Willingness to pay in arthritis: a Danish contribution

U. Slothuus and R. G. Brooks

University of Southern Denmark, Odense University, Institute of Public Health, Health Economics, Winsløwparken 19, 3, DK-5000 Odense C, Denmark

Abstract

Objective. To explore the use of willingness-to-pay (WTP) methods with respect to an antagonist of tumour necrosis factor as an antirheumatic drug.

Methods. One hundred and fifteen rheumatoid arthritis (RA) patients at a tertiary care centre in Odense, Denmark were interviewed using two WTP approaches, the contingent ranking and double-bounded (closed-ended) methods.

Results. The average closed-ended WTP value was DKr581 and the average contingent ranking WTP was DKr643. There were no statistically significant differences in the WTP estimates between the two methods.

Conclusion. It is feasible to use these methods with arthritis patients. If, as suggested in a number of recent reviews, a major effort is to be put into undertaking economic appraisals of arthritis programmes, then this should include more cost–benefit studies using WTP approaches of the kind illustrated in this paper.

Key words: Rheumatoid arthritis, TNF-α blockade, Willingness to pay, Economic appraisal, Cost–benefit analysis.

It has long been recognized by rheumatologists that the economic aspects of their work need to be taken into account. Consideration of the economics of arthritis goes back at least to the 1960s and was reviewed as early as 1972 [1]. Subsequent reviews indicate that, although a lot of work has been put into calculating the costs and burdens of arthritis, comparatively few full economic evaluations have been undertaken [2–6].

Four alternative approaches to economic evaluation are in use. (i) Cost-minimization analysis involves a given and agreed outcome, such as a particular course of treatment, or a completed surgical procedure. Alternative programmes, for example alternative drug regimens, can then be ranked according to their costs [7]. (ii) Cost–effectiveness analysis (CEA) is used where outcomes can be measured in natural units, such as life-years saved, functional status [8] or the number of cases treated. Since programmes can differ in costs or effectiveness or both, it is necessary to rank such programmes according to their cost-effectiveness. (iii) Cost–utility analysis (CUA) values outcomes by converting concepts of health-related quality of life into preferences or ‘utilities’, often in the form of quality-adjusted life years (QALYs) [9]. (iv) Cost–benefit analysis (CBA) values outcomes in the same terms as costs, thus using a common money metric.

One group of authors retrieved just 44 health economic studies published up to December 1995 [4]. Of these studies, only two CBAs and nine CEAs were judged to be full economic evaluations according to published criteria [e.g. 10]. No CUAAs were identified. The authors suggest that only two of the studies were methodologically sound. Another group, concentrating on North American studies, identified just six studies that evaluated the cost–effectiveness of interventions or alternative treatment strategies for rheumatoid arthritis (RA) and osteoarthritis [5]. A further survey for the period 1966–95 found 36 full economic evaluations, comprising 33 CEA and three CUA studies [6].

Recent publications suggest that the use of CEA [e.g. 11–13] continues, and that there are increasing numbers of both CEAs with quality of life as an endpoint and CUAAs [e.g. 14–18].

Three comments can be made on the published work: (i) there is a dearth of full economic evaluation studies in rheumatic disease; (ii) the economic evaluations reviewed have been of variable quality; and (iii) it is evident that CBA has been completely neglected in arthritis studies in the last 20 years.

Evidently the key difference between the economic evaluation approaches lies on the outcome side. We focus in this paper on the valuation of outcomes in CBA by presenting a description of the approach and relating it specifically to the use of ‘willingness-to-pay’ (WTP) methods in the valuation of outcomes and thus of benefits.

CBA is a comprehensive approach to appraisal which seeks to capture all the social costs and benefits associated with a given proposal, such as a medical
intervention [4, 19–21]. Consider the following formula:

\[ \sum_{j,k,t} \left[ \frac{P_{jkt}B_{ikt}}{(1 + R)^t} \right] - \sum_{j,k,t} \left[ \frac{V_{jkt}C_{ikt}}{(1 + R)^t} \right] \geq 0 \]

If a project gives a positive result in kroner or pounds according to this formula then it is inferred that social welfare will be increased. \( B \) and \( C \) are benefits and costs, respectively, with different categories of benefit and cost indicated by the \( i \) and \( j \) subscripts. The \( k \) subscript refers to the recipient of the benefit (individual or group), or the person or agency incurring the cost. The \( t \) subscript caters for the time dimension, usually measured in years. The expression \( B_{ikt} \) thus represents \( B \) units of benefit type \( i \) received in time period \( t \) by person or agency \( k \), and \( P_{jkt} \) is the corresponding weight or valuation. \( R \) is the social discount rate, which caters for adjustments in the time value of costs and benefits.

