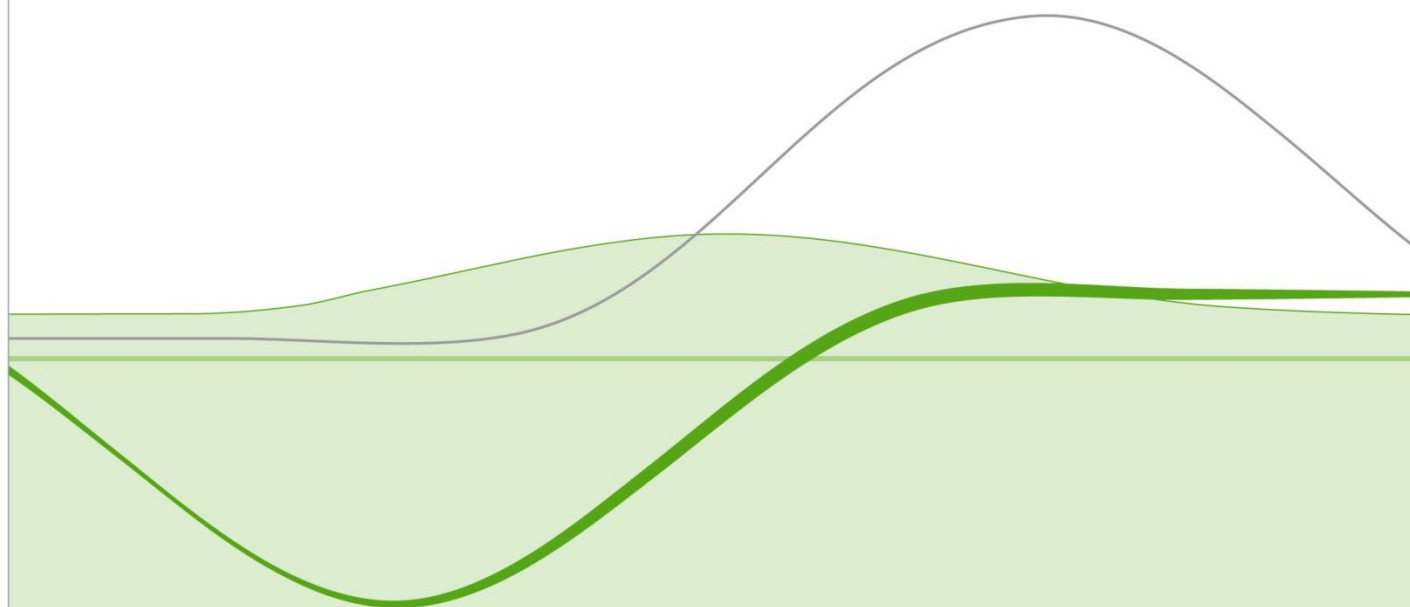


Searching for Cost-effectiveness Thresholds in NHS Scotland

December 2013

Sarah Karlsberg Schaffer, Jon Sussex,
Nancy Devlin and Andrew Walker



A revised version of this paper has been published in *Health Policy* and can be downloaded from:
<http://www.sciencedirect.com/science/article/pii/S0168851015001852>

Please cite as: Karlsberg Schaffer, S., Sussex, J., Devlin, N. and Walker, A., 2015. Local health care expenditure plans and their opportunity costs. *Health Policy*, 119(9), pp.1237-1244.

Searching for Cost-effectiveness Thresholds in NHS Scotland

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December 2013

Research Paper 13/07

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Acknowledgements

The authors would like to thank the Directors of Finance of NHS Scotland for their extremely valuable contributions.

Financial Disclosure

This work was funded by an unrestricted grant from the American Pharma Group (APG) and the Association of the British Pharmaceutical Industry (ABPI).

Disclaimer

The views expressed in this publication are those of the authors and do not necessarily represent those of the experts consulted, the ABPI or the OHE.

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ABSTRACT

Objectives

The objectives of this research were to identify the cost-effectiveness of health care services at the margin in the Scottish NHS; consider the extent to which the thresholds observed in Scottish NHS decision making are consistent with the threshold being used to make judgements about new health care technologies in the UK; and understand expenditure prioritisation decisions and the role that cost per QALY evidence plays in the decision making process.

Methods

We used data collected by a committee of the Scottish Parliament on spending decisions at NHS Board level, in combination with telephone interviews with senior NHS finance managers to identify services at the margin (services where investment or disinvestment is planned to, or could, take place). We then performed literature searches for cost per QALY evidence to estimate the threshold. The interviews were also used to explore the factors driving (dis)investment decisions at a local level.

Results

The estimated cost per QALY of services at the margin varies widely both between services and across different estimates of cost per QALY for the same service. However, cost per QALY evidence is rarely used as part of the decision-making process at territorial NHS Board level. We find that explicit disinvestments or service reductions are rare and that the majority of savings, when required, are made through increasing technical efficiency.

Conclusions

The assumed maximand—QALYs—that is implied by the use of a cost per QALY threshold by the SMC and other HTA bodies appears not to be the maximand pursued by NHS Boards in Scotland. NHS Boards seek to achieve numerous objectives, including but not limited to health gain, simultaneously.

INTRODUCTION

Health Technology Assessment (HTA) systems, such as those of the National Institute for Health and Care Excellence (NICE), the Scottish Medicines Consortium (SMC) and similar organisations internationally, play an important role in assessing the effectiveness and cost-effectiveness of new health care technologies. Such information allows health care systems to make decisions about whether new technologies should be added to the bundle of services that are funded or if existing technologies should be removed from it.

Within any given health care budget, a decision to reimburse a new, cost-increasing technology will affect the existing allocation of resources between services. Specifically, such decisions will have opportunity costs – the health forgone from the next best health care service displaced as a result of the new technology, assuming perfect rationality.

HTA therefore involves a process of weighing up the value for money of new technologies against the value for money of existing services. In practice, in the UK and some other countries, this entails comparing the incremental cost-effectiveness ratios (ICERs) of new technologies, generally expressed as a cost per quality-adjusted life year (QALY) gained, against a cost-effectiveness threshold. The threshold acts as a benchmark to judge whether or not the technology is acceptable value for money.

NICE has a threshold range of £20,000-£30,000 per QALY for most technologies (NICE, 2013), although it is clear that this was based on very limited evidence. Towse (2002) suggests that although technologies that cost more than £20,000-£30,000 are less likely to be accepted by NICE, they are by no means certain to be rejected. This is echoed by Devlin and Parkin (2004) who present evidence that the threshold may be considered as a probability rather than a number. Using a logistic regression model, the authors find that factors other than incremental cost per QALY, such as uncertainty (over the cost-effectiveness of the technology) and the burden of disease, are significant in explaining the likelihood of rejection of a technology by NICE.

The threshold remains a matter of some controversy: the House of Commons Select Committee on Health concluded in its 2007-2008 inquiry that “the affordability of NICE guidance and the range, measured in cost-per-QALY, it uses to decide whether a treatment is cost-effective is of serious concern. The threshold it employs is not based on empirical research and is not directly related to the NHS budget, nor is it at the same level as that used by PCTs [Primary Care Trusts – the territorial organisations responsible for purchasing health care for their local populations in England] in providing treatments not assessed by NICE”. The committee recommended that the NICE threshold be reviewed by an independent body (Health Select Committee, 2008, p. 94).

The question of what the threshold should be is a matter of fundamental importance to HTA processes and decisions. If the threshold is set too high, it is likely that technologies will be implemented that are worse value for money than those they displace, so that HTA worsens rather than improves allocative efficiency. Equally, if the threshold is set too low, it is probable that technologies will be rejected which are both effective and

good value for money. Yet *how* the threshold should be established and what evidence is most relevant in its selection remain matters of some dispute.

There are broadly two approaches to understanding the cost-effectiveness threshold. The first is to consider the threshold in terms of the value that society places on the health benefits of new technologies. This is known as the “social willingness to pay (WTP)” approach, as demonstrated in Donaldson (2011) and Mason et al (2008), for example. Such an approach implicitly assumes that the health care budget is flexible: (a random sample of) the general public expresses its WTP for care unconstrained by the size of that part of national income that is currently allocated to health care.

The second approach to understanding the threshold – known as the “shadow pricing” or “opportunity cost” approach – is to consider the opportunity costs of technologies purchased by the health service within its current budget and the cost-effectiveness of technologies currently used. Unless the health service budget has been set at a level that enables all technologies to be purchased that have a cost-effectiveness at least as good as the social willingness to pay, the opportunity cost will not equal the public’s willingness to pay. In contrast to the social WTP approach, in which it is assumed that NICE should *set* the cost-effectiveness threshold according to the WTP, the opportunity cost approach assumes that NICE should *search* for the threshold implied by the size of the current health care budget. Our research follows this second approach.

The concept of NICE searching for the threshold was put forward by Culyer et al (2007). They argued that it is not “constitutionally proper” for NICE to set the threshold and that NICE’s function should instead be to identify the optimal threshold that lies between the least cost-effective technology currently provided and the most cost-effective technology not yet available routinely in the NHS (Culyer et al, 2007, p. 56). This view is echoed by Appleby et al (2009) who warn against NICE “conjuring up a threshold” when the factors determining it are beyond NICE’s control (Appleby, Devlin and Parkin, 2007, p. 358).

Culyer et al (2007) present a model in which they show that, assuming that the health service seeks to maximise health gain, the threshold is equal to the inverse of the marginal health gain of the last technology funded and that as NICE cannot determine the size of the health care budget, its function is as a searcher for the threshold and not a setter of it.

A variety of empirical approaches have been taken to estimating health care system opportunity costs. Claxton et al (2013) use aggregate data on variations in spending and variations in outcomes between local NHS budget holders to estimate the opportunity cost per QALY in each Programme Budget Category (PBC)¹, and use this to generate an overall estimate of the average opportunity cost in the NHS. They state their “best estimate”, using 2008 expenditure data and 2008-10 mortality data, to be £18,317 per QALY (at 2008 prices). However, their approach reveals very large differences in the marginal cost of a QALY across the different PBCs, which highlights a need to understand

¹ Since 2003, the Department of Health has collected data on NHS expenditure on health care in England across 23 PBCs, such as “Infectious Diseases” and “Cancers and Tumours”.

better what services are at the margin when local expenditure decisions are made, and why, and what that tells us about cost-effectiveness thresholds.

