Faculty of Health and Social Care

Economic Appraisal

Introduction to Health Economics and Economic Appraisal for Behaviour Change Specialists

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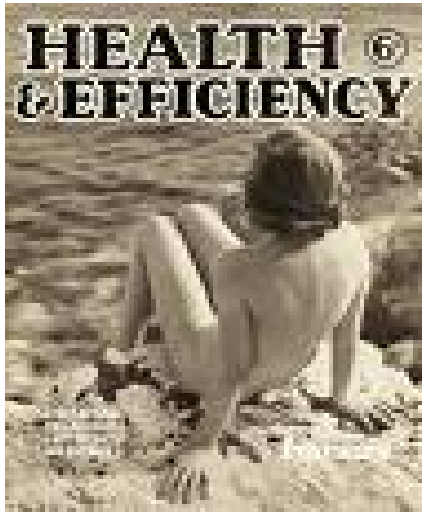
Introductions

- Please introduce yourself and your behaviour change project
- Will you need to apply economic appraisal?
  - What do you understand by this?
- I’m Graham Lister
  - As an economist and sociologist my job is to guide decisions by comparing cost to the value achieved
  - By cost I mean total input by society
  - By value I mean benefits to society
  - Economic return = a worthwhile contribution to society

Gay art or dismal science

- Socrates saw economics as part of a philosophy of virtue and knowledge
  - ‘Oeconomics' from the Greek for oikos = house and nomos = custom or law , hence "rules of good housekeeping."
- Jeremy Bentham saw it as the gay (meaning happy) science of improving wellbeing for all
  - “The greatest good for the greatest number of people is the measure of right and wrong”
- Thomas Carlyle attacked it as the “dismal science” because it held all people equal he was arguing for the continuation of slavery.

Health and efficiency



- Efficiency is the rate at which we generate value from costs, it is achieved by:
  - “Technical efficiency” delivering the same products and services at lower cost
  - “Allocation efficiency” using resources to maximise the total value of products and services delivered.
- The economy improves efficiency by 2% p. a.
  - Very largely by switch to “high value added” services
  - That is by “allocation efficiency”
- Health care costs rise ~ 3 - 4% above inflation
  - Aging and population growth adds ~1%
  - Consumer expectations add ~1%
  - Salaries increase account for ~1%
  - Medical technology adds ~ 1%
  - Less efficiency gain ~ ½% at best
- What is efficiency gain for the NHS?

Economics is central to health policy & management

- Health Economics “How people use limited resources in an attempt to satisfy unlimited health demands”
- Health economics is essential
  - To understand health policy
  - To be “economic” with resources
  - To develop and evaluate new solutions
- Value for Money in public expenditure means using all resources wisely not just shifting costs to the public.
- All health managers need a practical grasp of health economic principles, and an understanding of the social science of getting them implemented.

Commissioning and Delivering VfM

- As Chief Executive of the NHS and Chair of the NHS Commissioning Board Sir David Nicholson's challenge is to commission the right services (allocation efficiency) and to ensure their efficient delivery (technical efficiency).
- LAs and NHS commissioners and provider Trusts work with communities to achieve national and local objectives.
  - Improve health promotion and health services to increase healthy life expectancy
  - Address inequality to reduce the Index of Multiple Deprivation
  - Local partners should identify up to 8 local strategic objectives
- All with improved Value for Money
- What responsibilities do you share with David Nicholson?

Dame Sally Davies

Are we getting there?

- Health is a state of complete physical, mental, and social well-being, not merely the absence of disease or infirmity. (WHO)
- We are living longer but with more poor health
  - Life Expectancy (LE) at birth is increasing faster than Healthy Life Expectancy (HLE) : years lived in reported good health over the lifespan
  - Social class difference remains 3- 4 years for LE and 10-11 years for HLE

	Women		Men	
Year	1981	2001	1981	2001
LE	76.8	80.4	70.9	75.7
HLE	66.7	68.8	64.4	67.0
%	86.9	85.6	90.0	88.5

Source: www.statistics.gov.uk Note since this time HLE definition changed

How to improve the economic performance of the NHS

Lord Darzi

- Continuously improve the quality of prevention, care and treatment.
- Engage people to improve their health
- Reduce health inequality and address the needs of hard to reach groups
- Empower communities to care
- Shift from an illness service to focus on wellbeing – prevention can be much better value for money than cure
- Describe how your project will contribute

Behaviour change and allocation efficiency for health and wellbeing

- We will see that **well planned and managed** behaviour change initiatives, that **succeed in changing behaviour**:
  - Can achieve much higher rates of value for money in terms of reducing future health risks and costs, than most improvements to treatment programmes.
  - Can harness social capital for health and wellbeing i.e. the power of society to influence behaviour.
  - Can impact on society and future generations to reduce the long term health burden and support community care.
- In other words prevention is better than cure but we need to be able to demonstrate this to achieve a switch of resources