Thus we have an ambitious approach which seeks to capture all the social costs and benefits associated with a given proposal. In principle, the approach can be adapted to suit equity principles by choosing suitable weights for the valuation of costs and benefits (e.g. higher benefit weights for the poor), and by selecting a suitable social discount rate to reflect inter-generation considerations (for instance, greater sacrifices made now, with their consequent cost implications, could result in higher benefits in the future).

The valuation of social costs and benefits (weights \( V \) and \( P \)) can be accomplished in a variety of ways. As already indicated, we concentrate in this paper on the valuation of benefits. The ‘human capital’ approach measures benefits in terms of, for example, the value of a person’s return to work following medical treatment; this is sometimes termed the ‘productivity benefit’. Typically, wage rates and salaries are used to value these benefits, and proxy valuations are provided for household activity, such as the wages of home helps. This approach was used in early economic appraisals in arthritis [19, 21].

Another method is the WTP approach, which involves finding out what people are willing to pay for projects or programmes. There are a number of ways to accomplish this, but the most common approach has been through questionnaires in which people are asked to respond to questions concerning their WTP for alternatives posed to them.

The primary purpose of the study on which this paper is based was to test a new method of WTP, called ‘contingent ranking’, in a cohort of arthritis patients. In doing this, the feasibility of using this method and another WTP method, the ‘double-bound’ (closed-ended) method, was also addressed. The present paper emphasizes feasibility, since this has important implications for the use of these WTP methods in the economic appraisal of arthritis interventions.

Subjects and methods

Patients

The respondents were outpatients with RA from Odense University Hospital, Section of Rheumatology. This is a tertiary centre serving the county of Fyn (population 472,000), which in 1995 had approximately 900 registered patients with various arthritic conditions, of whom some 25–30% had RA.

All diagnosed RA patients who were registered at (and on the database of) the outpatients’ clinic in July 1996, apart from the 41 patients who had participated in an earlier pilot study, were invited to participate.

Three measures of RA activity were recorded in an interview: the duration of morning stiffness (measured in minutes); pain recorded on a 10 cm visual analogue scale; and the number of swollen joints. These particular measures were selected as patients could be expected to be familiar with them and to be able to respond to questions concerning them. Asking patients to understand and respond to commonly used clinical measures, such as changes in the erythrocyte sedimentation rate or haemoglobin count, would be problematic. In addition, in terms of the WTP measurement techniques, adding further variables to the three we actually used would have made the cognitive task for the patients more complex.

The patients were asked about their WTP for alleviation of symptoms that may be the outcome of administering a novel antirheumatic agent (cA2). The analysis was based on effect descriptions stated by Elliott et al. [22]. Previous experience with the agent was described at the beginning of an interview and the positive physical effects (e.g. improvement in duration of morning stiffness) was used as a base for the questionnaire employed.

Willfulness to pay methods

Two methods were used to derive WTP valuations—the double-bounded (closed-ended) method and the contingent ranking method.

Double-bounded method. In the double-bounded model, the respondent is first asked to evaluate a bid amount related to the payment the respondent would be willing to pay to receive an intervention such as drug therapy. Depending on the respondent’s acceptance or rejection of this bid, a second bid that is either higher or lower than the first bid is used to extract further information about the WTP value. The approach is illustrated in Fig. 1.

The expression ‘in excess of your present medical expenditure for antirheumatic drugs’ is used in order to conform with the principles of economic evaluation, in which the focus of interest is on new or additional projects or proposals. The costs of such projects are referred to as the ‘marginal costs’, for example the cost of supplying a new drug. For economic evaluation the additional or ‘marginal’ benefits then need to be calculated. Hence we refer to the ‘marginal WTP’.

WTP calculations concern the maximum sums of money that people would be willing to pay for a particular good or service. A person may, for example, be willing to pay more than the market price for a good. Maximum WTP calculations thus aim to capture the total satisfaction (usually called ‘utility’ by economists) that would be obtained from the consumption or use of
Willingness to pay in arthritis: a Danish contribution

Closed-ended questions with follow-up.

In health care, where markets as such may not exist, it is clearly essential to obtain values for these maximum amounts.

