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Understanding public preferences for health gains in the UK: Does QALY type matter?

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Abstract

Objectives: Health care budgets within many countries are finite and decisions must be made about which interventions to provide and, by implication, which will not be provided. The aim of this study was to investigate what features of health care interventions, including the type of health gain, are important to members of the UK general public in making priority setting decisions and to understand more about the reasons why.

Methods: Q methodology was used in a sample of 52 members of the public in North East England. Respondents rank ordered 36 health care interventions from those they would give highest priority to through to those they would give lowest priority to. A form of factor analysis was used to reveal a small number of shared viewpoints.

Results: From the factor analysis five factors emerged: 'life saving to maximise the size of the health gain', 'everyone deserves a chance at life', '(potential for) own benefit', 'maximum benefit for (perceived) lowest cost' and 'quality of life and social responsibility'.

Conclusions: This study indicates that there are different views about which interventions should be given priority. The factors revealed that respondents did consider the type of health gain received from an intervention but also highlighted other issues such as the size of the health gain, who received the health gain and an individual's personal responsibility were important to respondents

Introduction

In the UK quality adjusted life years (QALYs) have become the established measure of health outcome used in health care policy decision making. The National Institute for Health and Clinical Excellence (NICE) has specified in its reference case that QALYs should be included as a measure of health outcome for submissions of technology appraisals for new interventions[1]. One of the main assumptions of the QALY is that people value the trade-offs between quality of life and life expectancy the same. That is, they value a gain of one QALY which comes from an extra 1 year in full health the same as a one QALY gain arising from 10 years during which quality of life is improved by only 0.1 in each year (where 0 is death and 1 is full health). This position is adopted by health technology assessment agencies, like NICE, who assume that QALYs are of equal value. However, outside of these agencies there has been a tradition of questioning this, especially since the Oregon experiment[2].

Studies which have attempted to estimate the monetary value of a QALY from members of the public indicate that the type of QALY gain is important, with typically higher values for scenarios which include a reduction in the risk of death and lower values for studies in which the scenario is based on an improvement in quality of life only [3, 4]. Although these studies have shown that the type of QALY gain is important to people there is little evidence as to why this is the case. In this study Q methods were used to investigate what features of health care interventions, including the type of health gain, are important to members of the public and to understand more about the reasons why. As the type of QALY is unlikely to be the only feature of health care

interventions people consider when setting priorities for health care funding, this study will also contribute a wider understanding of the views that members of the public hold.

The next section of this paper describes the design of the Q study and the methods of data collection. The factors which emerged from the study are then described in detail. The paper concludes with some potential policy implications of the research.

Methods

The aim of this Q study was to explore the factors underlying the prioritisation of different health care interventions by members of the public and whether the components of the QALY were important in this. Q methodology is used to study "subjectivity" which can be described as an individual's views, opinions or beliefs on any given topic[5]. The stages of a Q study have been described in detail elsewhere [6, 7], therefore, only a brief overview is provided here. The starting point of any Q study is to develop the concourse which represents all of the possible views on the topic in question[8]. A set of statements (Q set) is derived from the concourse and provides the focus for data collection and analysis. Each individual respondent is asked to provide their point of view on the statements by rank ordering them (usually according to agreement). Following the Q sorting exercise, a form of "by-person" factor analysis is conducted. This analysis groups together similar Q sorts to reveal a small

number of underlying perspectives which are referred to as factors. A 'composite' Q sort can then be calculated to represent each factor. Through interpretation of the factors, rich descriptions of different points of view are generated. Q methodology was chosen as a study of priorities naturally leads to methods which involve rank ordering either explicitly, or by inferring an order at the aggregate level based on respondents' choices.

Developing the Statements (The Q set)

Generally in Q studies the concourse consists of statements of opinion on a particular topic which can be collected from sources such as interview transcripts, academic or popular literature[7]. In this study the concourse consists of health care interventions currently provided by the NHS. To reduce this large concourse down to a smaller Q set a matrix was devised (Table 1). It was structured to make the Q set representative of the types and size of QALY gain people could get from health care interventions. Four categories of health care intervention are represented in the Q set; quality of life enhancing interventions, life extending interventions, interventions which improve both quality of life and life expectancy and life saving interventions. Life saving interventions are defined as treatments which if not provided would result in premature death of the patient (clearly in the long term no intervention is life saving). Life extending interventions in this study are those which give small reductions in the risk of death each year, which over the long term would lead to a longer life expectancy. The size of the health gain was also included in the statements and the magnitude of QALY gains was

available for just under half of the interventions. The type of disease was not specifically included in the matrix but when choosing the interventions an attempt was made to cover a large number of disease areas, including some that were likely to be less familiar. As the statements in this study were not of the traditional discursive form, they will be referred to as "items" throughout the rest of this paper.