There have been attempts to identify these marginal services and thereby search for the optimal threshold, as explained by Culyer et al (2007). Appleby et al (2009) asked whether it was possible to infer local cost-effectiveness thresholds by studying decisions about service investments and disinvestments based on information collected from six Primary Care Trusts in England, including interviews with their Directors of Public Health and questionnaires given to the Directors of Finance. The authors were able to identify a number of services but concluded that they could not identify the implied cost per QALY threshold for the following reasons:

- They were not convinced they had identified “truly marginal” services; most PCT decisions were service reconfigurations including demand management and waiting list initiatives
- They could not identify *all* local decisions; many options for (dis)investment would have been rejected before they were made explicit in documentation.
- There was a range of criteria used to make local decisions and relatively little concern for cost per QALY.
- It was difficult to establish a causal link between a change in local NHS budgets and specific local (dis)investments.

The work by Appleby et al (2009) was a feasibility study and focussed on decisions made by a relatively small sample of commissioner and providers. The authors noted that there would be merit in attempting similar research on a wider scale. However, there are currently no routine data collected on investment and disinvestment decisions in England which might facilitate that. Claxton et al (2013, appendix C, addendum C2) report on an attempt to use strategic commissioning plans, which English NHS budget holders are required to publish annually, as a means to identify such services. However, problems with inconsistencies in the way information was reported by Primary Care Trusts (PCTs), and a lack of sufficiently detailed information, meant that the data could not be used to identify the cost per QALY threshold. Further, there have recently been major reforms to the English NHS, which have included dismantling the institutions that had been responsible for commissioning (PCTs) and shifting those responsibilities to Clinical Commissioning Groups (CCGs). As commissioning is in a period of transition, this limits the ability usefully to pursue research of this nature in the context of the NHS in England, until the new CCGs have properly established themselves.

However, there is an alternative source of data, arising from the NHS in Scotland, that can be used to explore research questions of this kind. The Health and Sport Committee of the Scottish Parliament scrutinises the Scottish Government’s plans for public spending as they relate to health and sport, including NHS Scotland. The Committee’s scrutiny includes the examination of a range of information relating to general spending pressures and efficiency savings. In 2010 and 2012 the Committee surveyed all NHS Boards in Scotland to seek information on their spending plans for the coming year – including new areas in which spending was planned, and where savings were to be made, and projects considered to be a high priority by the NHS Boards, but which were deemed not currently affordable. Numerous new investments and service expansions

were planned to take place in 2012/13 and went ahead, in a context of total NHS spending in Scotland growing by an estimated 2.2% in cash terms compared to 2011/12 (Scottish Government, 2012), which was equivalent to estimated growth of 0.9% in real terms (given estimated 1.3% UK general price inflation as measured by the GDP deflator; HM Treasury, 2013). But other planned investments were thwarted due to lack of funds.

Taken together, Health Boards' responses to the Committee's scrutiny potentially provide a unique opportunity to generate a comprehensive, system-wide list of the services "at the margin" in NHS Scotland, and to compile information on their cost-effectiveness. As the data are collected systematically, we are able to overcome the problems with the local English data that were faced by Claxton et al The data are in the public domain but have not previously been analysed for what they reveal about marginal opportunity costs.

The aims of this paper were therefore to: (1) explore the use of those data to identify the cost-effectiveness of health care services "at the margin" in the Scottish NHS, (2) consider the extent to which the thresholds observed in Scottish NHS decision making are consistent with the threshold being used to make judgements about new health care technologies in the UK, and (3) consider the extent to which Scottish NHS decision makers are QALY maximisers—and if not, what the implications of that are for approaches to HTA.

THE CONCEPTUAL FRAMEWORK

A principal aim of our research was to attempt to identify NHS services "at the margin", i.e. services where investment or disinvestment is planned to, or could, take place, and to consider the cost per QALY gained of those services. The conceptual basis for the approach is described in Appleby et al (2009), which we summarise here briefly.

From a given, fixed NHS budget, allocative efficiency (for example, defined as the maximisation of QALYs from a given budget) would be achieved by allocating resources to services which have the lowest incremental cost-effectiveness ratios (i.e. are best value for money), and proceeding to adopt new services in ascending order of their ICERs until the point at which the overall budget is exhausted. At that point, the cost per QALY of the next most cost-effective service tells us what service *would* be added, at the margin, if the total budget were to expand. Similarly, the service with the highest cost per QALY which *was* funded from the existing budget tells us the least cost-effective service currently affordable, given the budget constraint.


These "marginal" services define the NHS cost-effectiveness threshold. Given that the budget is fixed, if an HTA agency recommends a new, cost increasing technology, it can be provided only by the NHS reallocating resources away from other, extant services. If QALY maximisation is the guiding principle in resource allocation decisions by NHS budget holders, this disinvestment will occur in the marginal, least cost-effective, service currently funded.

Suppose we could identify, for every possible health care service, evidence on its cost per QALY gained (CQG) and an estimate of its overall annual cost (including associated service costs) if it were provided to all appropriate patients. As shown in Figure 1, this information could be presented as a “league table”. where services are ranked in order of their decreasing cost-effectiveness: the most cost-effective are at the top (CQG = £CE₁) and the least cost-effective at the bottom (CQG = £CE_N). In allocating their budgets, buudget holders will select cost-effective services because we assume them to be QALY maximisers. In other words, they will choose services in rank order, starting at the top and working down until the available budget is exhausted. For simplicity, and without loss of generality, we assume that there are no efficiencies from combining some services with others in bundles or clusters of mutually exclusive services.

The point at which the NHS budget of £ΣC_x is exhausted reveals the shadow price of a QALY as lying between the CQG of the highest cost per QALY service funded (£CE_x) and that of the lowest cost per QALY service *not* funded (£CE_y). The threshold is shown in Figure 1 as a bold line. The services immediately above that (shown in dark shading) and below it (shown in light shading) are those investment and disinvestment decisions (respectively) that may be observable at the margin during any given budget period. Identifying these marginal services potentially allows us to locate the region within which the effective cost-effectiveness threshold explicit or implicit in health care system decision making sits.

Figure 1. A stylised model of QALY maximising decision making

Health care service	CQG	Cost per year	Cumulative budget
Service 1	£CE ₁	£C ₁	£C ₁
Service 2	£CE ₂	£C ₂	£C ₁ + £C ₂ = £ΣC ₂
Service 3	£CE ₃	£C ₃	£ΣC ₂ + £C ₃ = £ΣC ₃
•	•	•	•
•	•	•	•
Service X	£CE _x	£C _x	£ΣC _x
Service Y	£CE _y	£C _y	£ΣC _y
•	•	•	•
•	•	•	•
Service N	£CE _N	£C _N	£ΣC _N



Source: Adapted from Appleby et al (2009)

In practice, organisations such as NICE and SMC do not have access to the sort of data required to populate such a table. In the absence of that evidence, the threshold they use in their decisions is effectively their best guess about the CQG that *would* be revealed if they did have that information.

By observing the way that real resource allocation decisions are made in the NHS, and the patterns of incremental spending and targets of cost cutting, we may be able to identify the services at the margin and the region (or range) of cost-effectiveness associated with those marginal services. Accordingly, our primary aim in this study was to identify decisions that are potentially threshold revealing.

The stylised model rests, however, on a number of important assumptions. For example, it assumes that the primary objective of NHS decision makers is to maximise QALYs; that NHS budget holders act in a manner consistent with that; and that they have access to sufficient evidence (for example, on the cost per QALY gained of services) to render that a realistic objective.

In practice, we know that a range of factors other than cost-effectiveness in QALY terms matter to health care policy makers (Shah et al 2012) and to health care budget holders (Appleby et al, 2009). Therefore our study also aims to test the extent to which budget holders' decisions may reasonably be characterised as QALY maximising – and if not, what the implications for threshold estimation might be.

METHODS

We proceeded with our attempt to quantify the revealed cost per QALY threshold in NHS Scotland using three steps:

- Data collection: identifying NHS board level (dis)investments from the 2012/13 Scottish Parliament budget scrutiny and follow-up interviews with NHS Board Finance Directors by the research team
- 1. List of relevant marginal services: identifying which of the marginal services found in step 1 might be threshold revealing and hence whether it would be appropriate to seek cost per QALY evidence relevant to Scotland for them in the empirical literature
- 2. Literature search: conducting a search for cost per QALY evidence for each marginal service identified in step 2.

Each of these stages is explained in more detail below.

Step 1: Data collection

The research used two data sources:

1. The 2012/13 budget scrutiny issued by the Health and Sport Committee of the Scottish Parliament (available online for all 14 territorial NHS Boards in Scotland)
2. Follow-up, structured interviews with representatives from 12 NHS boards (we approached all 14).

The data are presented in Section 4, below.

We used the 2012/13 budget scrutiny documents available from the Health and Sport Committee's website² to identify an initial list of potentially marginal services. Where the

²<http://www.scottish.parliament.uk/parliamentarybusiness/CurrentCommittees/49381.aspx>

response to the questionnaire was unclear or lacking in sufficient detail, a search of the NHS Board's website was performed to obtain further information on the (dis)investment in question. However, this was not always successful, as documentation about NHS Board decisions is not always available.

The information revealed in the budget scrutiny was supplemented by follow-up telephone interviews with Directors of Finance at NHS Boards. The interviews took place in the period February to May 2013. Most lasted approximately one hour, although three were approximately half an hour in duration. All interviews were undertaken by the same member of the research team (SKS) to ensure consistency of approach and data extraction. The purposes of the interviews were to: (1) clarify the researchers' understanding and obtain further details of the services identified in the budget scrutiny (where the information was not available on the NHS board's website), (2) identify additional marginal services which are not listed in the budget scrutiny, and (3) ascertain the drivers of (dis)investment decisions in NHS Scotland and the role of cost-effectiveness evidence in the decision making process. The interviews were in most cases audio recorded to ensure full capture of the information, although in three cases the interviewee preferred not to be audio recorded.

Each interview was written up by noting the answers given to each of the interview questions in turn. The notes were returned to the interviewee for confirmation or amendment. A number of the respondents followed up the interview by providing to the researchers additional information on particular (dis)investments discussed during the interviews. The additional information included press releases, correspondence between staff and copies of documents describing prioritisation procedures used by NHS Boards.

Step 2: List of marginal services

On completion of the data collection stage, the researcher who had conducted the interviews, SKS, compiled a full list of all marginal services in NHS Scotland mentioned for 2012/13. The following process was then used to narrow down the full list to a shorter list for which the research team were in agreement that it was appropriate to search for cost-effectiveness evidence.

The full list of services was passed to a second member of the team, JS, who began the categorisation procedure. Services were categorised by direction of spend and the type of marginal spend. Depending on the latter category, JS then labelled each (dis)investment according to whether it was potentially threshold revealing or not. Where the interviewee had made clear that a (dis)investment was a non-discretionary response (e.g. driven by obligatory maximum waiting times) to changes in the volume of demand for an existing service, that service was excluded from the list as it would not be threshold revealing. The services that were potentially threshold revealing were then grouped into two categories: those where cost per QALY evidence was likely to be available and those where the information about the service was too non-specific (e.g. an "emergency care centre" covering a wide range of services and patient groups) for a cost per QALY evidence search to be practicable.