The procedure used in our study gave only the interval for the WTP value for each respondent, so it was necessary to estimate a distribution including these response values. Since the distribution had to be estimated from an equation in which the dependent variable was a binary variable assigned the value of 0 or 1 (for a reply of no or yes, respectively, to the WTP question), a probit model was applied which allowed estimation of the relevant WTP distribution [23]. For the double-bounded model, the LIMDEP software package (Economic Software Inc., Bellport, NY, USA) was used.

Contingent ranking method. The contingent ranking method requires alternative scenarios to be placed in order. These scenarios comprise various contingencies to which respondents can react. Figure 2 shows the wording of the introduction used by the interviewer. Figure 3 shows the set of ranking cards employed.

The contingencies are represented by various levels of improvement in symptoms (0, 33, 66 or 100%) following treatment with an antirheumatic drug (the tumour necrosis factor antagonist cA2). Figure 3 also shows the sum of money the respondent would pay for each level of improvement. The reason for using these levels of improvement was that one card had to describe the patient’s present treatment, no treatment with the new drug implying an effect of 0. Another card had to describe the maximum effect possible, i.e. the 100% effect. To avoid unnecessary burden for respondents in covering intermediate levels, only two more cards were included.

Each of the alternatives was ranked by the respondent. The marginal WTP value in the contingent ranking method was determined indirectly by the use of an econometric model, the discrete choice model, which enables the ranked data to be analysed [23].

Interview methods. Before the interview, the respondents were allocated to eight groups depending on the bid values to be employed, the aim being to have approximately equal numbers of respondents in each group. The amounts used for both WTP methods were determined from the experience of an earlier pilot study, where one method used was an open-ended format. In the case of the double-bounded model, the sizes of the initial bid amounts for this study were fixed at DKK100, 450, 800, 1150, 1500, 1800, 2150 and 2500 per month, respectively. The high bid values were included to ensure that the upper limit was reached. In each interview, both closed-ended questions with follow-up and the contingent ranking method were used. Which method was used first was varied to avoid a framing effect.

Face-to-face interviews were carried out by the first author at the outpatients clinic or the patient’s home. The duration of an interview was on average about 30 min. The questionnaire proved acceptable for most respondents; where necessary further explanation of the tasks required was given by the interviewer.

Econometric models. It may be thought that a priori selection of just a few of the 26 variables would be the appropriate way in which to proceed. A principal com-
ponents analysis was therefore undertaken to investigate the relationship between the 26 variables studied. These variables, which cover arthritis activity, economic factors and demographics, are described in Tables 1–3. The analysis indicated that there were no high linear combinations within measures of disease activity, within present expenditures and amongst socioeconomic characteristics; thus it was not possible to make an *a priori* selection of variables for the estimation process. Hence it was necessary to employ a forward stepwise regression analysis to select the variables which were used in the calculation of the marginal WTP values.

The approach employed was more complex for the contingent ranking method since we were dealing with ordered data. To be able to deduce the WTP value in the contingent ranking method it was necessary to model the ranking data by creating interaction variables between the effect (0, 33, 67 and 100%) and the different variables, and the cost of the treatment and the different variables.

Fig. 3. Ranking cards.
Results

Descriptives
One hundred and twenty out of 179 patients (67%) agreed to take part in the study. Because five of the respondents did not answer all of the questions, these patients were excluded from the estimation sample, leaving 115 (64%) respondents.

Detailed data (median, average, mode or proportion, as appropriate) for each variable employed are presented in Tables 1–3.

The sample was dominated by patients who had lived with arthritis for <10 yr; however, 13% of the respondents had suffered from the illness for >30 yr, resulting in an average duration of 15 yr for the sample. Many of the respondents were retired and between 60 and 70 yr of age, and a few patients were in the group between 18 and 30 yr of age, giving a median age for the patients of 56 yr. Many patients had a current monthly expenditure of between DKr50 and DKr100 on antirheumatic drugs, but some had higher expenditures, of around DKr400 or more. The average monthly expenditure was DKr186, or DKr2232 for 1 yr, which can be compared with the most frequently recorded yearly income after tax of between DKr110000 and DKr165000.

The respondents’ answers to the bids offered in the double-bounded (closed-ended) method (Fig. 1) are summarized in Table 4. As the bid levels increased, the proportion of subjects responding ‘yes’ decreased.

Econometric model: marginal WTP estimates
As noted above, a forward stepwise regression model was employed, using a significance criterion of 5%. Applying this selection method to the closed-ended question data, the final model consisted of four variables, viz. pain level; expenditure for medications on prescription; present monthly expenditure for alternative medicine; and number of years suffering from arthritis.