[Table 1 about here]

Once the matrix structure had been established a number of sources were used to obtain information for the Q set. As a starting point, a general practioner was consulted who provided suggestions of medical and surgical interventions which could be classified under each of the four categories. To supplement this and to supply information on the size of the health gain for each of the interventions, a search of the clinical guidelines produced by NICE and the NHS Health Technology Assessment Programme was undertaken[9, 10]. The aim was to select interventions to achieve an equal number of items representing the four types of health gain. However, information on the size of the QALY gain was limited for the life extending interventions and the interventions which improve quality of life and life expectancy. A total of 36 interventions were included in the Q set (a full list of all the items is provided in Table 3). Each item was printed onto a card in a standard format including an item number which was used for data recording purposes (see Figure 1 for an example).

[Figure 1 about here]

Each card was 'labelled' with the name of the health care intervention, the condition in question and a brief explanation in lay terms. The impact of the intervention on quality of life and life expectancy was detailed on each card together with the size of the health gain in terms of the number of QALYs generated for the average patient over their remaining lifetime.

Sample (the P set)

Sample selection in Q methodology has much in common with qualitative sampling techniques. Respondents are sampled purposively in relatively small numbers sampling people who are likely to hold different views. A large sample size is not required and analysis reaches saturation when no new views are expressed with typically 40-60 respondents being sufficient[6]. A local social research company was contracted to recruit a sample of members of the public in North East England which was roughly balanced across age groups, employment status and gender (sample demographics are presented in Table 2). All respondents received £20 at the end of the session.

Conducting the Q sort

The Q sorts were conducted through a series of 10 groups consisting of between 2 and 8 people per group. At the beginning of each group, participants were told that the NHS operates with a limited budget therefore choices have to be made about which treatments to provide. As each item also provided information on the size of the QALY gain from treatment, an

introduction to the concept of QALYs and how they are calculated was presented. The study was set up as a societal problem with participants asked to consider the normative question of what interventions *should* be given priority while considering that the NHS operates with a fixed budget. Respondents were free to consider how prioritising the interventions might affect them personally, their immediate families and society more widely. No attempt was made to restrict their perspective to either an individual or a citizen perspective since public values are likely to incorporate all of these (this issue will be returned to in the discussion). To begin the Q sort each participant was given the pack of 36 cards (see column 2 Table 3). They were asked to read through each of the cards and sort them into three initial categories: those interventions they would give highest priority, those they would give lowest priority and those about which they were less sure.

Once the initial sort was completed the participants were asked to rank order the items using the Q sorting grid (Figure 2). The grid ranges from +4 (highest priority) through to -4 (lowest priority). It takes the form of a quasi-normal distribution with fewer items placed in the tails of the distribution. Participants were then directed to record their final sorts on a response sheet which was printed with a small reproduction of the sorting grid and participants transcribed the item numbers according to their Q sort. They also provided some written comments giving reasons why they had placed the cards in the +4 and -4 positions and any other general comments.

[Figure 2 about here]

Participants took around 45 minutes to complete their sort. Once all participants had completed the exercise a short group discussion was facilitated by the researcher to gain a better understanding of the views expressed by the participants in their sort. Participants were first asked to give general comments on the exercise before moving on to more specific questions about the placing of items, especially those at the extremes of the distribution. Whilst participants commented on each other's views, no changes to the Q sorts were made as a result of the discussion. The discussion was digitally audio recorded this was used to aid the interpretation of the factors.

Analysis

In Q methodology a form of factor analysis is used to identify a small number of 'shared viewpoints'. The degree to which an individual agrees with the factor is given by their *factor loading* which is essentially a correlation coefficient, takes a value between -1 and +1, and represents the degree to which each Q sort is (dis) similar to each factor [11]. Factors are represented by a *factor array*, which is a composite Q sort [7] based on the average of the scores (i.e. +4 to -4) given to an item by all of the defining Q sorts. These are Q sorts which are both significant for the factor (in this study this is a factor loading over 0.41 - an explanation of how this is calculated is shown under Table 4) but not significant on any other factor. These scores are then weighted to reflect that some Q sorts are more highly associated with a factor than others [11]. A factor array can be laid out for each factor using the original

sorting grid by placing each item in the spaces on the grid as an aid to interpretation[8].

Analysis was conducted using PQMethod 2.11 [12], a dedicated software package. Principal components analysis was followed by varimax rotation to derive the factors (for further explanation of factor analysis in Q methodology see Brown [6]).