JS's grouping of the services was then sent to ND and AW, in order for them to review the process and highlight areas where they disagreed, which would then be discussed by all members of the research team to reach a consensus decision. ND and AW confirmed the categorisations in all cases. Researchers JS, ND and AW have all either worked in the NHS or been involved in examination of NHS spending decisions in the past and thus have experience to make judgements. The categorisation process is outlined in Table 1, below.

Table 1. The categorisation procedure

Categories →	Direction of spend	Type of marginal spend	Potentially threshold revealing?	Cost per QALY evidence found?
	1. Increased	1. Increased demand for existing services	1. Yes: from categories 2-6	1. Yes
	2. Decreased	2. Major expansion	2. No: from categories 1, 7 or 8, or too vague	2. No
Options ↑ ↓	3. Increase desired but not implemented	3. Wider referral criteria		
		4. Narrower referral criteria		
		5. New service		
		6. Disinvestment		
		7. Non-QALY		
		8. Efficiency squeeze, no service impact		

The researchers identified 74 service changes from the budget scrutiny and a further 27 from the interviews, giving a total of 101 services. Of these, 68 were not potentially threshold-revealing and another six were too vaguely described to enable a cost per QALY evidence search, leaving 27 services. Of the 27, we were able to find cost per QALY evidence for 15, using the literature search strategy described below.

Step 3: Literature search

Having identified the relevant marginal services, we undertook a literature search for cost per QALY evidence. This was based on a hierarchy of sources, as summarised in Table 2. The options were examined sequentially – if evidence was found in option 1, the search for evidence ceased at that point; if none was found in option 1, we continued to option 2, and if evidence was found there the search ceased at that point; but if not we continued to option 3, and so on.

Table 2. Literature search sources

Option	Source
1	SMC guidance*
2	NICE guidance
3	NIHR HTA
4	NHSEED
5	Google

*Or another source specified by the interviewee

The first type of evidence we looked for was any source that we would have expected decision makers in NHS Scotland to consult, had they attempted to do so. Therefore, we searched first for documents such as SMC guidance and any material referred to directly by interviewees or found official documentation.

If this type of evidence was not available but NICE had appraised the technology, the estimates in the appropriate NICE Technology Appraisals (TA) are reported in the Results section. The SMC and NHS Scotland often rely on NICE multiple technology assessment (MTA) evidence. We assumed that if no Scottish-based evidence was available, NHS Scotland decision-makers would consult these alternative good-quality sources of evidence. Given the similarities between the Scottish, English and Welsh health care systems in terms of funding, service provision and patient population, we would not expect this to affect our results.

For both SMC and NICE appraisals, where there are many cost per QALY estimates per TA, the base case estimates for each patient group produced by both the manufacturer and the relevant reviewing body (Evidence Review Group/Assessment Group) are reported. In some cases, this includes optimistic and pessimistic estimates in addition to the “best” estimate. However, in instances where detailed sensitivity analyses are performed (for example, altering the values of a number of clinical variables), these were excluded for brevity and the evident decision ICER is reported.

If there was no SMC or NICE guidance available, we looked for an HTA report issued by the National Institute for Health Research (NIHR), which commissions work to assess the effectiveness and cost-effectiveness of treatments and tests for the NHS. The authors of each HTA report begin with a review of the existing cost per QALY evidence before creating their own estimates. As for the SMC and NICE TAs, we have excluded the results of sensitivity analyses reported in these sources in order to be concise.

If none of the above sources was available, we searched the NHS Economic Evaluation Database (NHSEED) for cost per QALY evidence. Again we have not reported the outcomes of any detailed sensitivity analyses.

Finally, if searching all of the above sources yielded no relevant results, a Google search was performed using the keywords [SERVICE], [cost] and [QALY]. We then limited our

search to the first 20 hits in each case. If this proved unsuccessful, we took this to indicate that there was no relevant evidence readily available.

The cost per QALY estimates for each marginal service were converted into 2012 GBP using the GDP deflator at market prices issued by HM Treasury.

DATA

The primary data source for this research is the 2012/13 survey of spending decisions at NHS Boards carried out by the Health and Sport Committee of the Scottish Parliament as part of its scrutiny of national spending plans. The secondary data source is a series of telephone interviews with senior NHS finance managers from 12 of the territorial NHS Boards (Directors of Finance in all but one case). We contacted all 14 territorial NHS Boards in Scotland but one did not respond after two follow-ups and one was unable to offer an interview date within the study period. The 12 NHS Boards where we obtained interviews account for 89% of Scotland's population.

The budget scrutiny

In 2010/11 and 2012/13, each of the NHS Boards in Scotland was asked to complete a budget scrutiny issued to them by the Health and Sport Committee of the Scottish Parliament. Our research started from the 2012/13 scrutiny, which was undertaken in March 2012, i.e. immediately before the start of the 2012/13 financial year. The questions from the budget scrutiny used for our research are those which potentially related to marginal spending decisions, namely questions:

- 4(b): "Please identify the three main areas in which ... savings will be made ... in 2012-13"
- 5(a): "Please give three examples of service developments that you have been able to fund in 2012-13"
- 5(b): "Please give three examples of service developments that you would consider priorities, but have been unable to fund in 2012-13"
- 6(a): "What specific preventative health programmes are included in your budget plans for 2012-13?"
- 8(a): "What is your planned allocation of the Change Funds³ for older people's services and Early Years intervention for 2012-13?"

The purpose of each budget scrutiny question for the research reported here is outlined in Table 3.

³ Change Funds are allocated to facilitate the movement of care from hospital to community settings.

Table 3. Use of budget scrutiny questions

Budget scrutiny question	Used to estimate:
4(b)	Upper estimate of threshold
5(a)	Lower estimate of threshold
5(b)	Upper estimate of threshold
6(a)	Lower estimate of threshold (specific to preventative health programmes)
8(a)	Lower estimate of threshold (specific to "Change Funds")

According to the theory outlined in Section 2 above, NHS Boards would be assumed to prioritise investment in services by cost-effectiveness and would therefore disinvest from the existing services with the *highest* cost per QALY if faced with tightening constraints on their budgets. For this reason, question 4(b) (which asks for areas of disinvestment) may be used to create an "upper" estimate of the cost per QALY threshold by identifying services at the margin. Suppose, for example, that a Board named three disinvestments that had costs per QALY of £25,000, £30,000 and £35,000 respectively; we would then conclude that the upper limit of their threshold was £25,000 (assuming all figures rounded to the nearest £'000 for practical purposes).

Similarly, question 5(b) (which asks for the services the NHS Boards would have invested in if the funds were available) identifies the services which are deemed *just too expensive* to be invested in. Therefore, 5(b) may also be used to find an "upper" estimate of the threshold. So if the three examples given by an NHS Board in answer to question 5(b) had costs per QALY of £24,000, £28,000 and £30,000 respectively, this would suggest an upper limit of the threshold of £24,000.

Questions 5(a), 6(a) and 8(a) all ask for examples of positive investment. Assuming again that NHS Boards buy the lowest cost QALYs first, then these questions also identify marginal services, this time those whose cost per QALY is *just low enough* to receive investment. Therefore, the highest of these costs per QALY of these services may be used to identify a "lower" estimate of the threshold.

The interviews

The interviews with Finance Directors were tailored to each individual NHS Board's budget scrutiny response but all followed the same basic structure and asked for the same information. The structure of the interviews is outlined in Table 4.

Table 4. Outline of interview questions

Part 1	<ul style="list-style-type: none"> a) Further details of planned investments mentioned in the budget scrutiny b) Further examples of planned investments (the budget scrutiny asked for only three) c) Drivers of each investment decision
Part 2	<ul style="list-style-type: none"> a) Further details of considered but not implemented investments mentioned in the budget scrutiny b) Further examples of considered but not implemented investments (the budget scrutiny asked for only three) c) Drivers of each decision not to invest
Part 3	<ul style="list-style-type: none"> a) Further details of planned disinvestments mentioned in the budget scrutiny b) Further examples of planned disinvestments (the budget scrutiny asked for only three) c) Drivers of each disinvestment decision
Part 4	<ul style="list-style-type: none"> a) If it would be considered marginal: further details of spending on the Change Fund for Older People’s Services b) If it would be considered marginal: drivers of the investment in the Change Fund for Older People’s Services c) If it would be considered marginal: further details of the spending on the Early Years Change Fund d) If it would be considered marginal: drivers of the investment in the Early Years Change Fund
Part 5	<ul style="list-style-type: none"> a) For all that would be considered marginal: Further details of spending on preventative health programmes b) Drivers of spending on each marginal preventative health programme

In each subsection relating to the drivers of a (dis)investment decision, questions were asked sequentially in order to minimise the risk of “leading” interviewees to particular answers. The questions were open-ended to start with and, depending on the responses, became more narrowly focussed on the use of cost per QALY evidence in the decision, that is:

1. What were the factors that led to this decision?
2. Did the cost-effectiveness of this service influence your decision?
3. Did the cost-effectiveness of this service in terms of the cost per QALY influence your decision?

Interviewees were assured that their responses would remain anonymous and aggregated with the information of obtained in all other interviews. A copy of the interview script for an NHS Board is supplied in Appendix B.