Using contingent ranking data, we again used stepwise regression to determine significant variables, i.e. the variables which would determine the WTP value. Variables that interacted with the effect of the treatment and emerged as significant were: morning stiffness; pain level; whether the patient had previously experienced a failed treatment; the percentage of respondents who received treatment from their general practitioner; the means of transport used; and the age of the respondent. Variables that interacted significantly with the cost of the treatment were: total time spent in transport; examination at the clinic and waiting time; monthly expenditure for drugs on prescription; monthly expenditure for alternative medicine; length of period between two consultations with a general practitioner; income; period between two examinations at the outpatient clinic; and the cost variable itself.

<table>
<thead>
<tr>
<th>Table 2. Economic variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Period between two consultations at respondent’s general practitioner, weeks (average)</td>
</tr>
<tr>
<td>Period between two examinations at out-patients’ clinic, weeks (average)</td>
</tr>
<tr>
<td>Period between two check-ups at out-patients’ clinic, weeks (average)</td>
</tr>
<tr>
<td>Time spent from leaving home, having check-up at out-patients’ clinic, and return home (average)</td>
</tr>
<tr>
<td>Transportation time to and from out-patients’ clinic, minutes average</td>
</tr>
<tr>
<td>Present medical expenditure for prescribed medicine, DKr (average)</td>
</tr>
<tr>
<td>Subsidy to expenditure on prescribed anti-rheumatic drugs (average)</td>
</tr>
<tr>
<td>Present monthly expenditure for drugs not on prescription (average)</td>
</tr>
<tr>
<td>Present monthly expenditure for alternative medicine (average)</td>
</tr>
<tr>
<td>Percentage of respondents requiring time off work to attend out-patients’ clinic</td>
</tr>
<tr>
<td>Percentage of respondents also receiving treatment from their general practitioner</td>
</tr>
<tr>
<td>Percentage of respondents with membership of a private insurance company</td>
</tr>
<tr>
<td>Percentage of respondents holding medical card with no expenditure for prescribed anti-rheumatic drugs</td>
</tr>
<tr>
<td>Means of transport used (1 = car)</td>
</tr>
<tr>
<td>Household’s total gross income per year (DKr, modal value)</td>
</tr>
</tbody>
</table>

n = 115. Modal value describes which category was chosen most often; numbers in brackets under modal value refer to corresponding modal percentages.

<table>
<thead>
<tr>
<th>Table 3. Sociodemographic variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Number of household members (average)</td>
</tr>
<tr>
<td>Respondent’s age (median)</td>
</tr>
<tr>
<td>Respondent’s sex (% women)</td>
</tr>
<tr>
<td>Respondent’s employment status</td>
</tr>
</tbody>
</table>

n = 115.
T 4. Selected bid responses

<table>
<thead>
<tr>
<th>Bid 1</th>
<th>n_i</th>
<th>Probability</th>
<th>Bid 2</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>13</td>
<td>0.85</td>
<td>200</td>
<td>0.70</td>
</tr>
<tr>
<td>No:</td>
<td>2</td>
<td>0.15</td>
<td>No:</td>
<td>2</td>
</tr>
<tr>
<td>800</td>
<td>17</td>
<td>0.53</td>
<td>1600</td>
<td>0.24</td>
</tr>
<tr>
<td>No:</td>
<td>8</td>
<td>0.47</td>
<td>Yes:</td>
<td>1</td>
</tr>
<tr>
<td>1500</td>
<td>15</td>
<td>0.33</td>
<td>3000</td>
<td>0.13</td>
</tr>
<tr>
<td>No:</td>
<td>10</td>
<td>0.67</td>
<td>Yes:</td>
<td>3</td>
</tr>
<tr>
<td>2150</td>
<td>12</td>
<td>0.25</td>
<td>4300</td>
<td>0.08</td>
</tr>
<tr>
<td>No:</td>
<td>9</td>
<td>0.75</td>
<td>Yes:</td>
<td>5</td>
</tr>
<tr>
<td>2500</td>
<td>13</td>
<td>0.23</td>
<td>5000</td>
<td>0.15</td>
</tr>
<tr>
<td>No:</td>
<td>10</td>
<td>0.77</td>
<td>Yes:</td>
<td>2</td>
</tr>
</tbody>
</table>

n_i, numbers in each selected bidding group. Yes, numbers accepting bid; no, numbers not accepting bid.