Results

Fifty two people took part in the exercise. The characteristics of those who took part are presented in Table 2.

[Table 2 about here]

A range of factor solutions based on 2 to 5 factors were explored. A 5 factor solution was chosen even though the fifth factor has only 4 significant Q sorts (and 2 defining sorts) because it provided a solution that was most consistent with the views expressed by those participants based on their comments during group discussions and the brief written summaries they provided. Three and four factor solutions did not allow this account to emerge. The factor arrays for all five factors are presented in Table 3. Table 4 presents the factor loading for each participant on each of the five factors.

[Table 3 about here]

[Table 4 about here]

Factor 1 – "Life saving to maximise the size of the health gain"

Interventions which were described as life saving were given highest priority in Factor 1 on the basis that they give the largest health gain in terms of the number of life years gained. This focus on the size of the health gain that would be received from a treatment is reflected in the comments provided by the respondents during the post-sort discussion and in their written comments:

> *"Renal replacement therapy can help a sick patient to have more life years" (ID4, female, age 29)*
>
> *"[referring to neonatal intensive care] babies have potentially their full life ahead of them so saving 79 years" (ID42, female, 43)*

The rule-of-rescue was another feature of the life saving interventions which was important to this factor. Treatments that would be conducted as an emergency or needed to be done urgently were given higher priority (items 4, appendectomy, (+2) and 33, salpingectomy, (+3)). Similarly interventions which were deemed to be non urgent or pose no immediate threat to patients were given lower priority by this factor.

Culpability is also a key issue for this factor, with interventions which could be caused by the patient's lifestyle given low priority (items 12, orlistat, (-4) and 2, counselling for alcoholism, (-4)). Lifestyle diseases are seen by respondents associated with this factor as being in the control of the patient:

"Because smoking and obesity are in the control of most individuals" (ID42, female, 43)

"Everybody knows about the negative effects of drinking alcohol so they should know how much they have drunk and how to [stop] drinking" (ID4, female, 29)

Related to this issue of control was the perception that these interventions (or alternatives to them) are available outside of the NHS and that patients should buy such treatments themselves.

Factor 2 – "Everyone deserves a chance at life"

Similarly Factor 2 is also concerned with life saving but with a focus on the age of patients. Children are given priority for two reasons: firstly they would receive the greatest increase in life expectancy (maximising benefit) and secondly because they 'deserve a chance at life'.

"Neonatal intensive care and Ectopic pregnancy are highest priority simply because highest priority has to go to the youngest patients because everyone deserves a chance at life" (ID25, male, 22)

"Priority goes to children – anything which has the greatest increase in life expectancy must be prioritised" (ID48, male, 21)

Like Factor 1, culpability is important with treatments for alcoholism and obesity in the -4 position and higher priority has been given to interventions for diseases where the patient had no control over the cause of the disease. Thus, inherited diseases such as cystic fibrosis ((F1) +1, (F2) **+2**, (F3) 0, (F4) -2, (F5) -1) and sickle cell anaemia (0, **+1**, 0, -2, -2,) have positive factor scores and are both distinguishing items for this factor.

Children were regarded by many participants as blameless for their illness which contributed to the focus on interventions for the young being given highest priority;

> *"The treatments are for children that are not to blame for their illness and have their whole life ahead of them" (ID28, female, 22)*

It is interesting to note the age distribution of the 18 participants who load onto this factor. The median age is 22 years and eight of the respondents with significant loadings on Factor 2 are students. Although Q studies are not designed to be representative across populations and are based on small numbers, it is possible that there is some relationship between the low age of the group and the focus on young people in the factor array. However without a subsequent study of a representative population sample it is not possible from the data available to make a more conclusive link.

Factor 3 – "(potential for) own benefit"

Factor 3 is concerned with the personal experiences of respondents and the people around them. The focus is on interventions from which they believe they would benefit personally. The type of QALY gain appears not to be important. Rather the type of disease plays a more important role in the decision. Four of the interventions given highest priority were for heart disease and several respondents' comments indicate that they feel they would benefit either now or in the future from the provision of heart disease interventions,

> *"Having heart problems, I feel they take the most problems and are required for myself" [referring to item 15] (ID35, male, 57)*
>
> *"At 72 two areas [Alzheimer's and arrhythmias] where I might need help the most" (ID33, male, 72)*

Although the general theme of the factor is on the personal benefit that would be received from treatment, one participant did indicate that treatments for heart disease should be provided as it was likely to affect a large number of people in society

> *"Probably the biggest potential killer diseases affecting large numbers of people?" [referring to items 5 and 31] (ID31, male, 66)*

The focus on heart disease may also be linked to the age range of the participants who have high factor loadings on this factor. The average age of the respondents is 59 years with a median age of 66 years which is notably higher than any of the other factors. Higher priority has been given to

interventions for cancers, Alzheimer's disease as well as heart disease all of which predominantly affect older people in society.

