Volume 4, number 2

What is PBMA?

Sponsored by an educational grant from Aventis

Peter Brambleby
MBBS DCH FRCP(Edin) FFPHM Director of Public Health, Norwich Primary Care Trust

Richard Fordham
PhD MA BA(Hons) Senior Lecturer in Health Economics and Director of NHS Health Economics Support Programme, University of East Anglia

- Programme budgeting and marginal analysis (PBMA) is a process that helps decision-makers maximise the impact of healthcare resources on the health needs of a local population.
- Programme budgeting is an appraisal of past resource allocation in specified programmes, with a view to tracking future resource allocation in those same programmes.
- Marginal analysis is the appraisal of the added benefits and added costs of a proposed investment (or the lost benefits and lower costs of a proposed disinvestment).
- Further information on the practical aspects of PBMA will appear in the next bulletin, *Implementing PBMA*.

Abbreviated prescribing information is on page 6

What is PBMA?

Programme budgeting is a retrospective appraisal of resource allocation, broken down into meaningful programmes, with a view to tracking future resource allocation in those same programmes.[1]

Marginal analysis is the appraisal of added benefits and added costs when new investment is proposed (or lost benefits and lower costs when disinvestment is proposed), in an incremental way.[1]

PBMA can assist decision-makers in directing resources, with the aim of maximising the impact of healthcare on the health needs of the local population. The approach relies on two fundamental economic principles: opportunity cost, or the forgone benefits of the next best alternative use of a given set of resources, and marginal analysis, which examines the incremental costs and benefits of shifting resources from one area to another, to provide insight into whether changes should be made. One of the primary goals of priority setting is therefore to maximise the benefits and minimise the opportunity costs for a given set of resources.

PBMA helps us to be:

- Comprehensive and inclusive
- Systematic and consistent
- Collaborative and fair
- Patient-focused and evidence-based
- Open and accountable.

PBMA should be:

- Relatively quick and simple, but sufficiently robust to be credible and inform decisions
- Supported by a common contract currency and resource mapping methodology
- Backed up by regular dialogue between clinicians, managers and the public.

The origins of PBMA

PBMA had its roots in the Rand Corporation in the USA in the 1950s. Its first major application was not in healthcare, but for the US Department of Defense in the 1960s where it was a cost-accounting tool that could display, over time, the deployment of resources towards specific military objectives, such as wars overseas, the support of NATO or the defence of the homeland, instead of the conventional budgetary headings of tanks, missiles or diesel fuel. Allocation of new resources, or shifts between budgets, could be judged on their relative contribution to these main objectives – a much more meaningful way of making decisions.

This can equally be applied to healthcare. Instead of seeing investment on the level of a hospital or drug budget, the focus switches to specific health objectives such as reducing death rates from heart disease, improving indicators of child health, reducing the burden on family carers of patients with senile dementia, and so on. The ultimate aim is to maximise health gain by deploying the available resources to best effect.

One of the principal researchers in this field, responsible for bridging the gap between military and healthcare applications in the USA, was Alain Enthoven, later an important influence on NHS reforms in the UK.[2]

It is not just the programmes – couched in terms of target groups or particular outcome indicators – that are important here, but the notion of the 'margin'. A marginal analysis is necessary because as each extra unit of input is added, the outcome usually increases in a roughly linear fashion to start with, before levelling out. This characteristic (the so-called 'law of diminishing returns') is apparent whether one is launching an additional missile to destroy a military target or deploying an additional health visitor to improve an immunisation uptake rate. As a programme expands its output, the incremental benefit to the recipients of each additional 'unit' of output tends to decline. Imagine if we offered hip replacement to anyone with the slightest pain in the hip – the level of improvement, and the ratio of risk to benefit, would be much more favourable in those at the severe end of the spectrum of symptoms than in those at the milder end.

PBMA in the NHS

Programme budgeting can help NHS health economies to understand:

- Where they currently invest resources
- The effectiveness of those investments
- The most effective way of investing in services in the future.

The implementation of PBMA at local level is supported by the modernisation and cost-effectiveness objectives set out in all recent NHS publications and review articles (see Box 1).[2–6]

The National Programme Budget Project was set up in 2002 by the Department of Health[7] to see if it is possible to map expenditure by major disease groups and national service frameworks (NSFs) across the whole NHS, including primary, community and hospital care.

