, Knox Lovell CA, Murray CJL & Evans DB (2004) World health system performance revisited: the impact of varying the relative importance of health system goals, *BMC Health Services Research* 4:19

Liss P-E (2003) The significance of the goal of health care for the setting of priorities, *Health Care Analysis*, 11(2) 161-170

Lockwood M (1988) Quality of life and resource allocation. In Bell JM, Mendus S (Eds) *Philosophy and Medical Welfare*, CUP, Cambridge.

Maarse H & Paulus A (2003) Has solidarity survived? A comparative analysis of the effect of social health insurance reform in four European Countries, *Journal of Health Politics, Policy and Law*, 28(4) 585-614

Maynard A (1996) Rationing health care, *BMJ*, 313(7071) 1499

Mechanic 1996

Mechanic 1998

Menzel PT (1990) *Strong Medicine*, OUP, New York.

Mooney G (1989) QALYs: are they enough? A health economist's perspective, *Journal of Medical Ethics* 15 148-152.

Mooney G, Gerard K, Donaldson C, Farrar S (1992) *Priority setting in purchasing*, Research Paper 6, NAHAT, Birmingham.

Mullen PM (1999) Are inequalities in health care consistent with equity in access? In De Angelis V, Ricciardi N, Storchi G, (Eds) *Monitoring, Evaluating, Planning Health Services*, World Scientific, Singapore.

Mullen PM & Mullen C (2006) Killing by numbers: Could quantitative analysis lead to involuntary 'euthanasia'? in Largergren M (ed) *Quantitative methods in aged care planning and operations*, Stockholm.

Mullen PM, Spurgeon P (2000) *Priority Setting and the Public*, Radcliffe Medical Press, Oxon