Like Factors 1 and 2, lower priority was given to interventions which were seen to be self inflicted and participants thought that treatment could be sought outside the NHS. An individual perspective was also adopted with regard to lower priority interventions as is shown in the comments,

> *"Smoking and alcoholism at the bottom as I don't drink or smoke. I just bought a new car as I don't drink" (ID8, male, 82)*

A somewhat unusual feature of Factor 3 is the positioning of item 21, which is an intervention for sudden infant death syndrome, in the -4 position. This is a distinguishing item for this factor (0, +3, **-4**, +3, 0). However, it is difficult to be clear on the reasons for the positioning of this item from the qualitative comments provided. Item 33, salpingectomy for Ectopic pregnancy (+3, +2, **-2**, 0, +2), is also distinguishing for factor 3. There may be a link between the positioning of this card, the individualistic approach of these respondents and the demographics of the participants who load onto this factor but it is not possible to be sure.

Factor 4 – "maximum benefit for (perceived) lowest cost"

Factor 4 was concerned with use of NHS resources to benefit the maximum number of people. Treatments which respondents considered best value for

money are given priority in this account despite the fact that no information is given on the cost of each item.

The items which are ranked highest for this factor relate to diseases which affect large numbers of the population but where the intervention is likely to be lower cost

> *"Based on straightforward low cost for maximum benefit. Acute MI, appendicitis are straightforward and affect many" (ID40, male, 38)*

However, no discussion was given to the overall health care budget and how, if many people are affected, the overall budget may have to be increased. The focus appears to be on using low cost per person technologies even if the overall cost is higher than for a high cost intervention used by a smaller percentage of the population. This is further evident in the positioning of item 13 (air ambulance) in the factor array in the -4 position which is a distinguishing item for Factor 4 (0, +3, +1, **-4**, +2). Many of the participant comments expressed the high cost element of the air ambulance and the number of people they would help,

> *"Lowest priority is to air ambulance as the number of people benefiting would be small and very expensive" (ID29, male, 67)*

This concern about the costs of treatments was also used as an argument for preventive treatments. Items 1 (flu vaccine (-1, 0, -1, **+2**, -2)) and 10 (smoking

cessation (-3,-3, -2, **+4**,+3)), distinguishing items for this factor, show how highly these preventative interventions are regarded in comparison to where they were placed by the other factors.

There is no discussion in this account of self infliction or blame. So called 'lifestyle diseases' are given high priority which differentiates this from previous factors,

> *"Don't think alcoholism is self inflicted, [it] probably doesn't cost very much [to give the advice] and can probably make a big difference" (ID1, male, 37)*

The placing of item 2 (counselling for alcoholism) reflects this view receiving a positive score compared with factors 1, 2 and 3 (-4, -4, -4, **+3**, +4).

Factor 5 – "quality of life and social responsibility"

The size of the health gain is less important in factor 5 and quality of life carries more weight than in any of the other factors. Personal experiences of the participants with high loadings on this factor have also influenced their Q sorts.

There is a mixture of quality of life enhancing and QALY gaining interventions in the highest priority section of the Q grid. Of the life saving interventions,

only the air ambulance was ranked in the top two columns by this factor. The importance of quality of life was emphasised by one participant commenting on item 18,

> *"Quality of life is very important. Alzheimer's is likely to become a large problem as more of us live longer. Long life expectancy with Alzheimer's is grim for everyone" (ID34, female, 38)*

However, a number of quality of life enhancing interventions have been given lower priority. The participants' comments suggest that they made some kind of judgement about the societal value of treatments for varicose veins and Viagra which were regarded as cosmetic or unimportant.

A distinguishing item for this factor is smoking cessation for COPD (-3, -3, -2, +4, **+3**) which is given a positive factor score. Like Factor 4, both smoking cessation and counselling for alcoholism are given high priority by Factor 5. The qualitative comments for this factor indicate that culpability is not a consideration, instead there was a perceptible view that society has a responsibility to help people with diseases which may be caused by lifestyle such as alcoholism and obesity,

> *"interventions earlier on are more important to prevent obesity in the first place. Society definitely does have a duty to address the consequences as high priority" (ID34, female, 38)*

Discussion

The aim of this study was to investigate what features of health care interventions, including the type of health gain, are important to members of the public when making judgements about which health care interventions to prioritise and to understand more about the reasons why. Five factors were identified: (F1) "Life saving to maximize the size of the health gain*";* (F2) *"*Everyone deserves a chance at life"; (F3) "(Potential for) own benefit"; (F4) "Maximum benefit for (perceived) lowest cost"; (F5) "Quality of life and social responsibility".