An understanding of how resources are invested will:

- Enable commissioners to identify current patterns of service delivery for groups of patients and to identify variations between providers and access to service by geographical area
- Facilitate the mapping of care pathways
- Be a powerful tool for agreeing the desired patterns of commissioning
- Make it possible to monitor NHS expenditure against the NSFs
- Help identify different expenditure patterns across the country, explain these to the population at large and get a more meaningful engagement of the public in the determination of future patterns of spending.

Box 1. What does the NHS say about PBMA?

'Efficient use of resources will be critical to delivering the best for patients. It is important that managers and clinicians alike have a proper understanding of the costs of local services, so that they can make appropriate local decisions on the best use of resources.'
Department of Health. *The new NHS: Modern, Dependable*. London: DoH, 1997.[3]

'Partnerships between secondary and primary care clinicians and with social services will provide the necessary basis for the establishment of "programmes of care", which will allow planning and resource management across organisational boundaries.'
Department of Health. *The new NHS: Modern, Dependable*. London: DoH, 1997.[3]

'The core content [of the Health Improvement Programme] will be … resource mapping, sharing base-line information and forecasts … it will be important that strategies are based wherever possible on sound evidence of the clinical cost-effectiveness and appropriateness of interventions.'
Department of Health. *Health improvement programmes: planning for better health and better health care*. HSC 1998/167.[4]

'Effective purchasers need programme budgeting and marginal analysis …'
Enthoven A. *In pursuit of an improving National Health Service*. London: Nuffield Trust, 1999.[2]

'The development of National Service Frameworks for important diseases/conditions such as cancer and coronary heart disease provides impetus to identify expenditure in these programmes and others.'
Department of Health. *Programme Budgeting*. London: DoH, 2002.[5]

'There has been widespread diffusion of PBMA in [regional health authorities] internationally and, overall, the impact of this approach has been positive.'
Mitton C, Donaldson D. Twenty-five years of programme budgeting and marginal analysis in the health sector, 1974–1999. *J Health Serv Res Policy* 2001; 6: 239–248.[6]

Implementing PBMA

An eight-step plan for PBMA is shown in Box 2 (page 5). This plan will be examined and illustrated in greater detail in the next bulletin, *Implementing PBMA*.

Applied PBMA

Medicine development is forever presenting new and challenging budgetary dilemmas. Typically, a new drug (for example, as recommended by the National Institute for Clinical Excellence [NICE]) will cost more than the currently available therapy, but will bring additional benefits to patients. As a result of adopting the new drug, further savings may occur that fall beyond the drug budget. The important figure is therefore not the simple 'acquisition cost' but the net cost, after delivery mechanisms, laboratory monitoring and savings from not using the original therapy have been factored in. Similarly, in respect of health gain it is net health gain that matters, after all positive and adverse effects have been considered. These net shifts in cost and outcome are of primary importance to decision-makers pursuing efficiency.

This is where local economic evaluation comes in. Although a national evaluation may have already been conducted, a more specific evaluation may often be required to establish the local impact. National norms of cost and outcome may not apply at local level, especially at the margin. The starting point

in terms of historical spending patterns may be different between different parts of the country, so the trade-offs will be different.

New money is not always available for every potentially beneficial treatment. PBMA can assist in those instances where 'resource neutrality', or at least a degree of trade-off, is a requirement – that is to say, new investment has to come from a reallocation of existing (and usually less beneficial) resources.

Imagine that the chief pharmacist of a large district general hospital has noticed an increasing trend in adverse events following surgery or prolonged hospital stay, due to venous thromboembolic disease (VTED). This has led to more bed-days in general medicine and medicine for the elderly. The current pattern of preventive and curative therapy is patchy, with different drugs being prescribed by different clinicians. In addition to this being potentially less than optimally effective care (taking into account recent developments in VTED therapy) there is an element of confusion for junior doctors, leading to possible medical error. The chief pharmacist, with support from the clinical governance committee in the hospital and the published evidence base, decides to recommend standardising on exonaparin, even though he recognises that this would add to the hospital drug budget.

As an initial step, an analysis is conducted of the current VTED drug expenditure patterns by specialty. It is found that 80% of the total spend comes from four specialties: orthopaedics, general surgery, geriatrics and general medicine. The remaining 20% comes from other areas of the hospital – the coronary care unit, the intensive care unit and the gynaecology department. Hospital activity analysis shows that over the last five years there has been an upward trend in the number of cases of deep vein thrombosis and pulmonary embolism, with a concomitant increased expenditure on their treatment. It is agreed that attention will focus on the 80% of drug use accounted for by the four main specialties.