The estimated WTP values are shown in Table 5 (US$1 is approximately equivalent to DKr7) together with the corresponding standard deviations, confidence intervals and the confidence interval for the difference between the estimates. Since the latter included zero, it is concluded that the marginal WTP estimates were not significantly different.

However, since the contingent ranking cards used values from DKr100 to DKr700 and the closed-ended question format employed bid amounts from DKr100 to DKr2500, resampling was undertaken to determine the implications of the difference in range. The resample consisted of data from respondents who received WTP questions where the bid amount for the first closed-ended question was lower than DKr700. The sample size was 27 observations. The variables employed when considering the whole sample were the same as those used for the estimation process. The result is shown in Table 6.

The closed-ended WTP value was now DKr581 (US$83), i.e. DKr56 lower than before. In addition, the contingent ranking WTP estimate (DKr643 or US$92) was only DKr7 lower than previously. The confidence interval for the difference between estimates included zero, so that the WTP estimates were not significantly different.

Discussion

In the early days of CBA in healthcare, the focus in benefit measurement was on the human capital approach, whereby benefits were deemed to have accrued to a health programme if a life was saved or a person was restored to health, thus providing productivity benefits either in the formal work context or in renewed ability to undertake household activities [19, 21].

CBA in healthcare using the human capital approach fell into disrepute for a number of reasons, one of which was the perceived difficulty of valuing the benefits of medical treatment in monetary terms [3, 24]. Another reason was that in chronic diseases such as those classified as rheumatological, the prime benefits are likely to be those now termed ‘health-related quality of life’ rather than the more narrowly conceived productivity benefits.

The debate on the appropriate valuation of benefits in the 1970s was subsequently conducted mainly in the context of the valuation of life, especially with respect to safety measures, road accidents and the like [e.g. 25]. The upshot of this debate proved to be increased use of WTP techniques involving the aggregation of individual valuations. The WTP approach is firmly rooted in a particular area of economic theory which considers it appropriate to measure social welfare changes using money as the common metric; by asking people their WTP for goods or services we choose to measure their welfare in monetary terms. Since all costs and benefits are measured in monetary terms, programmes can be compared and ranked as appropriate, pointing the way to the efficient allocation of resources in the health sector and the economy more generally. A full theoretical discussion placing WTP in the context of CBA can be found in a recent paper [26].

Interestingly, arthritis is one of the medical fields in which the WTP approach was first applied. In a number of studies, Thompson et al. [27, 28] demonstrated the feasibility of using WTP questions with arthritis patients, provided a number of WTP estimates and discussed the validity of their procedures. The main criticism of these pioneering studies in the field of

<table>
<thead>
<tr>
<th>Method</th>
<th>Estimated marginal willingness to pay for alleviation of symptoms (DKr)</th>
<th>Standard deviation</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-bounded model</td>
<td>637</td>
<td>17.8</td>
<td>602, 672</td>
</tr>
<tr>
<td>Contingent ranking method</td>
<td>650</td>
<td>26.4</td>
<td>598, 702</td>
</tr>
<tr>
<td>95% confidence interval for the difference in the estimates(^1)</td>
<td>–49, 75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)Assuming a covariance of zero.
The use of the contingent ranking method in the health grammes. League tables of cost per QALY have been to use in which context. The inter-relationships between expected that more CUAs will be undertaken.

The counterpart development in economics has been face validity. the outcome measure which, at least in principle, pro-

the (average) actual expenditures on antirheumatic drugs. The magnitude of these measures, especially of the arthritis-speci

If it has sometimes been found in WTP studies that 1940s, and continuing to the present day as workers in

Our major objective in this paper is to reintroduce equitable to allocate more resources to arthritis patients

In principle, then, WTP methods can be adopted for use in CBA. In practice, little work on the economics of arthritis has followed in Thompson’s footsteps. Mention of CBA still indicates that the main framework for benefit evaluation in monetary terms is perceived to be the human capital approach [24, 29]. Meanwhile, however, the number of WTP studies in health economics more generally has increased rapidly [30].

Our major objective in this paper is to reintroduce the WTP method to the arthritis area as a method of valuing benefits which can then be used in CBA appraisals in the area. The study reported in our paper shows that it is indeed feasible to derive WTP estimates, using two methods or approaches—the double-bounded (closed-ended) and contingent ranking models—with arthritis patients. There was a good response rate (67%) and the approach proved acceptable to patients.