These five factors indicate that respondents do take account of the type of health gain which arises from treatment but there are also other issues which are important to them. For factors 1 and 2 the QALY gains associated with life saving interventions are valued more highly than those which are life extending or quality of life enhancing. However, the factors present two distinct explanations for prioritising life saving interventions both of which are familiar from the health economics literature. The first relates to health maximisation and interventions which yield the greatest health benefits are prioritised. The maximisation of health gain (measured here in terms of the number of QALYs gained) is generally viewed as one of the main objectives of the health care system [13]. The second account takes a 'fair innings' view [14]

with priority given to life saving interventions for younger people who were seen not to have had a fair chance at life. This preference for younger people has also been expressed in a number of other studies [15-17]. Although other studies have found that members of the public prioritised life saving interventions the explanation as to why they are given priority has generally been based on a rule of rescue argument [18]. The results of this study indicate two alternative reasons for preferring life saving interventions which may be related to the type of interventions presented in the Q set.

An issue which has become increasingly prominent in the UK is whether treatments which provide small increases in life expectancy for patients with terminal illness should be provided. These interventions are often portrayed as life saving interventions as they are for people whose death can be considered premature. A policy debate on whether these interventions should be provided is ongoing and NICE has recently relaxed its guidance on cost effectiveness for these types of interventions [19]. While the results of this study do show that, to some people, life saving interventions are regarded as more important, caution must be used in making comparisons between the types of life saving interventions used in this study and those currently being considered by NICE. The interventions presented in this study produce health gains which are much larger than those which are subject to consideration by NICE where benefits are often a gain in life expectancy of only a few months. As can be seen by the explanations given by respondents associated with Factors 1 and 2, the size of the health gain is important in making this distinction between life saving interventions and all other interventions.

Further research is needed to examine the views of the public for interventions which result in small health gains.

Personal responsibility was important for three of the factors with counselling for alcoholism and smoking cessation for COPD given low priority. In contrast the other two factors were more concerned with social responsibility, leading to the same interventions being given high priority. This conflict between the factors on the issue of culpability is perhaps not surprising. There is mixed evidence within the literature regarding the extent to which a person's lifestyle should influence whether they receive treatment. In a small number of studies which have examined preferences for treatment for people with liver disease results have found that there is a preference for giving lower priority to patients whose illness was as a result of their lifestyle [20, 21]. However, in the case of liver disease the issue of culpability maybe confounded by the fact that treatment is generally a transplant where there is real scarcity in availability. Therefore this result may not be seen when looking at other disease areas in which there are more treatment options. More mixed results have been reported in studies which look at the general principles relating to culpability [18, 22]. The results of a Q methodology study conducted as part of the Social Value of a QALY (SVQ) project [22] found that respondents did not think that patient lifestyle should be taken into account when asked to consider the principles the health service should use when deciding on how resources should be allocated. The differences in the results between the study reported here and the SVQ study may be related to the type of statements in the Q sets. The SVQ study presented statements of general

principles for health care resource allocation rather than specific treatments as used in this study. This suggests that there may be different 'level's at which people will agree with a proposition [23], such as agreeing at a general policy level that there should be equal access to health care but making distinctions about the specific types of treatment that should be provided which no longer results in equal access to health care. Investigating public preferences across the different levels of decision making and the impact this has on policy is an important area for future research.

For this study it was decided that the name of the disease and the interventions should be included in the item description rather than presenting generic, unlabelled interventions. This was to enable respondents to identify with the interventions and to try and prevent respondents making different assumptions about what the intervention might be. This has potentially resulted in a labelling effect with diseases that were more familiar to the respondents being seen more in the tails of the distribution and therefore also more prominent in the group discussion while those interventions which were less familiar to respondents being seen more in the middle of the distribution. It was important to cover a wide range of disease areas to try and make respondents aware that decisions have to be made about all interventions in reality. At the end of the Q sort many respondents did comment that they found the exercise challenging which may also have resulted in those interventions with which they were most familiar being placed in the tails of the Q grid.

An interesting feature of the results of the study was the perspective taken by the respondents in completing their Q sort. As part of the general introduction to the Q sort exercise the issue of priority setting within the NHS was posed as a societal problem thus veering respondents towards a citizen perspective, although people could take a more selfish perspective. It was important not to constrain the perspective from which people conducted their sort as when thinking about their views on health policy respondents are citizens, individuals, family members and potential patients and it is appropriate that they can consider all of these things when Q sorting.