RESULTS

Cost per QALY of marginal services

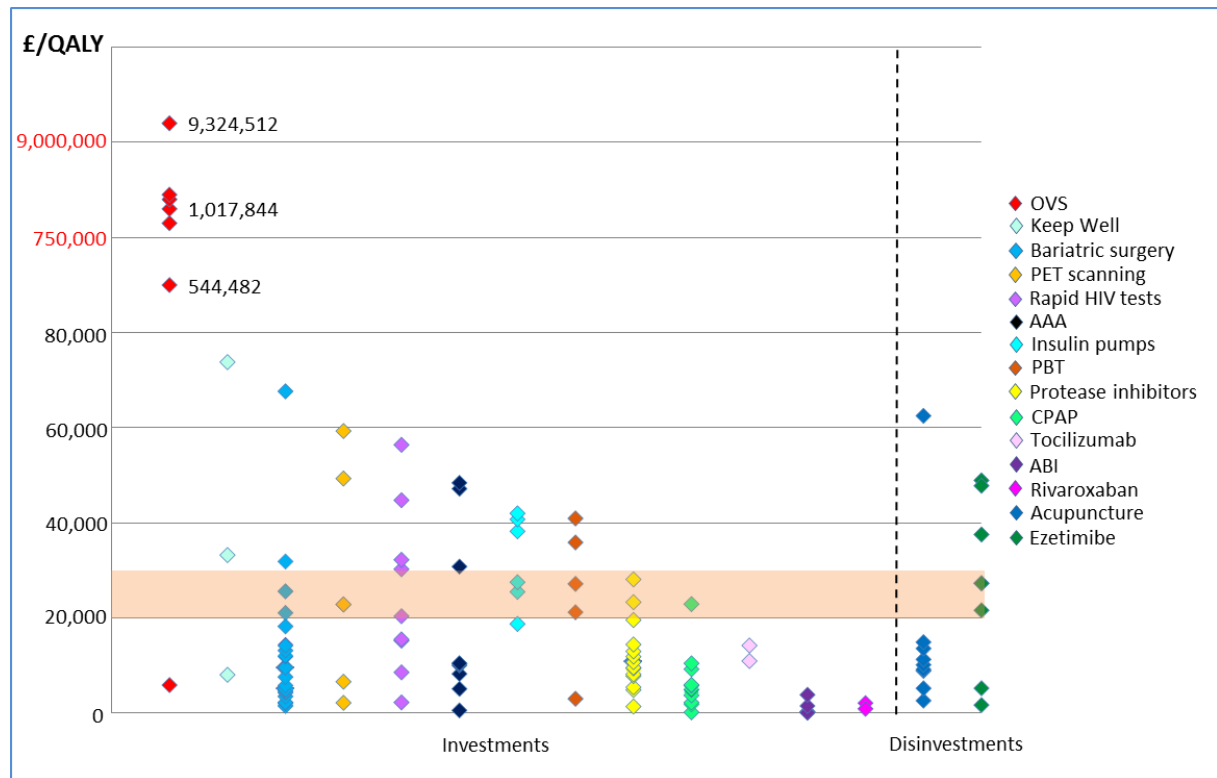
Table 5 gives details of the 15 services found to be at the margin in one or more NHS Boards in Scotland in 2012/13, for which we found cost per QALY evidence.

Table 5. Marginal services with cost per QALY evidence

Service/programme	Description	Number of Boards mentioning	Data source	Increased or decreased spend	Type of marginal spend
abdominal aortic aneurysm screening		3	Budget scrutiny	Increased	New service
Acupuncture		1	Interview	Decreased	Disinvestment
Alcohol Brief Interventions	Short sessions for individuals who report hazardous levels of	1	Interview	Increased	Major expansion
Bariatric surgery	For morbid obesity	2	Budget scrutiny	Increased	Major expansion
Continuous positive airway pressure	Relieves symptoms of sleep apnoea	1	Budget scrutiny	Desired but not implemented	Major expansion
Ezetimibe	Lowers cholesterol levels	1	Interview	Decreased	Disinvestment
Insulin pumps	For selected people with diabetes	3	Interview	Increased	Major expansion
Keep Well	Targeted screening of over-40s for cardiovascular disease	3	Interview	Increased in 2 Boards	Major expansion in 2 Boards
				Decreased in 1 Board	Disinvestment in 1 Board
Orthoptic vision screening	For pre-school children	1	Interview	Increased	New service
Positron Emission Tomography scanning	For various cancers	3	Interview	Increased	Major expansion
Protease inhibitors	For hepatitis C	3	Budget scrutiny	Increased	New service
Proton beam therapy	Radiotherapy for cancer	1	Interview	Increased	New service
Rapid HIV tests	Delivered at a clinic for men who have sex with men	1	Interview	Increased	New service
Rivaroxaban	Anticoagulant	2	Budget scrutiny	Increased	New service
Tocilizumab	Biologic therapy for rheumatic conditions	1	Budget scrutiny	Increased	Major expansion

Figure 2 summarises the cost per QALY evidence found for these 15 services, expressed in £2012. Each point on the graph represents an estimate from the body of evidence. The services are grouped into investments and disinvestments and are in decreasing order of highest cost per QALY estimate⁴. The threshold of £20,000-30,000 used by NICE is shown for reference as a shaded band.

Figure 2. Marginal services – costs per QALY ranges



Key: AAA = abdominal aortic aneurysm screening; ABI = alcohol brief interventions; CPAP = continuous positive airway pressure; OVS = orthoptic vision screening; PBT = proton beam therapy; PET = positron emission tomography

Each of the 15 services in Table 5 and Figure 2 is discussed in more detail in Appendix A, including a description of the service, an explanation of the data sources and the search terms used to identify them and references for the studies from which the cost per QALY data were drawn. Table 6 in Appendix A describes every estimate used to populate Figure 2.

Within each marginal service, there is a large amount of variation across the estimates of cost per QALY. The cause of this variation is dependent on the source of evidence. For some services, the results presented come from different studies. For example, the data points for abdominal aortic aneurysm (AAA) represent each study that the UK National Screening Committee used to assess the evidence on the cost-effectiveness of the screening programme before deciding it should be implemented. The studies estimate

⁴ Although Keep Well was cited as both an investment and disinvestment, it is grouped with the investments in Figure 2 as it fell under this category more often.

the cost per QALY of AAA screening programmes using patient populations in various countries and after varying amounts of time, e.g. after 4 years, after 20 years.

For other services, the same source offers a number of different estimates. For example, when the data source is an SMC or a NICE technology appraisal, we report the cost per QALY results given by the manufacturer, the Evidence Review Group or Assessment Group and the estimates the Committee conclude are likely to be most accurate. Where these parties provide different estimates under different assumptions (often labelled pessimistic and optimistic), these are also reported. In many cases, the estimated cost per QALY of the service is different for different patient groups.

In the case of the Orthoptic Vision Screening (OVS) service, for example, the low estimate (£5,902 per QALY) comes from one study and the very high estimates come from another. The variation of results from the latter study comes from estimating the cost-effectiveness of two slightly different types of OVS for three different patient age groups (three-, four- and five-year-old children). For other technologies, the studies varied in the perspective the researchers had taken (societal, health service, etc.). See Appendix A for full details.

While it could be argued that each cost per QALY data point for a service does not carry equal weight due to the various differences in study design discussed above, we have made no attempt to prioritise them in terms of quality. However, the variation *between* services is such that even reporting only one cost per QALY estimate for each service would still result in a large range of values within which the threshold might lie. For example, if we were to simply take the median cost per QALY estimate for each service, the estimated threshold would be anywhere in the range of £1,516 to £1,017,844 per QALY gained.

An implication of the theory outlined in Section 2 is that those in charge of NHS Boards would be expected to prioritise services by ascending cost per QALY. If they did we would observe the disinvestments to be less cost-effective (have a higher cost per QALY) than the positive investments. But this is not evident from Figure 2, although we only identified two examples of disinvestments.

Drivers of the decision making process

Although it was possible to find cost per QALY evidence for many of the marginal services identified in the budget scrutiny and the interviews, it is important to note that such evidence was rarely the driver of (dis)investment decisions at the level of NHS Boards. The SMC makes recommendations based on cost per QALY evidence, among other factors, on whether new medicines should be reimbursed by the NHS in Scotland (SMC, 2012d). Other than that, according to our interviews, cost per QALY evidence was not used *on any occasion* to justify marginal spending or disinvestment decisions made at NHS Board level. The lack of consideration of cost per QALY evidence presumably contributes to the lack of an apparent threshold in Figure 2.

An interviewee from one of the smaller Boards explained that they simply did not have the level of health economics expertise available that would allow them to perform cost-effectiveness analysis as part of their decision-making process. An interviewee from a

larger Board suggested that Boards did not sift the evidence in the way the conceptual framework in Section 2 of the paper assumes. Decisions were based instead on perceived imperatives and priorities set outside the NHS Board. When asked the extent to which the dis(investment) process involved assessing services against a set of formally defined criteria, a representative from another Board described it as “more organic than that”. We interpret this to mean that the decision involved discussion of multiple factors, some of which were traded-off against each other, to produce a local consensus; this would contrast with a simple association like a high cost per QALY meaning automatic rejection (or disinvestment). The same interviewee explained that cost-effectiveness in terms of QALYs was not a key factor in decision making and gave a specific example of where criteria important to the local NHS had meant that a potentially *less* cost-effective option, in cost per QALY terms, had been chosen.

There were, however, examples of NHS Boards making expenditure prioritisation decisions based, in part, on cost-effectiveness measured in some metric other than QALYs. For example, one Board has a prioritisation procedure involving 21 weighted criteria, of which one is “cost-effectiveness”. This implies that the objective of the Board is not to maximise QALYs but some combination of the 21 criteria. Representatives from a number of Boards that did not currently apply this sort of procedure explained that they were in the process of developing their own models of this kind.

It should also be noted that for some decisions the cost-effectiveness analysis takes place at a national level. This is important because there were examples of Boards investing in services because they were told to by the Scottish Government, for example the AAA screening programme. We did not seek evidence on whether Scottish Government had considered cost-effectiveness before issuing guidance to NHS Boards on specific services; none of the interviewees mentioned having seen such evidence.

Another theme that became apparent during the interviews was that explicit disinvestment from services of the type envisaged in Section 2 of the paper, i.e. making a service unavailable to patient groups to whom it was previously available, takes place only rarely. Question 4(b) of the budget scrutiny, which asked for the three main areas in which savings would be made at each NHS Board was universally answered with examples of efficiency savings, which the interviewees unanimously described as lowering costs without any expected reduction in benefits. A number of interviewees explained that for political reasons, cutting front-line services was simply not an option.

One interviewee did, however, refer to a report called “Making Difficult Decisions in NHS Boards in Scotland”, created by a short-life working group for NHS Scotland (Radford et al, 2010). The document considers decision-making at a population level as well as at an individual patient level and aims to guide NHS Boards in making decisions that are “transparent, accountable and robust enough to withstand scrutiny” (Radford et al, 2010, p. 9). The working group noted that there were large variations across Boards in the way decisions were being made and sought to develop and standardise the methods. However, cost-effectiveness is mentioned only briefly in this report. In addition, no NHS Boards other than the one that originally mentioned it said that they used the report to help make any “difficult decisions”.

Having discussed the extent to which cost-effectiveness evidence is used by NHS Boards, the interviewees were asked to name the other drivers of their marginal spending decisions. The following factors were specifically mentioned, where the number in brackets indicates the number of references to that driver in association with a particular spending decision that were found in the interview recordings:

- Excess demand (where demand for a service consistently outstrips the supply), e.g. for dialysis due to the ageing population (15)
- Scottish Government initiatives (9)
- Clinical effectiveness (6)
- Patient convenience, e.g. providing services locally where patients previously travelled to other Board areas (5)
- New drugs being approved by the SMC (4)
- 'Political pressure' (3)
- Centrally-led waiting time targets, e.g. "treatment time guarantees" for certain procedures (2)
- The Board's position relative to other Boards, e.g. providing a comparatively low volume of service or being the only Board which does not provide a service (2)
- Patient safety (1).