On presenting his findings and ideas to the chief executive, it is made clear to the chief pharmacist that the drug budget can only be increased if the changes are fully self-funded and 'resource-neutral' to the hospital overall.

From his computer-based prescribing system, the chief pharmacist estimates that a switch to the new VTED therapy will roughly cost the hospital an additional £100,000. This takes account of an increased use in VTED prophylaxis in orthopaedics, general surgery and long-term medical patients. Subsequent savings are likely to be made in the treatment of symptomatic patients.

The chief pharmacist obtains the cost map from the finance department and decides to investigate possible areas of saving (an example cost map is given in Table 1).[8] He constructs a model to look at the reduction in VTED and the savings in the medical specialties which would otherwise deal with these cases. While not on a sufficient scale to allow actual closure of beds ('fixed costs'), these reductions would at least generate savings on variable elements of a patient hospital episode and permit 'virement' (transfer between budgets) from medicine to surgery budgets to cover the prescribing costs.

The chief pharmacist presents his plans at the next chief executive's meeting, where the additional investment requirement is discussed. The proposals are found to fit in with clinical governance policies on reducing hospital complication rates, shortening stays and implementing NSF 'clinical best practice' recommendations for older patients. GPs from the nearby primary care trusts are also supportive, because they recognise the savings in primary care if VTEDs can be prevented. In this scenario, the new rationalisation policy is approved.

Box 2. PBMA in eight steps

1. Choose a set of meaningful programmes.
2. Identify current activity and expenditure in those programmes.
3. Think of improvements.
4. Weigh up incremental costs and incremental benefits and prioritise a list.
5. Consult widely.
6. Decide on changes.
7. Effect the changes.
8. Evaluate progress.

Table 1. An example of a cost map (figures in £000s)[8]

Spend area	Age group in years (as in weighted capitation formula)								
	0–4	5–14	15–44	45–64	65–74	75–84	85+	All ages	% of total
General surgery	78.6	116.5	1,114.5	1,682.6	1,733.1	2,088.8	740.8	**7,554.7**	10.57
Urology	3.4	17.7	140	310.3	471	719.1	269.8	**1,931.3**	2.70
Orthopaedics	73.8	209.2	903.7	941.5	1,147.7	3,227	1,227.7	**7,730.6**	10.82
Ear, nose and throat surgery	118.2	403.3	363.8	165.5	86.2	92.1	28.4	**1,257.5**	1.76
Ophthalmology	45.7	32.8	59.4	173.2	372.6	588.9	285.5	**1,558.1**	2.18
Oral surgery	99.3	181	168.6	8.2	7	4.4	1.4	**469.9**	0.66
Pain relief	0	0	36.6	46.8	17.8	22.8	7.6	**131.6**	0.18
Obstetrics	0	1.1	3,272.1	3.9	0	0	0	**3,277.1**	4.58
Gynaecology	0.8	7.5	1,899.6	846.4	335.6	193.2	67.7	**3,350.8**	4.69
A&E	149.3	88.4	408.5	270.9	296.4	482	274.8	**1,970.3**	2.76
General medicine	1.8	0	895.3	1,994.5	2,693.2	640.8	63.3	**6,288.9**	8.80
Haematology	0	0	50	126.6	34.8	145.6	0	**357**	0.50
Rheumatology	0	0	92.6	177.8	66.8	19.4	7.8	**364.4**	0.51
Geriatrics	0	0	0	93.9	505.2	5,170.5	4,037.2	**9,806.8**	13.72
Paediatrics	2,728.7	843.5	47.6	0	0	0	0	**3,619.8**	5.06
Psychiatry	24.2	56.1	1,815.6	1,180	790.9	1,347.6	453.9	**5,668.3**	7.93
Regional specialties	228.8	138.5	660.7	1,069.4	745.7	312.3	130.8	**3,286.2**	4.60
Learning difficulty	0	42.9	280.7	150.5	17.8	1.4	0	**493.3**	0.69
Health promotion	6.1	11.5	38.5	23.3	13.8	9.8	3.3	**106.3**	0.15
Drug abuse	0	9.2	227.1	12.6	3.4	0	0	**252.3**	0.35
HIV/AIDS	0	20.8	166.6	20.8	0	0	0	**208.2**	0.29
Disablement	2.7	7.7	63.2	34.7	42.4	118.8	45.1	**314.6**	0.44
Joint finance	23.6	44.7	149.8	90.6	53.8	38.1	12.8	**413.4**	0.58
Community nursing	9.4	18.7	148.6	281.4	482	1,012.4	696.5	**2,649**	3.71
Community clinics	0.6	1.1	9	16.6	28.9	62.2	43.4	**161.8**	0.23
Community therapy	43.9	39.5	77.1	83.3	127.7	189.3	99	**659.8**	0.92
GP pathology	33.2	33.9	220	114.9	106.2	165.2	72.8	**746.2**	1.04
GP radiology	15.9	16.2	219.4	55.2	51	69.8	35	**462.5**	0.65
Hospice	0	0	129.3	78.4	46.5	32.8	11	**298**	0.42
Out of district	0	0	124.5	75.3	44.8	0	0	**244.6**	0.34
Extra contract cases	360.9	118	989.8	560	264.3	258	51.2	**2,602.2**	3.64
Ambulance	132.6	88.2	568.3	294.5	273.6	369.1	184.9	**1,911.2**	2.67
Management costs	76.2	144.2	482.8	292.2	173.4	122.8	41.6	**1,333.2**	1.87
Total	**4,257.7**	**2,692.2**	**15,823.3**	**11,276**	**11,033.6**	**17,504.2**	**8,893.1**	**71,479.9**	100
Capitation allocation	2,931	2,788	8,506	8,578	14,225	22,516	11,866	71,408	
Variance: actual/ capitation (%)	145	97	186	131	78	78	75	100	