A number of the issues which have been highlighted in this study have been debated by policy makers, such as the NICE end of life guidance [19], and decisions are made without rigorous evidence about the views of members of the public. The results of this study provide useful information to those who wish to use the views of members of the public in the decision making process such as the reasoning around the prioritisation around lifesaving interventions and the discussions both for against considering personal responsibility in making decisions. If confirmed in a large, nationally representative sample, it could also be useful for agencies that seek to represent the views of members of the public, such as NICE's Citizen's Council or as part of consultations, that they might represent people associated with different viewpoints, especially as there is some conflict between the factors. Consensus items across factors can also prove useful

for policy makers. In this study there was only one consensus item, with all respondents giving low priority to the provision of Viagra with the general view being that this was something people could purchase outside of the NHS.

This study has shown that when people are asked to think about prioritising health care, they consider more than just the magnitude of the health outcomes (in the form of the QALY) to make their decisions. Future research will focus on the differences between stated principles and specific priorities, developing a greater understanding of the views on interventions which result in small health gains and development of Q techniques to examine the extent to which the views which arise in a Q study are found in larger, nationally representative populations.

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Table 1. Q set Matrix

		Intervention			
		Quality of life	Life Extending	Quality of life and life expectancy	Life saving
QALY gain included	Yes	6	5	4	6
	No	3	4	5	3

Table 2. Sample characteristics

		N (52)
Age	18-34 35-54 55+	22 14 16
Sex	Male Female	33 19
Occupation	Employed Unemployed Retired Student Missing	19 2 12 16 3

Table 3. Q items and Factor Arrays

#	Item	F1	F2	F3	F4	F5
1	Influenza vaccine (flu), flu vaccine for types A and B to prevent the complications associated with flu, does not improve quality of life, increases life expectancy, 6.4 QALYs gained	-1	0	-1	2	-2
2	Counselling (alcoholism), counselling session for heavy drinkers to provide motivation and help to reduce alcohol intake, improves quality of life, increases life expectancy, 0.4 QALYs gained	-4	-4	-4	3	4
3	Neonatal intensive care (premature babies), incubation and treatment in intensive care unit for premature babies, intervention is life saving, no information available on the number of life years gained,	3	4	1	0	0
4	Appendectomy (appendicitis), surgical removal; of the appendix to treat appendicitis, intervention is life saving, 64 life years gained in full health	2	2	0	3	0
5	Statins (chronic heart disease), reduce the level of blood cholesterol, does not improve quality of life, increases life expectancy, no QALY information available	0	-1	3	1	0
6	Interferon Alpha (hepatitis C), treatment for hepatitis C a disease which affects the functioning of the liver, does not improve quality of life, increases life expectancy, no QALY information available	-1	0	-2	-2	1
7	Capecitabine (breast cancer), chemotherapy for breast cancer, does not improve quality of life, increases life expectancy, 0.8 QALYs gained	1	4	1	2	1

8	Drug treatment for early thrombolysis (acute myocardial infarction), early drug treatment to breakdown blood clots following a heart attack, intervention is life saving, 14 life years gained in full health	4	2	3	4	2
9	Surgery (varicose veins), surgical removal of varicose veins in the leg, improves quality of life, does not increase life expectancy, no QALY information available	-2	-2	-2	-1	-3
10	Smoking cessation (chronic obstructive pulmonary disease), quitting smoking to prevent the onset and progression of COPD a chronic lung disease, improves quality of life, increase life expectancy, no QALY information available	-3	-3	-2	4	3
11	rhDNase therapy (cystic fibrosis), treatment to improve lung function and reduce incidence and severity of lung infections, improves quality of life, increases life expectancy, 2 QALYs gained	1	2	0	-2	-1
12	Orlistat (obesity), drug treatment which prevents the absorption of some fats in the intestine, improves quality of life, increases life expectancy, 0.02 QALYs gained	-4	-4	-1	-4	-3
13	Air ambulance service, helicopter ambulance service to provide quick assistance in emergency rescue, intervention is life saving, no information available on the number of life years gained	0	3	1	-4	2
14	Angiotensin converting enzyme (ACE) inhibitors (hypertension in Type 2 diabetes), drug treatment to reduce high blood pressure in people with type 2 diabetes, improves quality of life, increases life expectancy, 0.39 QALYs gained	1	0	0	-2	-2