Cost-effectiveness, in non-QALY terms, was mentioned four times throughout the interviews. In all cases, the interviewee was unable to describe the type of cost-effectiveness evidence that was used, only that it did not involve QALYs.

DISCUSSION AND CONCLUSIONS

Our principal aim was to identify the services that were at the margin in NHS Scotland in 2012/13—i.e. the services where investment or disinvestment was planned to take place. In addition, we obtained information on the other factors taken into account within NHS Boards in Scotland when making spending prioritisation decisions.

The combination of the published scrutiny by the Health and Sport Committee of NHS Boards' expenditure plans at the margin backed by interviews with Finance Directors at the Boards yielded valuable information. We are grateful for the willingness of those Finance Directors to discuss the services they considered to be marginal. As a result we found a considerable and varied list of health care services and technologies that are at the margin of NHS spending in one or more Board areas in Scotland.

We found relevant cost per QALY evidence in the published economic literature for some, though not all, of the marginal services identified. The evidence revealed ranges of cost per QALY estimates for each individual service, sometimes very wide ranges. The ranges are also very different from service to service. The consequence is that the location of the threshold is unclear. Even if NHS managers *were* primarily concerned with maximising QALYs from their budgets, they would find it difficult to determine which particular cost per QALY estimate they should use for their decision making. The relevant threshold is equally unclear from the perspective of the SMC, whose function is to make judgements about value for money in a way that is consistent with the marginal cost of a QALY in the NHS.

Furthermore, the ranges of costs per QALY of the services being invested in at the margin overlap greatly with the ranges of costs per QALY of the services being disinvested from (see Figure 2). Indeed the cost per QALY of acupuncture, which one NHS Board disinvested from, seems likely to be below that of other services currently being invested in. This would imply allocative inefficiency if the aim of the NHS in Scotland is to maximise QALYs. This is the assumption that justifies the use of a reimbursement threshold expressed as cost per QALY by SMC (and in England and Wales by NICE): i.e. that NHS decision-makers should prioritise their spending decisions as if they are maximising QALYs.

We have, in the current study in Scotland, gone further than Appleby and colleagues were able to in early 2007 in England (as reported in Appleby et al, 2009). Due to the availability of the Health and Sport Committee budget scrutiny data, and to how we were consequently able to structure the follow-up interviews, the services we have identified as potentially threshold revealing are truly marginal. In addition, both of our data sources included information on service developments that were considered but not implemented. Question 5(b) of the budget scrutiny questionnaire asked Boards for “three examples of service developments that you would consider priorities, but have been unable to fund in 2012/13”. In the interviews we asked for further information about these and any additional examples of priorities that were not funded (see Question 2 in Appendix B of this paper). Thus we obtained information on spending plans which were rejected whether or not they were explicitly mentioned in other documentation.

We were also able to establish a clear causal link between the disinvestments and incremental developments identified by Boards and the need to stay within the budget for the financial year about to commence. The budget scrutiny asked how savings were being found to enable the Board to stay within its stated budget for 2012/13 and what incremental investments were planned within that budget. Our interviews followed up in the same terms and asked for further examples in the same context (see Question 3 in Appendix B of this paper).

Although we were successful in identifying a significant number of marginal services and finding corresponding cost per QALY evidence, we were repeatedly told in our interviews that cost per QALY evidence was, in practice, not taken into account in NHS Board expenditure decisions. NHS Boards are required to pursue numerous central targets—e.g. on waiting times, moving services from hospital to community settings, reducing inequalities in health—and respond to local and national political and public pressure. NHS Boards are evidently not trying to maximise QALYs but to hit simultaneously a multidimensional set of objectives within their constrained budgets. The approach to expenditure prioritisation taken by SMC and NICE appears to be fundamentally different from the view taken by NHS Boards as reported to us by their Finance Directors.

The SMC, and in England and Wales NICE, conduct health technology assessments on the assumption that the objective of NHS organisations is to maximise health gain as measured by QALYs, with some adjustment of the £/QALY threshold to take account of social value judgements (Rawlins, Barnett and Stevens, 2010). The evidence presented in this paper is not consistent with this assumption. The applicability of a cost per QALY

threshold in HTA is questionable when it plays no part in expenditure prioritisation decisions made in practice in the NHS.

One possibility is that Health Boards are not attempting to maximise any single objective but may be aiming to satisfy minimum requirements across multiple objectives. Our interviewees mentioned waiting times initiatives on several occasions, suggesting that satisfying these may be one of the key objectives of decision makers. This fits well with Dimakou et al (2009) who showed that hospitals responded to waiting time targets introduced by the English NHS. Multi-criteria decision making was also noted in Shah et al (2012), where the authors analysed Impact Assessments carried out by the (English) Department of Health and identified 18 benefits other than QALYs that were taken into account.

The idea that Boards do not face a standard maximisation problem is consistent with our observation that savings are generally sought from efficiency improvements in the provision of existing services, or by deferring some other planned expenditure. Our interviewees identified numerous areas for efficiency improvements that would not, in their view, reduce the quality of, or the health gains from, those services. This behaviour might be expected if the aim of decision makers is not to fall below a satisfactory level of performance across multiple objectives or targets. It implies that NHS Boards do not operate "at the margin", the way they are assumed to in standard economic models.

Given the apparent mismatch between an approach to HTA which gives the greatest weight to incremental cost per QALY gained when advising on NHS reimbursement and the considerations driving local NHS expenditure prioritisation decisions in practice, there are several possible policy implications. Either the SMC should adjust its methods to more closely align with the objectives of the NHS or the NHS itself should attempt to more often make decisions based on the incremental cost per QALY gained of the services it provides. A third option is that the two organisations "meet in the middle" by using cost per QALY evidence in the areas where it is most appropriate and useful. However, while different parts of the NHS are prioritising expenditure according to different criteria, whatever they are, then the result will very probably be allocative inefficiency from anyone's perspective.

APPENDIX A: COST-PER-QALY RESULTS

This appendix describes in turn each of the 15 marginal services for which we could find cost per QALY evidence), including a description of the search strategy and the evidence source, as well as an explanation of the variation in the cost per QALY estimates for that service, where relevant. Table 6 then references and summarises the cost per QALY evidence.

Abdominal aortic aneurysm screening

Starting in June 2012, all men across Scotland aged 65 were invited to be screened for abdominal aortic aneurysm (AAA). The programme aims to identify men who have an aortic diameter of greater than 3cm by way of ultrasound examination of the aorta. If the measurement is over 3cm, they are referred to their GP who prescribes the next step (Health Improvement Strategy Division, 2010).

As the Scottish Government explicitly named the cost-effectiveness evidence assessed by the UK National Screening Committee (UK NSC) as part of the process of approving the screening programme⁵, it is those cost per QALY estimates that are reported in Table 6. Because each point in Figure 2 comes from a different study (that uses a different patient population from a different country), the estimates display a considerable degree of variation.

Acupuncture

Acupuncture involves the stimulation of points on the body using a variety of techniques and is most often used in the treatment of pain relief.

As none of the other sources provided cost per QALY evidence for acupuncture, a Google search was performed using the keywords [acupuncture], [cost] and [QALY]. A number of the hits were lists or assessments of all the available evidence on the cost per QALY of acupuncture for various conditions. These reviews included the same studies which also matched the studies found in the original Google search (Ratcliffe et al, 2006; Reinhold et al, 2008; Stamuli et al, 2012; Willich et al, 2006; Witt et al, 2006; Witt et al, 2008a; Witt et al, 2008b; Witt et al, 2009; Wonderling et al, 2004).

Much of the variation in these cost per QALY estimates may be explained by the studies evaluating the cost-effectiveness of acupuncture for a number of different problems: lower back pain, osteoarthritis pain, Irritable Bowel Syndrome, neck pain, headache and dysmenorrhea.

Alcohol brief interventions

An Alcohol brief intervention (ABI) is a small series of sessions each lasting from a few minutes to 1 hour, targeted at individuals who report drinking at hazardous levels. The interventions are designed to be conducted by health professionals who do not specialise in treating alcoholism.

⁵ <http://aaa.screening.nhs.uk/cms.php?folder=23633>

Services for the prevention and treatment of alcohol abuse were mentioned by one NHS Board as an area of investment. Alcohol Brief Interventions in Primary Care, A&E and Maternity wards are one part of the Board's strategy to reduce problems resulting from alcohol abuse.

Neither NICE nor the SMC has issued an appraisal of ABIs, nor has an HTA been published by the NIHR. However, NICE commissioned a report from the School of Health and Related Research (SchARR) at the University of Sheffield to gather evidence of the cost-effectiveness of ABIs (Latimer et al, 2009). The report performed a literature search for evidence on the cost-effectiveness of ABIs in primary care, A&G and among hospital inpatients and outpatients but found cost per QALY evidence only for primary care. These results (originally from different studies) are displayed in Figure 2.

Bariatric surgery

There are a number of different types of bariatric (weight loss) surgery available in NHS Scotland, including:

- Gastric bypass (GBP) (open or laparoscopic)
- Adjustable gastric band (AGB) (open or laparoscopic)
- Vertical banded gastroplasty (VBG).

The interviews indicated that investments in bariatric surgery involved all of the above procedures. We could not locate any cost-effectiveness evidence produced by NICE.

In 2009, the National Institute for Health Research (NIHR) produced an HTA of bariatric surgery (Picot et al, 2009). The HTA begins with a review of existing evidence: Ackroyd (2006); Craig and Tseng (2002); Jensen and Flum (2005); Salem et al (2008) and van Mastrigt et al (2006). These demonstrate the effectiveness of a variety of bariatric surgical procedures on a number of different patient groups.

Picot et al (2009) then assess the cost-effectiveness of bariatric surgery for three patient populations: (1) patients with morbid obesity ($BMI \geq 40$); (2) patients with moderate-to-severe obesity ($30 \leq BMI < 40$) with significant comorbidity (Type 2 diabetes); and (3) patients with moderate obesity ($30 \leq BMI < 35$). The results from all of the studies are displayed in Figure 2.

As data points come from different sources and are for different patient groups, there is some variation, although most estimates lie below or within the £20,000–£30,000 range. The one estimate which shows bariatric surgery not to be cost-effective by conventional standards is found in Salem et al (2008) and is for a population of individuals with $30 \leq BMI < 35$, after two years. Further details may be found in Table 6.

Continuous positive airway pressure

Continuous positive airway pressure (CPAP) is used to relieve the symptoms of sleep apnoea by delivering a stream of compressed air to the airway, keeping it open and allowing unobstructed breathing.

Although the representative of the NHS Board in question confirmed that CPAP would be used if the Board were to invest in a sleep disorder clinic, it should be noted that the use of such equipment is just one of the interventions that would be provided by this clinic.