Graham Lister

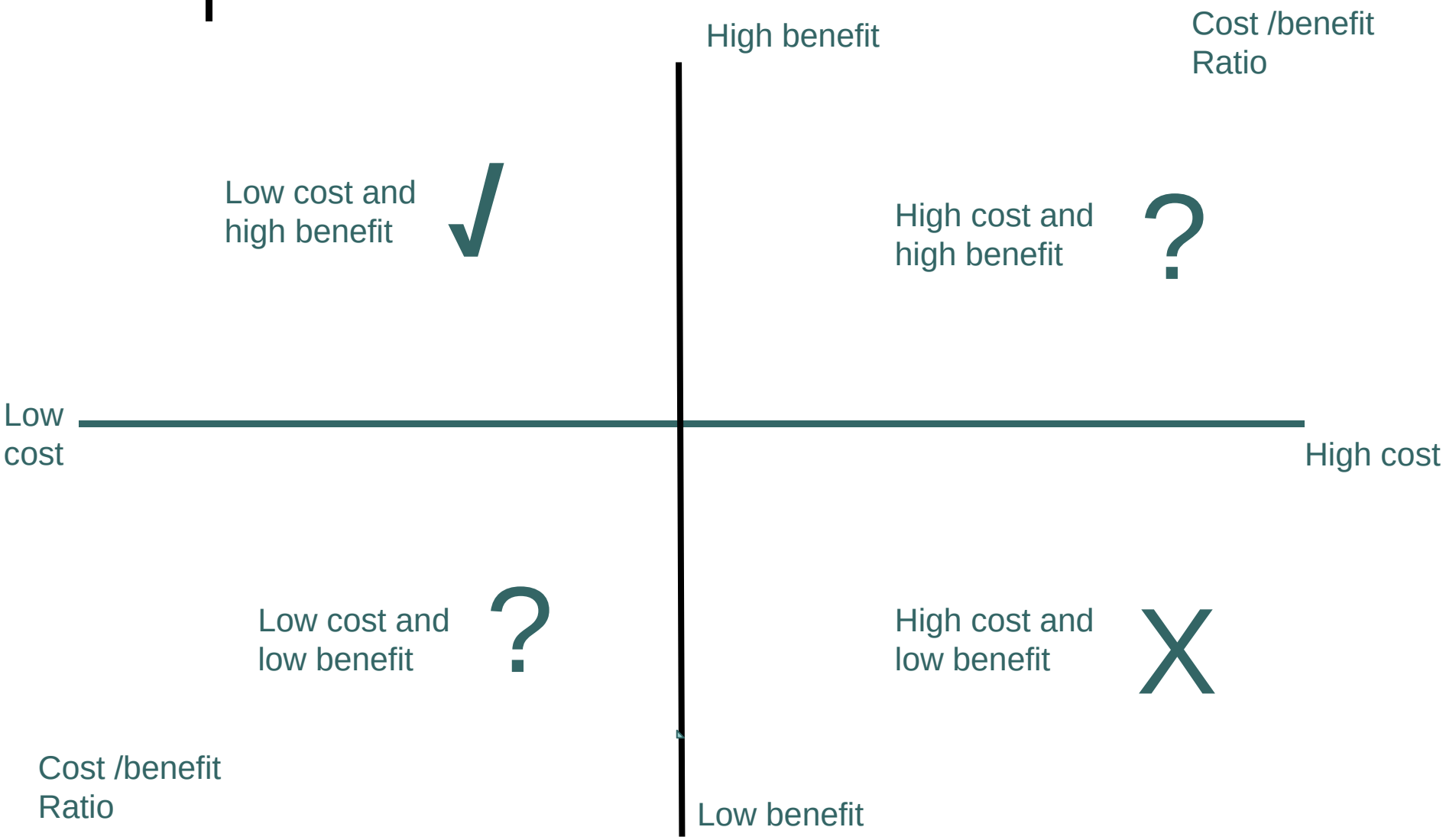
Economic appraisal at every stage in behaviour change programmes

- It is essential to think through how you will achieve the maximum health gain at the minimum cost at every stage:
  - Commissioning services, Planning and developing new services, Implementing services as well as Evaluation.
- Evaluation is always a comparison:
  - What would happen if you did nothing, what is the next best alternative, outcomes for a control group.
- VfM evaluation is a good practice principle for all LA/ NHS services from changing behaviour to delivering services
- How and when do you apply economic appraisal to your social marketing project?