The Danish health system is largely tax-financed, with just 18% of health sector expenditure spent privately on drugs, spectacles, dental treatment and hearing aids [31]. It has sometimes been found in WTP studies that patients in such a tax-based system have difficulty in coping with questions concerning their WTP. This was certainly not the case in our study. It should also be noted that our study presents marginal WTP estimates, i.e. estimates in excess of the present monthly expenditure on antirheumatic drugs. The magnitude of these estimates seems eminently reasonable in the context of the (average) actual expenditures on antirheumatic drugs (Table 2). The results can thus be deemed to have face validity.

Moreover, our study pioneers the investigation of the use of the contingent ranking method in the health sector, the results showing that there is no significant difference between the two methods in the WTP estimates obtained.

There is a continuing debate, not least amongst economists, concerning which economic evaluation method to use in which context. The inter-relationships between CEA, CUA and CBA continue to receive attention, as does the precise meaning of these terms [32]. Our study is thus also offered as a contribution to economic evaluation methods in arthritis.

We should note that WTP methodology and its application remain controversial. Although guidelines are available, they should not be regarded as set in stone [33]. One problem lies in the piecemeal approach which considers WTP for programmes in each specific disease/condition. Although there is a common money metric, it has been argued that, because WTP estimates are programme/condition-specific, there may be difficulty in comparing WTP from differently designed studies. This raises questions of efficiency in the allocation of resources across programmes. Equity issues arise when WTP estimates are not controlled in some way for ability to pay, and, even if they are controlled, is it equitable to allocate more resources to arthritis patients should they generate estimates higher than for, say, those for cancer patients?

In addition to the issues just raised, and since there is clearly some unease concerning the use of monetary valuations for health outcomes, we now comment briefly on the alternatives. In arthritis care, outcomes of programmes have largely been assessed not only in terms of changes in clinical variables, but also in terms of changes in functional status. There is a long history of the latter approach, going back to the American Rheumatism Association classification from the late 1940s, and continuing to the present day as workers in the arthritis area have contributed significantly to the development of what are now termed ‘health-related quality of life’ measures [34–36]. One way of optimizing the allocation of resources for programmes within the arthritis field is to use health-related quality of life measures, especially of the arthritis-specific variety, as outcomes in CEA.

The counterpart development in economics has been CUA, which for the most part has used the QALY as the outcome measure which, at least in principle, provides a common metric for comparison across programmes. League tables of cost per QALY have been constructed with the aim of guiding resource use, a development which remains controversial. The thrust of recent recommendations in arthritis has evidently been to concentrate on the measurement and valuation of health-related quality of life [37, 38]. Thus it is to be expected that more CUAs will be undertaken.

Another recent development has been the proposal

<table>
<thead>
<tr>
<th>Method</th>
<th>Estimated marginal willingness to pay for alleviation of symptoms (DKr)</th>
<th>Standard deviation</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-bounded model</td>
<td>581</td>
<td>26.6</td>
<td>529, 633</td>
</tr>
<tr>
<td>Contingent ranking method</td>
<td>643</td>
<td>38.5</td>
<td>568, 718</td>
</tr>
<tr>
<td>95% confidence interval for the difference in the estimates(^1)</td>
<td>—30, 154</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)Assuming a covariance of zero.
for a generic WTP per incremental unit of health-related quality of life benefit (such as a QALY), suitably adjusted for equity purposes, to be applied. Here, WTP would probably be determined using approaches similar to those used for placing values on risks to life in road project analysis in the UK, for example. The development of such an indicator would then permit resource allocation decisions across the spectrum of health programmes, including arthritis [39].

There are alternative economic approaches available to assess arthritis care programmes. There is a lively ongoing debate amongst health economists and health sector evaluators concerning the pros and cons of the WTP approach, accompanied by a considerable amount of empirical work. Our study adds to this body of empirical evidence by showing that it is feasible to undertake WTP studies in arthritis. In our view, CBA should not be abandoned on the grounds that it is not practicable to ask arthritis respondents about their willingness to pay for alternative treatments. We also argue that theoretical controversies concerning the validity of CBA as a way of assessing changes in social welfare should not be used to justify the neglect of this approach in arthritis.

It has been suggested in a number of recent publications in arthritis journals that a major effort be put into undertaking economic appraisals of arthritis programmes which meet acceptable methodological standards. We believe this should include more CBA studies incorporating the WTP methods illustrated in our paper.

Acknowledgements

We are grateful to all the patients who participated in the study, to Peter Junker for his help, and to Nigel Hurst and two anonymous referees for valuable comments.

References

26. Bula MV, Maukopf JA, Wood LL. Willingness to pay as...