What is PBMA?

Further reading

Further information on the practical aspects of PBMA will appear in the next bulletin, *Implementing PBMA*.

McGuire A, Henderson J, Mooney G. *The economics of health care: An introductory text*. London: Routledge, 1998.

Drummond MF, O'Brien BJ, Stoddard GL, Torrance GW. *Methods for the economic evaluation of health care programmes*, 2nd edn. Oxford: Oxford University Press, 1997.

Mooney G, Gerard K, Donaldson C, Farrar S. *Priority setting in purchasing: some practical guidelines. Research Paper 6.* National Association of Health Authorities and Trusts (NAHAT), Birmingham, 1992.

An entire issue of *Health Policy* (1995; **33**) was devoted to articles on the subject of PBMA.

Scott A, Donaldson C, Scott S. Program budgeting and marginal analysis: pragmatism and policy. *J Health Serv Res Policy* 1999; **4:** 1–2.

References

1. Mooney G, Russell E, Weir R. *Choices for health care: a practical introduction to the economics of health provision*, 2nd edn. London: MacMillan, 1986.
2. Enthoven A. *In pursuit of an improving National Health Service*. London: Nuffield Trust, 1999.
3. Department of Health. *The new NHS: Modern. Dependable*. London: DoH, 1997.
4. Department of Health. *Health improvement programmes: planning for better health and better health care*. HSC 1998/167.
5. Department of Health. *Programme budgeting*. London: DoH, 2002.
6. Mitton C, Donaldson C. Twenty-five years of programme budgeting and marginal analysis in the health sector, 1974–1999. *J Health Serv Res Policy* 2001; **6:** 239–248.
7. Department of Health. *Initial meeting of the National Programme Budget Project*. London: DoH, 2002.
8. Brambleby P. A survivor's guide to programme budgeting. *Health Policy* 1995; **33:** 127–145.

Sponsored by an educational grant from *Aventis*

Any enquiries please contact:
Team Assistant to the Health Economics Unit
Aventis House
Kings Hill
West Malling
Kent
ME19 4AH
Tel: 01732 584000
Fax: 01732 584080

Published by Hayward Medical Communications, a division of Hayward Group plc.
'What is ...' is a Hayward Group plc publication.

HE0230503
Date of preparation: June 2003

What is… ?

Sponsored by an educational grant from Aventis

'What is…?' bulletins

faxback form fax no. 01732 584080

If you would like to receive more information about the What is… ? series simply print out this form, fill in your details and fax it to: Team Assistant to the Health Economics Unit, Aventis.

Name: _____

Position: _____

Address: _____

_____

_____

Postcode: _____ (For mailing purposes a postcode must be supplied)

Tel: _____ Fax: _____

Email: _____

www.evidence-based-medicine.co.uk