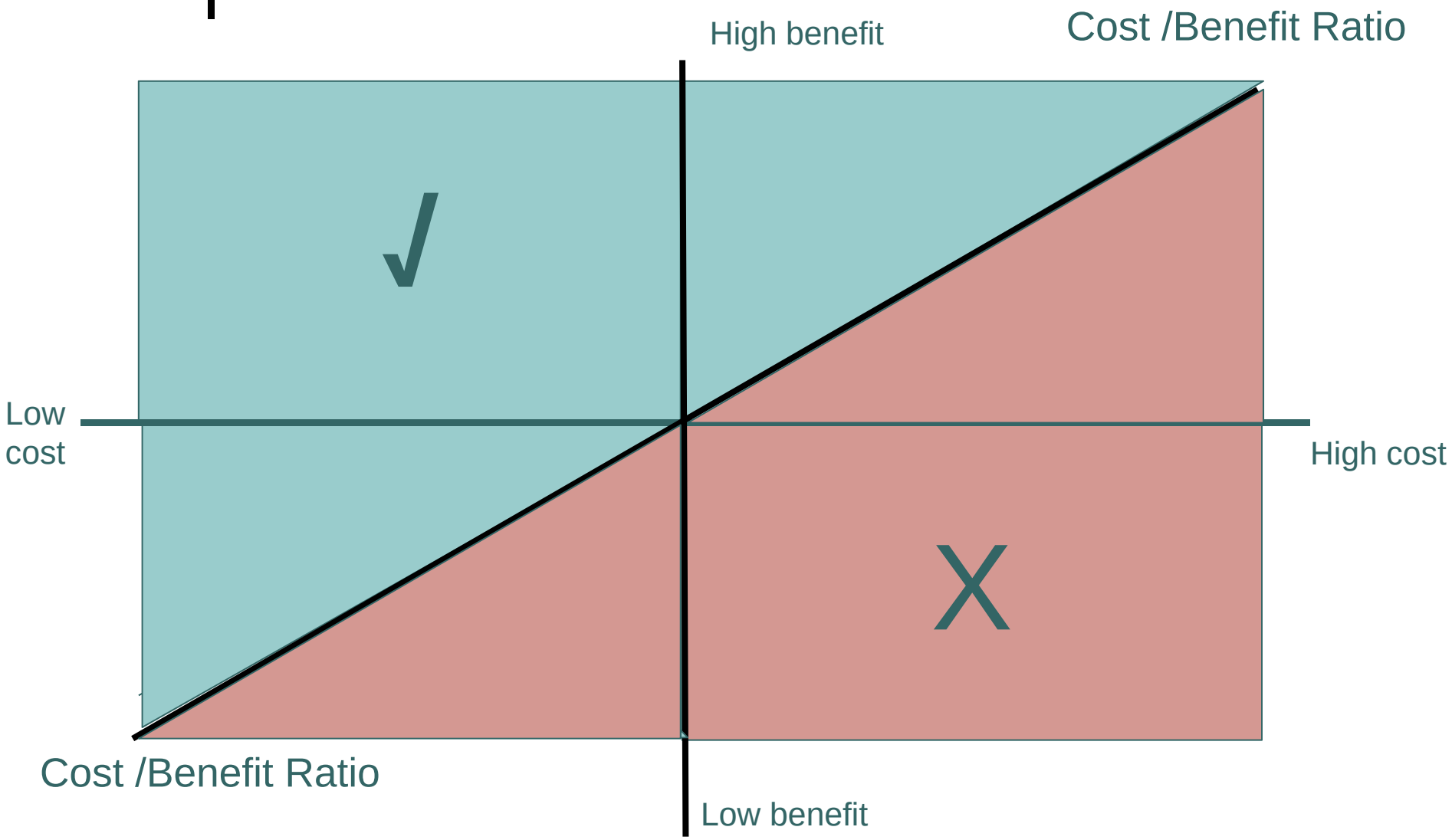
What is Value for Money

- Getting high benefits for low cost
  - Is obviously good value for money
- And if high cost produces low benefits
  - This is obviously poor value for money
- But most health has intermediate costs and benefits
  - So we need to establish a ratio showing how much it is worth spending for 1 unit of benefit
  - The cost benefit ratio of acceptable cost/benefits

Cost /Benefit Analysis



Cost /Benefit Ratio



Economic Appraisal

- Economic appraisal in health may apply:
  - Cost Offset ~ cost per £ saved
  - Cost effectiveness ~ cost/ outcome
  - Cost consequences ~ cost/ multiple outcome
  - Cost-utility ~ cost/weighted outcomes
  - Cost benefit ~ cost/ £ economic value
  - Social Return on Investment ~ total social cost per value to society improved
- In all cases compare with base case, do nothing or next best alternative. – what is your comparator?

Why is improving equality important for VfM in social marketing

- Because it is morally wrong to allow disadvantage to determine health - so equity is an objective of healthcare
- People in the most deprived areas, have a life expectancy 3-4 years less than those in the least deprived areas, about 2 years less than the average
- HLE varies by about 10 years 5 yrs less than average
- Improving health for the most deprived group to the level of the best would generate about 4 Life Years, about 7 QALYs.
- Reducing inequality in health is also a social value and a target for the NHS and Local Authorities.