15	Implantable cardio defibrillators (arrhythmias), keeps the heart rate regular and in normal rhythm to reduce the risk of sudden cardiac death, does not improve quality of life, increases life expectancy, 0.75 QALYs gained	-1	0	3	1	1
16	Coronary artery bypass graft (coronary artery disease), surgery to move a blood vessel from elsewhere in the body and use it to bypass a blocked coronary artery, improves quality of life, increases life expectancy, 0.3 QALYs gained	2	1	4	-1	3
17	Bone marrow transplant (sickle cell disease), bone marrow transplant to cure sickle cell disease, which affects the body's red blood cells, does not improve quality of life, increase life expectancy, no QALY information available	0	1	0	-2	-2
18	Cholinesterase inhibitors (Alzheimer's disease), drug treatment to slow functional decline in people with Alzheimer's disease, improves quality of life, does not increase life expectancy, no QALY information available	-3	1	4	-1	4
19	Inhalers (asthma), quick relievers to ease the symptoms of asthma, improves quality of life, does not increase life expectancy, 7 QALYs gained	2	0	0	2	-1
20	Chemotherapy and surgery (colorectal cancer), surgical removal of tumour followed by chemotherapy for treatment of early colorectal cancer, intervention is life saving, 4 life years gained in full health	3	2	2	1	1
21	Advice on sleeping positions (sudden infant death syndrome), advice for new parents from health care practioner on sleeping positions for children to reduce the risk of SIDS, intervention is life saving, 79	0	3	-4	3	0

	life years saved in full health					
22	Cataract extraction, surgical removal of a cataract in one eye, improves quality of life, does not increase life expectancy, 1.7 QALYs gained	-2	-2	2	2	-1
23	Antiretroviral therapy (HIV), combination of highly active antiretroviral drugs to slow down the progression of HIV, does not improve quality of life, increases life expectancy, 2.4 QALYs gained	-2	-1	-2	1	0
24	Renal replacement therapy (end stage renal disease), dialysis or transplant for severe kidney failure, intervention is life saving, 23 life years gained in less than full health if receiving dialysis	4	3	1	-1	-1
25	Metal on metal hip resurfacing (hip disease), repair of diseased hip joint, improves quality of life, does not increase life expectancy, no QALY information available	-1	-2	0	0	2
26	Thiazide and β blockers (hypertension), drug treatment to reduce blood pressure, does not improve quality of life, increases life expectancy, 0.8 QALYS gained	-2	-1	2	-2	2
27	Cholecystectomy (gallstones), surgical removal of gallstones to prevent blockage of cystic duct and infection of the gall bladder, improves quality of life, increases life expectancy, no QALY information available	2	-1	-1	-1	1
28	Continuous positive airway pressure (sleep apnoea), use of machine and facial mask to regulate air pressure to the nose and mouth to prevent airway collapsing during sleeping, improves quality of life, increases life expectancy, no QALY information available	-2	0	-3	0	-1

29	Laparoscopic surgery (inguinal hernia), surgery to repair a hernia in the groin, improves quality of life, does not increase life expectancy, 3 QALYs gained	1	-2	1	0	-3
30	Infliximab (Crohn's disease), treatment to reduce inflammation in the intestines and reduce the symptoms of Crohn's disease, improves quality of life, does not increase life expectancy, 0.05 QALYs gained	-1	-1	-1	-3	-4
31	Aspirin (stroke), medical treatment to be taken within 2 days of a stroke occurring, improves quality of life, increases life expectancy, no QALY information available	0	1	2	2	-2
32	Insulin (type 1 diabetes), long lasting insulin for treatment of type 1 (insulin dependant) diabetes, does not improve quality of life, increases life expectancy, no QALY information available	1	1	2	0	0
33	Salpingectomy (Ectopic pregnancy), surgical treatment for Ectopic pregnancy, intervention is life saving, no information available on the number of life years gained	3	2	-2	0	2
34	Acetylcysteine (paracetamol overdose), drug treatment in hospital for attempted suicide by paracetamol overdose, intervention is life saving, 19 life years gained in full health	2	-3	-3	1	-2
35	Viagra (erectile dysfunction), treatment for impotence in men, improves quality of life, does not increase life expectancy, 0.11 QALYs gained	-3	-3	-3	-3	-4
36	Glucosamine sulphate (osteoarthritis), pain relief medication, improves quality of life, does not increase life expectancy, no QALY information available	0	-2	-2	-3	2