CPAP for sleep apnoea falls outside the remit of SMC, so the cost-effectiveness estimates displayed Figure 2 are taken from NICE guidance (NICE, 2008a). The Assessment Group discussed four unnamed "published economic evaluations" as well as the manufacturer's submission before calculating its own cost per QALY estimates for three levels of severity of obstructive sleep apnoea/hypopnoea syndrome (OSAHS).

Ezetimibe

In 2003, the SMC recommended ezetimibe as an add-on treatment to statins and as a monotherapy treatment where statin therapy is inappropriate or poorly tolerated (SMC, 2003). In 2007, NICE issued a technology appraisal which recommended ezetimibe as an option for use in similar circumstances (NICE, 2007). In 2007, NHS Quality Improvement Scotland reviewed NICE's 2007 guidance on ezetimibe and concluded that it superseded the original SMC recommendation (Healthcare Improvement Scotland, 2007). Therefore, the cost-effectiveness estimates used in this report are those from the 2007 NICE guidance.

As part of the technology appraisal, the manufacturer submitted its estimates for the cost per QALY of ezetimibe. These included only ranges of estimates and no specific estimated costs per QALY. However, the Assessment Group's estimates were more precise and the NICE Appraisal Committee concluded that "the Assessment Group's model represented the most appropriate analysis on which to base its decision regarding the use of ezetimibe" (NICE, 2007, p.17). For this reason, it is the Assessment Group's estimates, by patient group, which are reported in Table 6 and presented in Figure 2.

Insulin pumps

Insulin pump therapy, also known as continuous subcutaneous insulin infusion (CSII), is used to manage diabetes by continually infusing insulin into the subcutaneous tissue of the patient.

In 2011, NHS Scotland announced a large investment in insulin pump therapy with the aim of achieving:

- 25% of under-18s with type 1 diabetes on insulin pump therapy by March 2013
- Total number of people using insulin pumps to triple by March 2015 (Feeley, 2012).

It appears that NHS Scotland relies on the NICE guidance for insulin pumps (updated in 2008) to inform its decisions⁶. The various estimates of the cost per QALY of insulin pumps, as submitted by the manufacturer and reviewed by NICE's Assessment Group, are displayed in Figure 2 (NICE, 2008b). These vary depending on whether the assumptions made are "optimistic" or "pessimistic".

⁶ <http://www.ipagscotland.org/component/content/article/102.html>

Keep Well

The Keep Well programme of health checks was launched in Scotland in 2006 with the aim of reducing inequalities in health care. Specifically, it offers screening for cardiovascular disease and its main risk factors in individuals aged between 40 and 64. The programme operates in all NHS Boards but to differing degrees; it was initially rolled out in poorer areas.

Keep Well is an intervention focused at a very specific group of the population, and we were unable to find a SMC/NICE appraisal or an HTA specifically relevant. A search of NHSEED also yielded no results. Therefore, a Google search was performed using the keywords [Keep Well], [Scotland], [cost] and [QALY]. The search yielded one cost-effectiveness study: Lawson et al (2010). This research was based on the first 23 months of the programme in the pilot areas of Glasgow North and Glasgow East. The three points on Figure 2 represent the optimistic, base-case and pessimistic cost-per-QALY estimates.

Orthoptic vision screening

NHS Scotland is in the process of creating a universal orthoptic vision screening service for children in their pre-school year. This aim is close to being achieved but in 2012/13 there was still one NHS Board which had yet to provide the service and which listed it as an investment for the coming year during the interview.

In 2008, a review of orthoptic vision screening for pre-school children was carried out by the NIHR HTA Programme (Carlton et al, 2008). This review included an assessment of the existing literature as well as a model created by the HTA team. Of the previous studies identified by the authors of the HTA, only one reported results using QALYs and used a sufficiently intricate model to satisfy Carlton et al (Kønig and Barry, 2004). These, along with the base-case results from the HTA (Carlton et al, 2008) model are presented Figure 2. Carlton et al (2008) estimate the cost per QALY of orthoptic vision screening both with and without an auto-refractor (a machine used to provide a measurement of a person's refractive error and prescription for glasses). The "reference case" results estimated by Carlton et al are presented in Figure 2, along with the results from Kønig and Barry (2004).

A possible explanation for the extremely high ICERs in the reference case in Carlton et al (2008) is that the authors assumed no utility effect of loss of vision in one eye, as is consistent with the evidence in the literature. When this assumption is relaxed, the ICERs fall considerably and are more closely aligned with those reported in Kønig and Barry.

Positron emission tomography scanning

The purchasing of positron emission tomography (PET) scanners was mentioned by a number of Boards both in the budget scrutiny and in the telephone interviews. The scanners were planned to be used to detect various forms of cancer.

A Google search was performed using the keywords [PET scan], [cancer], [cost] and [QALY]. This yielded four appropriate studies which estimated the cost per QALY of PET

scanning for colorectal cancer, follow-up of non-small cell lung cancer and head and neck squamous cell carcinoma (HNSCC): Brush et al (2011), Hollenbeak et al (2001), Schreyögg et al (2010) and van Loon et al (2010).

Brush et al (2011) is an NIHR HTA that evaluates the cost-effectiveness of fluorine-18-deoxyglucose (FDG) PET/CT compared with conventional imaging (without PET) for the pre-operative staging of recurrent and metastatic colorectal cancer. Van Loon et al (2010) compare a strategy of PET/CT scanning with conventional treatment in the follow-up of non-small cell lung cancer, where "conventional treatment" refers to a chest X-ray. Hollenbeak et al (2001) and Schreyögg et al (2010) compare a strategy of PET/CT scanning with CT scanning alone for HNSCC and non-small cell lung cancer, respectively.

Protease inhibitors (hepatitis C)

In late 2011, the SMC accepted two new hepatitis C protease inhibitors for use: boceprevir and telaprevir. The interviewees from all Boards that named protease inhibitors on their budget scrutiny returns confirmed in the interviews that they were referring to these new drugs.

Given that the decision to invest in hepatitis C protease inhibitors was made centrally (relying on the SMC's assessment of the evidence), we report the cost per QALY evidence from the SMC appraisal (SMC, 2011a-d).

For both drugs, the manufacturers submitted cost-effectiveness estimates by patient group (naïve, experienced or "null responders") and by severity of liver disease. For this reason, there is some variation in the ICERs displayed in Figure 2.

The disease severity was not measured in exactly the same way for each drug: for boceprevir, patients were given a liver fibrosis "score" (F0 least severe, F4 most severe); for telaprevir, the severity was branded "mild", "moderate" or "severe". In all cases, the new drugs in combination with two other drugs (peginterferon alfa and ribavirin) were compared with the two other drugs alone.

Proton beam therapy

In NHS Scotland, there are seven Special Health Boards which support the 14 territorial Boards. One of the "specials" is NHS National Services Scotland (also known as National Services Division), which funds a number of specialised services. Every year, an amount is top-sliced from each territorial Board's population-based resource allocations to fund the specialised services.

Proton beam therapy (PBT) is a specialised service which is receiving investment in NHS Scotland. It is a type of radiotherapy that uses a high-energy beam of protons rather than high energy X-rays to deliver a dose of radiotherapy for patients with cancer.

PBT has not been appraised by NICE, nor has it been assessed by the NIHR. Studies by Konski et al (2007) and Lundkvist et al (2005) were found by searching NHSEED. A two-page Google search yielded no additional results. Konski et al assessed the cost-effectiveness of PBT to treat prostate cancer (for two separate population groups),

whereas Lungkvist et al looked at a number of different cancers (breast, prostate, head and neck, and medulloblastoma). Further details may be found in Table 6.

Rapid HIV testing for MSM

Rapid HIV testing allows results to be available in 5 to 30 minutes, as opposed to a number of days. As a result, the test, as well as referral for treatment and counselling, can take place in one visit. This is intended to make taking an HIV test less daunting and therefore encourage more people to get tested and to receive treatment. Men who have sex with men (MSM) are a particularly at-risk group. This has led to an investment in sexual health services intended especially for this group, including rapid HIV testing.

A Google search was performed to identify cost-effectiveness evidence for rapid HIV testing among MSM. This used the keywords [rapid HIV test], [men who have sex with men], [cost] and [QALY]. This yielded a number of results, presented in Figure 2 and in Table 6, below (Han et al, 2011; Juusola et al, 2011; Long et al, 2010; Lucas and Armbruster, 2012; Paltiel et al, 2005; Prabhu et al, 2011).

It is important to note that some of the cost per QALY estimates are based on populations which include groups other than MSM alone, for example all “high risk” groups, as well as groups from various countries. In addition, a number of the studies attempted to estimate the cost-effectiveness of various hypothetical changes to HIV screening habits, for example comparing screening every 2.4 years for low-risk; every 9 months for moderate risk; and every 3 months for high-risk to every 20-years low risk and every year for high risk.

Rivaroxaban

Rivaroxaban was accepted for use by the SMC in 2008 for the prevention of venous thromboembolism (VTE) in adult patients undergoing elective hip or knee replacement surgery. In 2012, the drug was accepted for two new indications:

- Prevention of stroke and systemic embolism in adult patients with non-valvular atrial fibrillation (AF) with one or more risk factors
- Treatment of deep vein thrombosis (DVT).

It was clarified in the interviews that every NHS Board that stated it planned to spend more on anticoagulants in 2012/13 was doing so because of these additional indications.

Given that the decision to invest in rivaroxaban was made centrally (relying on the SMC’s assessment of the evidence), we report the cost per QALY evidence from the SMC appraisal. The results presented are the manufacturer’s base-case estimates which were not disputed by the SMC (SMC, 2012a; SMC, 2012b).

Tocilizumab (biologic therapies)

In its response to the budget scrutiny, one NHS Board mentioned “biologic therapies” as an area of investment in 2012/13. In the follow-up telephone interview, the Finance Director explained that this was mostly for rheumatic conditions and involved recently approved drugs.

In August 2012, the SMC accepted the biologic agent tocilizumab (in combination with methotrexate) for use in patients with rheumatoid arthritis who have either responded inadequately to, or who were intolerant to, previous therapy with one or more disease-modifying antirheumatic drugs (DMARDs) or tumour necrosis factor (TNF) antagonists.

We use SMC estimates for the cost-effectiveness of tocilizumab. The cost per QALY estimates presented in Table 6 are those submitted by the manufacturer and include the effect of a Patient Access Scheme. These ICERs were reasonably robust to various changes to the model and were accepted by the SMC (SMC, 2012c).