Index of Multiple Deprivation

- English IMD estimates disadvantage using small area statistics (about 1,500 people) for 7 factors measured by a number of indicators, weighted in a total score:
  - Income 5 indicators weighted 22.5%
  - Employment 5 indicators weighted 22.5%
  - Health 4 indicators weighted 13.5%
  - Education and Training 7 indicators weighted 13.5%
  - Access/barriers to services 7 indicators weighted 9.3%
  - Living environment/housing 4 indicators weighted 9.3%
  - Crime 4 indicators weighted 9.3%
- Note: Northern Ireland, Scotland and Wales use slightly different measures

What is social capital?

- Social capital is the framework of values and norms of behaviour that fosters bonds within community groups, bridges between groups and links with formal and informal organisations*
- Behaviour change must support and work with social capital
  - By recognising and influencing existing group norms
  - By forming social groups to support behaviour change persistence
  - By providing links to social support from community and services
- Social capital can and should be measured it is an essential added value of behaviour change

* Rosalyn Harper (2002) “The Measurement of Social Capital in the UK” National Statistics

Why is Social Capital important to the VfM of Behaviour Change?

- Because it is an important moral issue for society, and
- Because the most critical factor in cost effectiveness is how long the behaviour change persists
- Behaviour change may be shown after one month but what happens over a year or 10 years?
  - In most cases people give up
- Social capital is the most important factor in sustaining behaviour change.
  - And it can be developed by families, support groups and community organizations plus local services

VfM Describes, Measures and Values Outcomes and Costs

- VfM requires clarity of goals, outcomes and measures
  - Set out stakeholder objectives and impacts
    - Using a social impact matrix
  - Map intended causal chain
    - Consider unintended consequences
  - Describe, measure and value costs and impacts
  - Relate interim impacts to long term health gain
  - Consider uncertainties and risks
  - Relate costs to current value of health gains
  - To produce a cost per unit of health gain
- Are you clear about your goals, outcomes and measures?

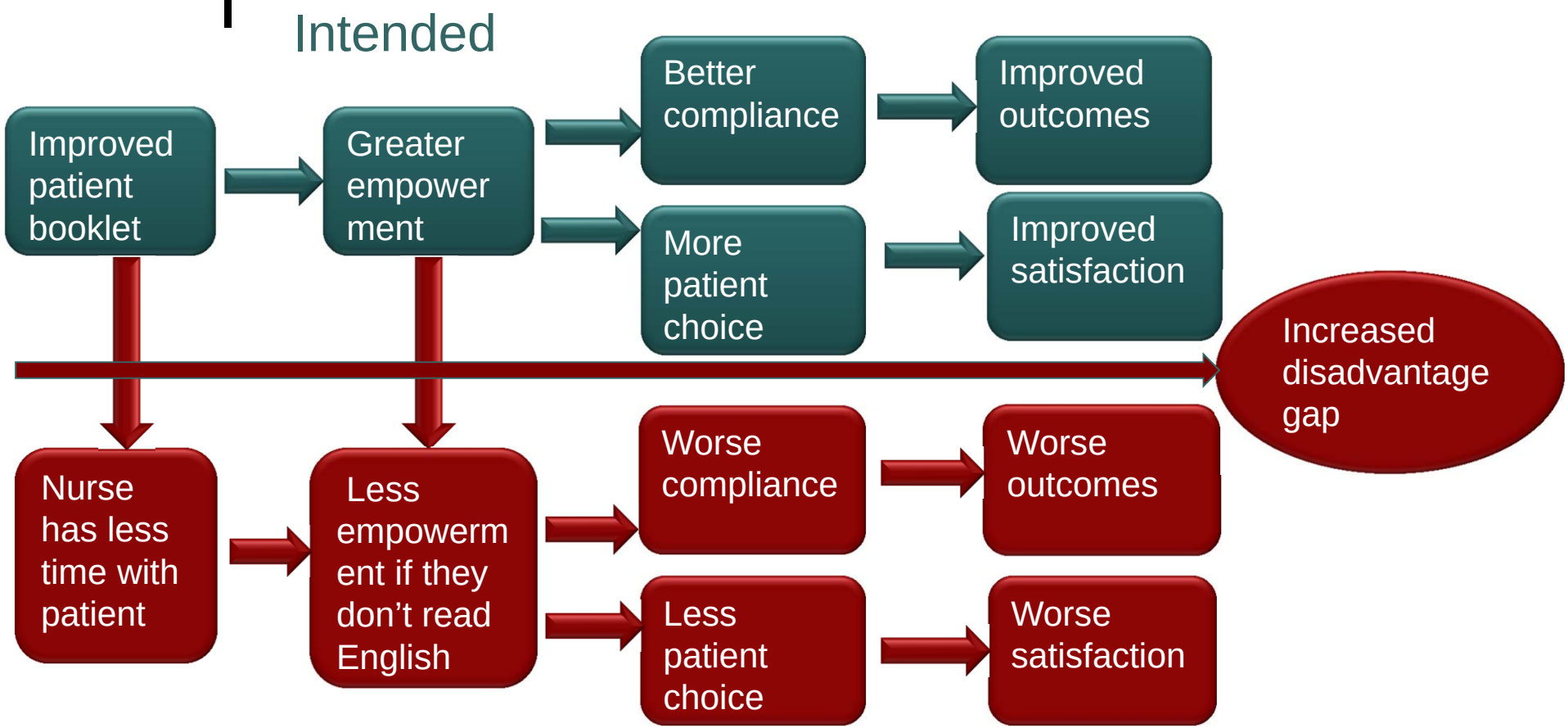
Apply these scoping questions to your own behaviour change project