Shading indicates consensus items

Table 4. Factor loadings with X indicating a defining sort

Q sort	Age	Gender	F1	F2	F3	F4	F5
1	37	Male	0.12	-0.06	-0.23	**0.68X**	0.40
2	77	Female	0.30	0.34	**0.51**	-0.26	0.18
3	40	Female	**0.53**	0.18	**0.50**	-0.02	0.23
4	29	Female	**0.54X**	0.32	0.29	0.19	-0.05
5	38	Male	0.17	**0.57X**	**0.50**	-0.06	0.19
6	23	Male	0.17	0.21	0.11	**-0.53X**	-0.18
7	68	Female	0.20	**0.54X**	**0.44**	-0.01	0.01
8	82	Male	0.38	-0.03	**0.61X**	-0.0003	-0.21
9	64	Male	-0.06	**0.47**	**0.45**	**0.45**	-0.20
10	77	Male	-0.03	-0.15	**0.65X**	-0.19	-0.13
11	60	Female	0.35	**0.64X**	0.16	-0.12	0.17
12	19	Female	-0.06	0.32	**0.54**	0.18	**0.45**
13	20	Female	0.23	**0.78X**	0.25	0.18	-0.05
14	42	Male	**0.61**	0.36	-0.03	**0.48**	-0.18
15	23	Female	0.30	**0.60X**	0.41	0.0027	0.1
16	54	Male	0.03	**0.45**	0.22	**0.48**	-0.32
17	19	Female	0.10	**0.74X**	0.20	0.01	0.21
18	21	Female	0.30	**0.69X**	-0.12	-0.17	0.13
19	35	Male	0.38	0.33	**0.44**	-0.06	0.08
20	21	Male	0.06	**0.70X**	-0.02	0.16	-0.25
21	23	Male	0.20	0.08	-0.21	**0.68X**	-0.12
22	20	Male	**0.45**	**0.58X**	0.04	0.09	0.28
23	56	Male	**0.74X**	0.19	0.25	0.06	0.08
24	20	Male	0.25	**0.65X**	0.33	-0.04	0.11
25	22	Male	0.28	**0.83X**	0.11	0.01	0.15
26	24	Male	-0.19	0.36	-0.01	0.24	**0.63X**
27	39	Female	0.37	**0.60X**	0.31	0.19	0.18
28	22	Female	0.23	**0.82X**	0.17	-0.05	0.15
29	67	Male	0.07	0.03	-0.02	**0.75X**	-0.05
30	72	Male	**0.50**	0.19	**0.53**	0.07	0.03
31	66	Male	0.11	0.34	**0.65X**	-0.15	-0.08
32	75	Male	0.15	**0.49**	**0.55**	0.06	-0.28
33	72	Male	0.14	0.36	**0.67X**	-0.05	0.14
34	38	Female	0.13	-0.08	0.36	0.10	**0.70X**
35	57	Male	0.17	0.20	**0.77X**	-0.20	0.16
36	21	Male	0.34	-0.34	0.28	**0.62X**	0.15

37	22	Male	0.23	**0.83X**	0.09	0.02	-0.21
38	40	Female	**0.57**	**0.42**	-0.15	**0.46**	0.03
39	61	Male	0.15	**0.72X**	0.38	0.12	0.25
40	38	Male	-0.01	0.17	0.09	**0.50X**	0.08
41	61	Male	**0.56**	**0.48**	0.28	0.01	0.0002
42	43	Female	**0.66X**	**0.54**	0.19	0.07	0.10
43	41	Female	**0.42**	0.34	0.35	0.28.	0.16
44	67	Female	**0.52X**	0.36	0.18	-0.21	0.06
45	35	Female	0.21	**0.59X**	0.21	0.41	0.14
46	**32**	Male	**0.52**	**0.59**	-0.02	0.37	-0.05
47	25	Male	0.32	**0.47**	0.23	0.22	-0.20
48	21	Male	0.41	**0.68X**	0.19	0.18	-0.13
49	30	Male	**0.74X**	0.32	-0.02	0.07	-0.13
50	44	Female	-0.01	-0.01	**0.68X**	0.29	0.27
51	21	Male	0.31	**0.50**	-0.02	-0.22	**0.51**
52	23	Male	0.03	0.15	**0.59X**	0.13	0.05
% explained variance			12	23	13	9	5
Eigen value			6.27	11.8	6.95	4.43	2.74

*Significant loadings are shown in bold type. Significance at the 1% level is taken as a factor loading greater than (2.58 x $1/\sqrt{n}$ where n= the number of statements – so in this case significant loadings are those higher than 0.41. Defining sorts which are used to construct the *factor array* are identified by an **X. X** is calculated using a PQMethod algorithm which flags a factor loading **a** if (1) $\mathbf{a}^2 > h^2/2$ and (2) **a** > 1.96. This indicates that the factor loading must explain more than half of the common variance and that it is a significant loading at the 5% level.

Figure 1. Example Q item

Cataract Extraction **22**
Surgical removal of a cataract in one eye
Improves quality of life
Does not increase life expectancy
1.7 QALYS gained

Figure 2. Q grid