Table 6. Cost per QALY evidence used in this research

Service	Source	Comments (1)	Comments (2)	(Comments 3)	ICER
AAA	Ehlers et al (2009)	Hypothetical population of men aged 65 invited (or not invited) for ultrasound screening in Denmark			48,420
	Giardina et al (2011)	Hypothetical population of men aged 65-75 invited (or not invited) for ultrasound screening in Italy			5,108
	Henriksson and Lundgren (2003)	Hypothetical population of men aged 65 invited (or not invited) for ultrasound screening in Sweden			8,255
	Lee et al (2002)	Hypothetical population of men aged 70 invited (or not invited) for ultrasound screening in the US			10,041
	Multicentre Aneurysm Screening Study Group (2002)	Population based sample of 67,800 men aged 65-74 years in the UK	After 4 years		47,172
			After 10 years		10,483
	Lindholt et al (2012)	Hypothetical cohort of 65 year old men from the general population in Denmark	Lifetime screening		31,002
Rescreening once				10,393	
One-off screening				576	
Acupuncture	Ratcliffe et al (2006)	Lower back pain	Private acupuncture clinics and GPs in England		5,217
	Reinhold et al (2008)	Osteoarthritis pain	Multicentre, Germany		13,592
	Stamuli et al (2012)	Irritable Bowel Syndrome	Multicentre, UK		62,500
	Willich et al (2006)	Neck pain	Multicentre, Germany		10,145
	Witt et al (2006)	Lower back pain	Multicentre, Germany		9,169
	Witt et al (2008a)	Headache	Multicentre, Germany		8,879
	Witt et al (2008b)	Dysmenorrhoea	Multicentre, Germany		2,622
Alcohol brief interventions	NICE	Mortimer and Segal (2005)	Average of 7 similar intervention programmes	Men	328
			Average of 7 similar intervention programmes	Women	240
		Mortimer and Segal (2006)	Average of 7 similar	Men	123

Service	Source	Comments (1)	Comments (2)	(Comments 3)	ICER
			intervention programmes Average of 7 similar intervention programmes	Women	91
		Solberg et al (2008)		Health-system perspective Medical perspective	1,518 ABI dominates no intervention
		Saitz et al (2006)		Societal perspective	3,863
Bariatric surgery	Ackroyd et al (2006)	LGBP	BMI>35, type II diabetes		1,777
		LAGB	BMI>35, type II diabetes		2,259
	Craig and Tseng (2002)	OGBP	BMI=40, male, age 35		25,606
		OGBP	BMI=50, male, age 35		9,580
		OGBP	BMI=40, male, age 55		31,874
		OGBP	BMI=50, male, age 55		11,908
		OGBP	BMI=40, female, age 35		13,161
		OGBP	BMI=50, female, age 35		5,103
		OGBP	BMI=40, female, age 55		14,415
		OGBP	BMI=50, female, age 55		4,835
	Jensen and Flum (2005)	OGBP	BMI>40, age 40, white		4,664
	Picot et al (2009)	GBP	BMI>40, pessimistic assumptions		4,595
		GBP	BMI>40, optimistic assumptions		3,519
		AGB	BMI>40, pessimistic assumptions		4,301
		AGB	BMI>40, optimistic assumptions		2,112
AGB		30<BMI<40, type II diabetes, after 2 years		21,078	
AGB		30<BMI<35, after 5 years		18,240	

Service	Source	Comments (1)	Comments (2)	(Comments 3)	ICER
		AGB	30<BMI<35, after 20 years		14,211
		AGB	30<BMI<40, type II diabetes, after 5 years		5,100
		AGB	30<BMI<35, after 2 years		67,649
		AGB	30<BMI<40, type II diabetes, after 20 years		1,523
	Salem et al (2008)	LAGB	BMI=40, male, age 35		12,136
		LAGB	BMI=40, male, age 35		7,594
		LGBP	BMI=40, female, age 35		9,608
		LGBP	BMI=40, female, age 35		5,810
	van Mastrigt et al (2006)	OVGB vs. LAGB	BMI > 40 or BMI between 35-40 + significant comorbidity		Laparoscopic AGB dominates open VGB
CPAP	NICE	"Published economic evaluation" 1	CPAP vs. no intervention	Third-party payer perspective	1,880
			CPAP vs. no intervention	Societal perspective	176
		"Published economic evaluation" 2	CPAP vs. no intervention	5-year time horizon	5,955
			CPAP vs. no intervention	Lifetime horizon	3,740
		"Published economic evaluation" 3	CPAP vs. no intervention	After 1 year	9,242
			CPAP vs. no intervention	After 2 years	5,790
		"Published economic evaluation" 4	CPAP vs. no intervention	High-cost estimate	5,182
			CPAP vs. no intervention	Low-cost estimate	1,862
		Manufacturer	CPAP vs. no intervention		CPAP dominated no intervention
		Assessment Group	Dental devices vs. lifestyle management		2,227
			CPAP vs. dental devices		4,341
			CPAP vs. lifestyle management	Mild OSAHS	22,921
				Moderate OSAHS	10,457
				Severe OSAHS	4,914

Service	Source	Comments (1)	Comments (2)	(Comments 3)	ICER
Ezetimibe	NICE	Cholesterol concentration not appropriately controlled	Comparator: Current statin therapy alone or rosuvastatin monotherapy	Lower estimate	21,624
			Comparator: Current statin therapy alone or rosuvastatin monotherapy	Upper estimate	37,557
			Comparator: Atorvastatin	Lower estimate	1,707
			Comparator: Atorvastatin	Upper estimate	5,235
			Comparator: Current statin therapy titrated to the next dose	Lower estimate	27,314
			Comparator: Current statin therapy titrated to the next dose	Upper estimate	48,938
		Contraindications to initial statin or intolerant to statin therapy	No comparator	Lower estimate	27,314
		No comparator	Upper estimate	47,800	
Insulin pumps	SMC	Manufacturer, pessimistic assumptions			38,226
		Manufacturer, intermediate assumptions			25,496
		Manufacturer, optimistic assumptions			18,753
		Assessment Group, pessimistic assumptions			41,992
		Assessment Group, intermediate assumptions			40,739
		Assessment Group, optimistic assumptions			27,525
Keep Well	Lawson et al (2010)	Pessimistic assumptions			73,791
		Baseline assumptions			33,228
		Optimistic assumptions			8,056
OVS	Carlton et al (2008)	Age 3 without AR, UK			544,482
		Age 4 without AR, UK			1,017,844
		Age 5 without AR, UK			1,286,329
		Age 3 with AR, UK			1,124,901
		Age 4 with AR, UK			834,951
		Age 5 with AR, UK			9,324,512
	König and Barry (2004)	Age 3, Germany			5,902

Service	Source	Comments (1)	Comments (2)	(Comments 3)	ICER
PET Scanning	Brush et al (2011)	Rectal cancer	PET/CT versus CT alone		22,835
		Colon cancer	PET/CT versus CT alone		6,601
		Metastatic cancer	PET/CT versus CT alone		22,862
	van Loon et al (2010)	Non-small cell lung cancer	PET-CT follow-up vs conventional follow-up		59,309
	Hollenbeak et al (2001)	Head and neck squamous cell carcinoma (HNSCC)	PET/CT versus CT alone		2,166
	Schreyögg et al (2010)	Non-small cell lung cancer	PET/CT versus CT alone		49,327
Protease inhibitors	SMC	Boceprevir	Naïve	F0 – F3	8,924
			Naïve	F4	11,888
			Experienced	F0 – F3	7,799
			Experienced	F4	1,387
			Experienced	Null responders	8,156
		Telaprevir	Naïve	All	14,431
			Naïve	Mild	19,573
			Naïve	Moderate	12,981
			Naïve	Cirrhosis	10,750
			Experienced	All	9,574
			Experienced	Mild	23,325
			Experienced	Moderate	9,432
			Experienced	Cirrhosis	4,868
			Experienced, prior relapser	All	5,439
			Experienced, prior partial responders	All	10,707
Experienced, null responders	All	28,117			
PBT	Konski et al (2007)	Prostate	Age 70		40,936
		Prostate	Age 60		35,880
	Lundkvist et al (2005)	Breast	Age 55+		27,166
		Prostate	Age 65+		21,213
		Head and neck	Age 65+		3,019
		Medulloblastoma	Children age 5+		PBT dominated other radiation therapy
Rapid HIV Tests for MSM	Han et al (2011)	MSM, China	Rapid test		2,256

Service	Source	Comments (1)	Comments (2)	(Comments 3)	ICER
	Long et al (2010)	High-risk, US	Rapid test	One-time HIV screening of low-risk individuals; annual screening of high-risk individuals	15,240
	Lucas and Armbruster (2012)	High-risk, US	Rapid test		30,261
	Paltiel et al (2005)	High-risk, US	Not rapid test		32,232
		High-risk, US	Not rapid test		44,766
		High-risk, US	Not rapid test		56,406
	Prabhu et al (2011)	MSM, US	Rapid test	Opportunistic screening in STI clinics	Testing STI clinics dominated testing in emergency departments
	Juusola et al (2011)	MSM, US	Rapid test	Expanding annual screening from 66% to 90%	8,567
		MSM, US	Rapid test	Symptom-based testing	15,515
		MSM, US	Rapid test	Symptom-based testing & expanded antibody screening	20,374
Rivaroxaban	SMC	Atrial fibrillation	Patients not well-controlled on warfarin Patients unsuitable for warfarin	Warfarin Aspirin No treatment	Rivaroxaban dominates warfarin 2,112 919
		Deep vein thrombosis	All	Low molecular weight heparin (LMWH) followed by warfarin	Rivaroxaban dominates alternative regime
Tocilizumab	SMC	First-line tocilizumab monotherapy ahead of a sequence of TNF antagonists (certolizumab pegol, adalimumab, etanercept and palliative care) compared to standard care comprising the same sequence of TNF antagonists First-line tocilizumab monotherapy as an alternative to certolizumab pegol monotherapy with each medicine followed by			14,615 11,266

Service	Source	Comments (1)	Comments (2)	(Comments 3)	ICER
		adalimumab, etanercept and palliative care			

APPENDIX B: EXAMPLE INTERVIEW SCRIPT (NHS AYRSHIRE & ARRAN)

Interview plan

1. Give some definitions of important words/phrases
2. Provide a short recap of the project and the information we would like from you
3. Conduct a semi-structured interview about spending decisions
4. Opportunity for interviewee to ask questions.

Definitions

- QALY = quality adjusted life year
- Marginal = added or subtracted, e.g. when we say marginal spending = spending on new services or increased spending on existing services, and when we say marginal disinvesting = stopping or reducing existing services.