- Context
  - Current behaviour, and consequent outcomes, who are the stakeholders
- Outline of proposed project
  - What is included/excluded, direct/indirect impact
- What are the alternatives
  - Current practice, evidence of best practice in behaviour change
- What are the aims and objectives of the proposal for all stakeholders
  - What is the causal link between action and outcomes
- What improved outcomes are targeted
  - Improved health, quality of life, social capital, cost savings…
- How can outcomes be measured and valued
  - Immediate changes and long term impacts on health and services
- Are there other factors influencing outcomes
  - Age/sex of clients, disadvantage, competing advertising, peer pressure
- What resources are required
  - Investment in time and resources to affect behaviour change
  - What about client time and resources or other public services

A societal impact matrix for a BC project

Objectives › Stakeholders v	Improved Health and Wellbeing	Reduced inequality	Improved social capital	Reduce long term costs
1. Local Authorities	Improved wellbeing QALY gain	Disadvantaged and Hard to reach % IMD	Membership of community groups	Reduced social care and other service costs
2. NHS	Improved health status QALY gain	Reduce health inequality % IMD	Better use of NHS services more participation	Reduced NHS costs from associated conditions
3. Other Government	As above	As above	Improved employment	Tax, benefit, excise and VAT impacts
4. Clients	Improved personal health status	Access for disadvantaged and hard to reach	More opportunities to participate and community support	Employment income Less expenditure on addictive products and informal care
5. Community	Better access to health and care	Wider participation	Increased volunteering	Opportunities for cost sharing
6. Employers	Reduced sickness and absenteeism	Less long term sickness	Improved staff relations	Less costs of replacing staff better productivity

Causal Chain Map for a BC Project



Draw your causal chain

Describe impacts before you can measure them

Qualitative and quantitative evaluations are equally important

- You have to be able to describe impacts to measure them.

- But you need to describe them systematically
  - The social impact matrix and the causal chain analysis
  - Provide a framework for both types of analysis
- Even more important you must engage with the stakeholders to ensure you have understood their perspectives for both qualitative and quantitative evaluations

Measuring costs

- This depends on the perspective, if you are taking a societal perspective:
  - Costs should take into account all capital and revenue costs to all stakeholders.
  - Non financial costs e.g. client's time, may be taken into account, this can be quantified as leisure time cost.
- If you are taking an organisation view you could consider only the organisation's costs:
  - This should include only avoidable marginal costs i.e. do not value rooms and facilities used unless they have an alternative use, similarly only consider "central overheads" if they would otherwise be reduced.
- In both cases costs incurred over time should be discounted to a current value.

Measuring Interim Impacts

- Measures of immediate impacts are an essential starting point,
- It can be argued that they simplify the complexity and variety of individual outcomes. However, this can be overcome by including a descriptive qualitative assessment.
- Impact measures allow comparison of different ways of achieving the same impact = cost effectiveness
- If valued in terms of contribution to long term health outcomes they can be compared to other interventions = cost utility
- A social value can be attributed e.g. £30,00 per QALY to give a social return on investment (see later)

Examples Interim Impact Measures

- There are many different ways of measuring the immediate impact of an intervention e.g:
  - Clients advised and referred to services (signposted)
  - Self reported 4 week smoking quitters
  - CO tested 4 week smoking quitters
  - Weight reduction targets
  - Personal health goal attainment
- Each measure provides some indication of possible long term health outcomes, but this is tenuous.
- What interim measures will you use?

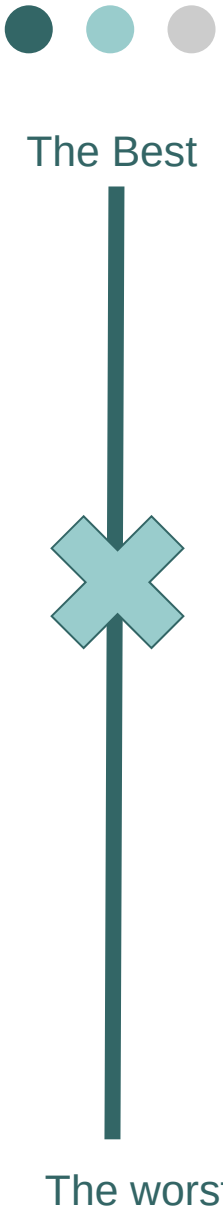
Long term Health Gains

Margaret Chan

- QALYs = quality adjusted life years
  - Years of life are weighted between 0-1
  - Depending on the quality of life
  - As seen by patients but
  - It depends who you ask and when
  - It varies with the age of the patient
  - There are many different QALY tables
- DALYs = disability adjusted life years
  - Used by WHO for burden of disease
  - They apply standard weights from 0-1
  - DALYs = Years of life lost + weighted years lived with disability
  - QALYs gained ~ DALYs reduced*

*See Franco Sassi (2006) “Calculating QALYs, comparing QALY and DALY calculations” Oxford University Press and LSHTM here

EuroQol 5D (3 or 5 levels)



- Dimensions:
  - mobility, self care, usual activities, pain/discomfort, anxiety/depression
- 3-5 levels:
  - no problems, slight problems, moderate problems, severe problems, and extreme problems
- Visual analogue scale:
  - ‘the best health you can imagine’ - ‘the worst health you can imagine’
- Could you apply this thinking to your case?

EuroQol 5 D Outcomes

Health State	Description	Valuation
11111	No Problems	1.000
11221	No problems walking about; no problems with self-care; some problems with performing usual activities; some pain or discomfort; not anxious or depressed	0.760
22222	Some problems walking about; some problems washing or dressing self; some problems with performing usual activities; moderate pain or discomfort; moderately anxious or depressed	0.516
12321	No problems walking about; some problems washing or dressing self; unable to perform usual activities; some pain or discomfort; not anxious or depressed	0.329
21123	Some problems walking about; no problems with self-care; no problems with performing usual activities; moderate pain or discomfort; extremely anxious or depressed	0.222
23322	Some problems walking about, unable to wash or dress self, unable to perform usual activities, moderate pain or discomfort, moderately anxious or depressed	0.079
33332	Confined to bed; unable to wash or dress self; unable to perform usual activities; extreme pain or discomfort; moderately anxious or depressed	-0.429

Translating Interim Impacts to Long term Health Outcomes

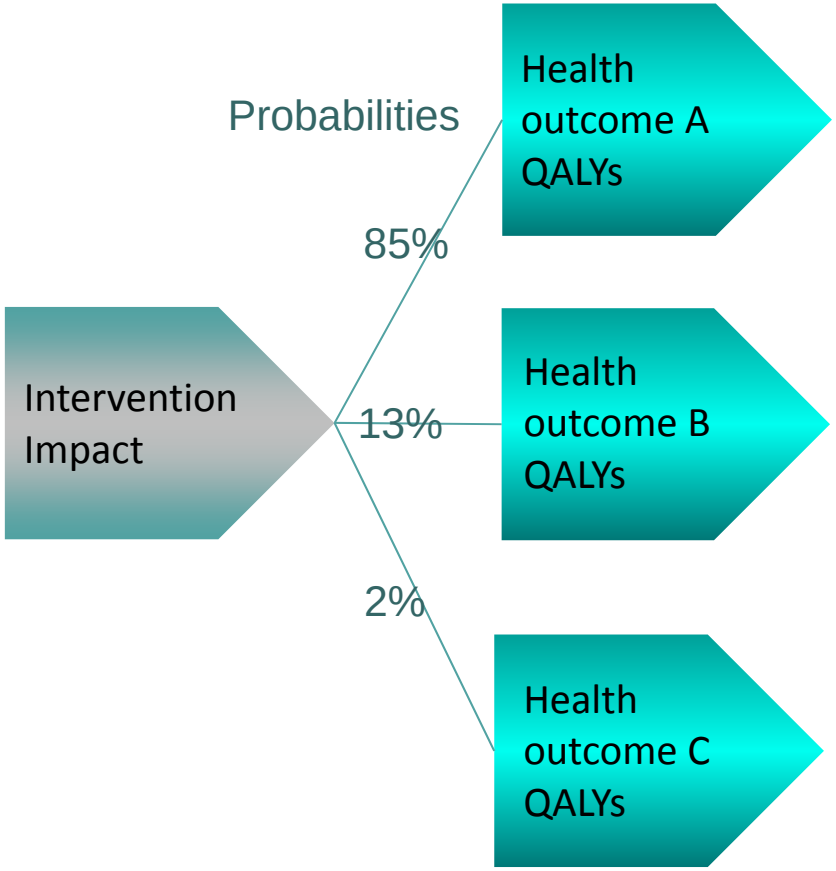
- Interim impact scores show immediate effects not long term health gain, for this you need to know
  - How long will the effect of the intervention last
  - How will the probability of good health outcomes improve
- Social capital to provide support for change is key.
- For interventions that cause a step change in probable health outcomes a decision tree can be used.
- For interventions that effect change over time a lifetime Markov cycle model is required.
- Fortunately for some interventions this has already been calculated as a burden of disease.