Recap of the project

- This is a joint project between the Office of Health Economics and the University of Glasgow, funded by an unrestricted grant from the American Pharma Group (APG).
- The aims of the project are to quantify the revealed cost per QALY threshold in NHS Scotland and to understand marginal investment and disinvestment decisions.
- We attended meeting of finance directors of NHS boards at end of Jan 2013 and obtained your agreement to take part.
- The interview will concentrate on questions 4,5,6 and 8 of the Health and Sport Committee's 2012 budget scrutiny, which relate to marginal spending plans.
- In particular, we wish to identify (more precisely in some cases) the nature of the services you referred to.
- Information revealed in this interview will be aggregated with that collected from other interviews and will be kept fully anonymous unless permission is given.

Interview

Question 1

Question 5(a) of the budget scrutiny asked:

"Please give three examples of service developments that you have been able to fund in 2012-13"

You answered:

1. Oral Maxillofacial Cancer
2. Rheumatology Consultant
3. Insulin Pumps

(a) I would like to find out some more about the new services for oral maxillofacial cancer at NHS Ayrshire and Arran.

- (i) Could you firstly provide some details of the planned investments in this area? For example, did you invest in a new piece of screening equipment or expand the provision of a particular type of surgery? As you know, we are aiming to identify specific services for which we can find cost per QALY evidence, so the more detail you can provide, the better.
- (ii) What were the factors that led to these services being prioritised over other services you could have set up or expanded?
- (iii) Did the cost-effectiveness of the services influence your decision?
- (iv) **IF INTERVIEWEE DOES NOT REFER TO COST/QALY:** Did the cost-effectiveness of the services in terms of the cost per QALY influence your decision?
- (v) Could you point me to any particular evidence (published or unpublished) which helped you to make the decision?

(b) We would like to find out some more details about the new rheumatology consultant:

- (i) Were they hired to address any particular rheumatologic condition, or to provide services across the board?
- (ii) What were the factors that led to this particular service being prioritised over other services you could have set up or expanded?
- (iii) Did the cost-effectiveness of this service influence your decision?
- (iv) **IF INTERVIEWEE DOES NOT REFER TO COST/QALY:** Did the cost-effectiveness of this service in terms of the cost per QALY influence your decision?
- (v) Could you point me to any particular evidence (published or unpublished) which helped you to make the decision to fund this service?

(c) We would like to find out some more details about the investment in insulin pumps:

- (i) As I understand it, all NHS Boards in Scotland have HEAT targets to meet regarding the provision of insulin pumps – is it the response to this Scottish Government initiative that you’re referring to?
- (ii) What were the factors that led to this particular service being prioritised over other services you could have set up or expanded?
- (iii) Did the cost-effectiveness of this service influence your decision?
- (iv) **IF INTERVIEWEE DOES NOT REFER TO COST/QALY:** Did the cost-effectiveness of this service in terms of the cost per QALY influence your decision?
- (v) Could you point me to any particular evidence (published or unpublished) which helped you to make the decision to fund this service?

(c) The budget scrutiny asked for only 3 examples of marginal services – are there any others you could have mentioned? In particular, we are looking for examples of widening the referral criteria for a service, adding a wholly new service or extending an existing service to increase substantially the numbers of patients who can access it.

(d) **IF APPROPRIATE:** Moving on to **OTHER SERVICE:**

- (i) What were the factors that led to this particular service being prioritised over other services you could have set up or expanded?
- (ii) Did the cost-effectiveness of this service influence your decision?

- (iii) **IF INTERVIEWEE DOES NOT REFER TO COST/QALY:** Did the cost-effectiveness of this service in terms of the cost per QALY influence your decision?
- (iv) Could you point me to any particular evidence (published or unpublished) which helped you to make the decision?
- (v) REPEAT IF APPROPRIATE

Question 2

Question 5(b) of the budget scrutiny asked:

“Please give three examples of service developments that you would consider priorities, but have been unable to fund in 2012-13”

You answered:

1. Sleep disorders (including sleep apnoea)
2. Bariatric surgery
3. Immunology testing validation

(a) I would like to find out some more about the sleep disorder services you would have liked to have funded but were unable to.

- (i) Could you provide some more details of these services? As you know, our aim is to identify specific services for which we can obtain cost per QALY evidence.
- (ii) What were the factors that led to your decision not to invest in these sleep-disorder services despite having considered it?
- (iii) Did the cost-effectiveness of these services influence your decision?
- (iv) **IF INTERVIEWEE DOES NOT REFER TO COST/QALY:** Did the cost-effectiveness of these services in terms of the cost per QALY influence your decision?
- (v) Could you point me to any particular evidence (published or unpublished) which helped you to make the decision?

(b) I would like to find out some more details about the bariatric surgery you would like to have invested in but were unable to:

- (i) Are you currently performing any bariatric surgery at NHS Ayrshire and Arran?
- (ii) Could you provide more details of the types of bariatric surgery which you would have liked to be provided? For example gastric band or gastric bypass surgery, for any particular BMI group?
- (iii) What were the factors that led to your decision not to invest in bariatric surgery despite having considered it?
- (iv) Did the cost-effectiveness of these services influence your decision?
- (v) **IF INTERVIEWEE DOES NOT REFER TO COST/QALY:** Did the cost-effectiveness of these services in terms of the cost per QALY influence your decision?
- (vi) Could you point me to any particular evidence (published or unpublished) which helped you to make the decision?

(c) I would like to find out some more about the immunology testing validation services you would have liked to have funded but were unable to.

- (i) You will have to excuse my ignorance – what is immunology testing validation?

- (ii) **IF APPROPRIATE:** What exactly would you have done if you could? Bear in mind we are looking to identify services for which we can look for cost per QALY evidence.
- (iii) **IF APPROPRIATE:** What were the factors that led to your decision not to invest despite having considered it?
- (iv) **IF APPROPRIATE:** Did cost-effectiveness of this service influence your decision not to expand the service?
- (v) **IF APPROPRIATE AND INTERVIEWEE DOES NOT REFER TO COST/QALY:** Did cost-effectiveness of this service in terms of the cost per QALY influence your decision not to expand the service?
- (vi) **IF APPROPRIATE:** Could you point me to any particular evidence (published or unpublished) which helped you to make the decision?]

(d) The budget scrutiny asked for only 3 examples of marginal services you would like to have funded but didn't – are there any others you could have mentioned? Again, we are looking for examples of widening the referral criteria for a service, adding a wholly new service or extending an existing service to increase substantially the numbers of patients who can access it.

(e) **IF APPROPRIATE:** Starting with **OTHER SERVICE**

- (i) What were the factors that led to your decision not to invest in it despite having considered it?
- (ii) Did the cost-effectiveness of this service influence your decision?
- (iii) **IF INTERVIEWEE DOES NOT REFER TO COST/QALY:** Did the cost-effectiveness of this service in terms of the cost per QALY influence your decision?
- (iv) Could you point me to any particular evidence (published or unpublished) which helped you to make the decision?
- (v) REPEAT IF APPROPRIATE

Question 3

Question 4 of the budget scrutiny asked:

“(a) What level of cost savings will be required by your NHS board in order to break even in 2012-13? (i.e. to what extent do known and projected expenditure commitments exceed anticipated funding and income)

(b) Please identify the three main areas in which these savings will be made and the contribution that these areas will make to overall savings in 2012-13”

To part (b), you answered:

1. Prescribing including drugs coming off patent
2. Rationalisation of support services
3. Clinical productivity through Lean, Best Value reviews, etc.

(a)

- (i) Just to check: I am assuming that the savings named here were planned to be made through efficiency improvements rather than disinvesting in health-improving services – is this right?

- (ii) Were there any other planned disinvestments for 2012-13? As you know, our aim is to identify specific services for which we can look for cost per QALY evidence. With that in mind, we are particularly interested in instances where you might have stopped or deliberately decreased funding, or tightened the referral criteria, for particular services/technologies/medicines/procedures?
- (iii) **IF STILL DOESN'T SAY ANYTHING:** Another NHS board pointed me to a "Making Difficult Decisions" framework that was developed in 2010 – are you aware of it? Were any disinvestments made following this?

(b) **IF APPROPRIATE:** Regarding **NAMED DISINVESTMENTS**

- (i) What were the factors that influenced your decision to decrease/stop spending on this service rather than any other?
- (ii) Did the cost-effectiveness of this service influence your decision to decrease/stop spending on it?
- (iii) **IF INTERVIEWEE DOES NOT REFER TO COST/QALY:** Did the cost-effectiveness of this service in terms of the cost per QALY influence your decision to decrease/stop spending on it?
- (iv) Could you point me to any particular evidence (published or unpublished) which helped you to make the decision?
- (v) REPEAT IF APPROPRIATE

Question 4

Question 8(a) of the budget scrutiny asked:

"What is your planned allocation of the Change Funds for older people's services and Early Years intervention for 2012-13?"

(a) You gave a useful breakdown of the allocations.

- (i) Does the allocation to any specific part of the Change Fund for older people's services represent a significant increase or decrease from the amount spent on it in the previous year?
- (ii) **IF YES:** As you know, our aim is to identify services for which we can look for cost per QALY evidence. With that in mind, could you give some more details of where the extra money would be spent?
- (iii) Does the allocation to any specific part of the Early Years Change Fund represent a significant increase or decrease from the amount spent on it in the previous year?
- (iv) **IF YES:** As you know, our aim is to identify services for which we can look for cost per QALY evidence. With that in mind, could you give some more details of where the extra money would be spent?

Question 6(a) of the budget scrutiny asked:

"What specific preventative health programmes are included in your budget plans for 2012-13? (please give details of planned expenditure)"

You answered:

1. Change fund for older people's services
2. Early years investment on nutrition and dental health

3. Smoking prevention
4. Blood borne virus prevention
5. Sexual health
6. Keep Well

(b) Would any of the planned spending on each of these programmes be classed as marginal, i.e. was spending on a programme substantially increased or reduced in 2012-13, or was 2012-13 the first year of spending on a particular programme?

- (i) **IF INTERVIEWEE SAYS YES, FOR EACH MARGINAL PROGRAMME:** As you know, our aim is to identify services for which we can look for cost per QALY evidence. With that in mind, could you give more details of what this programme involves?
- (ii) What were the factors that led to this particular programme being prioritised over others you could have set up or expanded?
- (iii) Did the cost-effectiveness of this preventative health programme influence your decision to start funding it/increase its funding?
- (iv) **IF INTERVIEWEE DOES NOT REFER TO COST/QALY:** Did the cost-effectiveness of this preventative health programme in terms of the cost per QALY influence your decision to start funding it/increase its funding?
- (v) Could you point me to any particular evidence (published or unpublished) which helped you to make the decision?
- (vi) REPEAT IF APPROPRIATE

Opportunity to ask questions

Do you have any questions about the project or the interview?

We will write a concise note of the main points from the interview, which we will send to you for confirmation or correction.

We will provide all interviewees with an early copy of the report/article we will write about this research. Thank you for your time.

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