Lifetime Impacts

- Many interventions have a short term impact e.g.
  - For every seven, “4 week smoking quitter” reported
  - Only one will not resume smoking in 12 months
- Most people do not spring back to full health e.g.
  - Young people recover health after smoking
  - Middle aged and older people only recover 50%
- Impacts may last for rest of life, so depend on age and
- Social capital- support from family, friends and society
- What is the duration and impacts of your intervention?

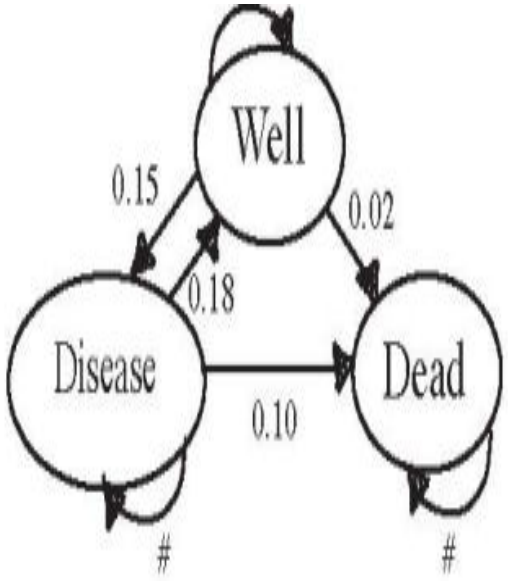
Decision Tree

- Used when there is an immediate health outcome
- For example providing a treatment or screening or a flu inoculation.
- You need to know the QALY value of each possible outcome and the probability of that outcome
- Q_A= Years of Life Added x Quality of Life for outcome A
- P_A = Probability of outcome A
- QALY value of one intervention = $P_AxQ_A + P_Bx\ Q_B + P_CxQ_C$



Markov Model

- A Markov model represents a continuing pattern of events when the probable outcomes for each period of time depend upon conditions in the previous period.
- For example if you smoke now you will probably continue to smoke or you may stop.
- You may stay well but the probability of become ill increases as you get older.
- If you get a smoking related disease you may live with the disease or recover or you may die.
- The maths of this are complicated but give a health outcome for smoking and therefore a health gain from stopping.



Burden of Disease

- WHO produce a National Burden of Disease Model
- This shows how health outcomes are attributable to various causes.
- There are different Burden of Disease Tools for different sorts of country.
- For the UK the relevant Tool relates to low mortality European countries

- This has been applied to UK data to show how health outcomes relate to causes.
- A similar burden of disease tool was developed in the UK in 1996 but is out of date.
- Review the detailed presentation on the application of the WHO National Burden of Disease Tool to the UK

Improving health conditions/risk

- Treatment can improve immediate conditions
  - Improve health x a period = QALY gain
- Intervention can also reduce longer term risk
  - Reduced probability x ill health for a period = QALY gain
- It is important to estimate
  - Improvement in health condition
  - Reduced probability of ill health
  - Period for which improvement will apply
  - Cost of achieving this gain = cost of treatment/intrvention
- Compare costs with QALY gain = cost/benefit ratio

Valuing QALYs

- Willingness to pay (to avoid risk of loss)
  - £25,000 – £50,000 say £30,000/QALY
  - Marginal productivity of NHS £25,000- £30,000
  - Income effect for the family £25,000 - £35,000 + Employers, public services, taxes and benefits
- NICE recommend NHS limit
  - £30,000 (£20,000 - £70,000)/ QALY
- A value of £30,000 can be used in social return on investment calculations if QALY gain is certain

Examples of costs per QALY

Intervention	Cost per QALY 1980
Pacemaker for atrioventricular heart block	£700
Hip replacement	£750
Valve replacement for aortic stenosis	£900
CABG (severe angina; left main disease)	£1 040
CABG (severe angina; triple vessel disease)	£1 270
CABG (moderate angina; left main disease)	£1 330
CABG (severe angina; left main disease)	£2 280
CABG (moderate angina; triple vessel disease)	£2 400
CABG (mild angina; left main disease)	£2 520
Kidney transplantation (cadaver)	£3 000
CABG (moderate angina; double vessel disease)	£4 000
Heart transplantation	£5 000
CABG (mild angina; triple vessel disease)	£6 300
Haemodialysis at home	£11 000
CABG (mild angina; double vessel disease)	£12 600
Haemodialysis in hospital	£14 000

VfM outcomes from Health England

Category	Type of Intervention	HELP Utility Score	Net cost per QALY
Alcohol	Increase tax by 5%	11.30 %	-£5,267
Smoking	Increase tax by 5%	9.62 %	-£2,951
Smoking	National Media Campaign	9.46 %	-£2,663
Diet, activity, obesity	National Media Campaign	9.09 %	-£3,290
Smoking	Brief Intervention in GP practices	8.98 %	-£1,799
Alcohol	Brief Intervention in GP practices	8.70 %	-£750
Diet, activity, obesity	Brief Intervention in GP practices	8.63 %	-£2,151
Smoking	Nicotine Replacement Therapy	8.25 %	-£563
STI / teen pregnancy	Screening and Treatment	7.38 %	£370
Diet, activity, obesity	School based education	7.25 %	£599
STI / teen pregnancy	School based education condoms	6.00 %	£4,965
Statins	Use for primary prevention	4.26 %	£9,858
Mental health	Assessment + support for carers	0.95 %	£35,264
Mental health	Screening retirees for depression	0.12 %	£70,120

Taken From “Health England Leading Prioritisation: HELP” by Matrix Consulting

Why discount the future?

- Most benefits and some costs occur in the future
- Resources and outcomes (benefits) are discounted
  - Discount rates for resources reflect the opportunity cost of money so cost savings and benefits are discounted to
  - The “Net present value” of the investment
  - Discount rates for benefits reflect utility of current versus future benefits a “social time preference rate” i.e. the fact we would prefer to have benefits now!
- For health costs and benefits the discount rate set by the Treasury is 3.5% per year

Discounted value of a cost or benefit stream

$$\mathrm{DPV} = \sum_{t=0}^{N} \frac{FV_t}{(1+d)^t}$$

- Discounted present value DPV of a stream of unit (1) inputs at the social time preference rate of 3.5% p a

1 -10	11-20	21-30	31-40	41-50
1 0.9661	9.007	14.698	18.736	21.599
2 1.900	9.663	15.167	19.069	21.835
3 2.802	10.303	15.620	19.390	22.062
4 3.673	10.921	16.058	19.701	22.027
5 4.515	11.517	16.482	20.001	22.495
6 5.329	12.094	16.890	20.290	22.701
7 6.115	12,651	17.285	20.571	22.900
8 6.874	13.190	17.667	20.841	23.098
9 7.608	13.710	18.036	21.102	23.283
10 8.371	14.212	18.392	21.355	23.462

Recognising Uncertainty

- Most health data is uncertain
- Behaviour change is particularly difficult to predict, and
- Long term future projections even more so
- With many causes and consequences
- Often based on assumptions, so
- Recognise uncertainty and estimate ranges of values
- Establish confidence interval (probability of outcome)
- Perform sensitivity analysis
  - Test outcomes when assumptions change
  - Don’t pretend precise knowledge

Using the Tools

- Go to the behaviour change evaluation tools
  - On this CD or online at http://thensmc.com/resources/vfm
  - Open the Smoking cessation model try out an intervention using estimates of cost and impact.
  - Try varying some of the factors to see how outcomes change.
  - This will give you an initial taste of how VfM works but for a full user guide apply for training and read the guides.

Making the case

- If you have worked out the sums correctly you will be able to compare options in terms of cost per QALY and Social Return on Investment.
- But is this the end of the story?
- What other evidence would you present and how would this affect your final recommendations?
- Hint you need to draw on qualitative assessment, consider the other options and be aware of the assumptions and uncertainties that are inherent in the VfM tools. Perhaps more research will be needed.

Short Cuts

- You may find studies on the internet evaluating the costs/benefits of services similar to those you propose.
- You may use these as a short cut for assessing your services, but beware:
  - Are your costs similar?
  - Are impact measures comparable?
  - Are you achieving the same level of efficiency?
  - Are client groups comparable?
  - What assumptions and estimates did the study use?

What have we learnt?

- Why is health economics important?
- Does it apply to your field and your project?
- What are the intended costs and outcomes?
- Are there unintended consequences?
- How does it affect all stakeholders?
- How will you value outcomes?
- How will you assess value for money?
- How will you handle timing and uncertainty?

Further reading

- “Methods for the Economic Evaluation of Health Care Programmes” Drummond et al
- “Social Marketing and Public Health: Theory and Practice” J French et al Oxford University Press
- Look at the National Social Marketing Centre Value for Money Tools and resources at http://thensmc.com/resources/vfm