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SOCIETAL ASPECTS OF THE DISTRIBUTION OF HEALTH GAINS

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I. INTRODUCTION

Health economics is a relatively new discipline which came to life amidst the economic and social modernisation processes that have taken place in recent decades, as did a number of disciplines in other areas of economics. In public policy analyses and in welfare and public service implementation, the economic approach has been observably upgraded and integrated in public policy decision-making. [Jenei 2005]

These tendencies are even more conspicuous in health care as the rapid development of health-care technologies and the social and demographical processes have brought about significant changes in the socio-economic environment of health-care policies and schemes. Public expectations *vis-à-vis* health-care delivery have soared in developed countries. While the development of medical technology has broadened the options in medical care, aging societies, people's increasingly conscious attitudes, and easier accessibility of information have boosted demands for health-care delivery. These tendencies are likely to lead to cost increases, thus generating a striking tension between technological possibilities, social expectations and economic potential. [Callahan 1990, Eddy 1994]

In Hungary, health economics has been cultivated for only a few years, yet it has made a significant progress. It is incorporated in higher education curricula and also made its appearance in health-care policy decision-making, where the use of the achievements of health economics is endorsed by the institutional and legal environment. [Boncz 2006, Gulácsi 2009]

I.1 Presentation of the initial problem

The scarcity of economic assets may be posed as one of the basic tenets of economics as well as a practical reality. Consequently, only a part of the social demands can be met. Owing to the scarcity of economic assets, it is necessary to set up certain priorities and introduce rationing, on the basis of which it can be decided which targets are to be funded from the available resources, and which are to be denied such funds. Economic issues are gaining bigger scope in the process of resource allocation in health care, and beside the three traditional principles of health policy, i.e. safety, efficacy and quality, cost-effectiveness has become a new factor that is referred to as the so called "fourth hurdle" in the literature. [Gulácsi 2004]

Prioritisation is no novel issue in health care. Ever since medicine has been practised, decisions have had to be brought in one way or another as to which patients are to be treated and which therapies are to be applied. [Ryynänen et al 1999]

Cochrane was the first in the 1970s to set forth the necessity of rationing[1] in a systematic way. [Cochrane 1971] He argued for effectiveness and efficiency in health-care provision, as is expected in view of the scarcity of financial assets and also out of ethical considerations. In light of this, the first step in rationing is the use of health-care technologies (e.g. medicinal products) that bring about a positive effect in the patients' condition and which generate health gain, while the use of inefficient treatments should be abandoned.

The concept of rationing in health care was defined by Williams as a process in the course of which patients are denied certain medical treatments which people otherwise wish to receive and about which there is a general consensus is that they 'do you good'. [Maynard-Bloor 1998] In other words, because of the scarcity of resources, certain therapies have to be ruled out, even though they can generate health gain.

The allocation of resources takes place predominantly along lines or patterns distorted by historical tradition or political considerations, and this leads to a sub-optimal allocation of the scant resources. While health-care reforms follow one after another all over the world, in many places, measuring 'return on investment' is still

[1] The concept of rationing may differ to some degree from its use in other areas of sciences, such as statistics. Rationing here gains meaning in examinations of the compliance of medical treatments to certain criteria. Health care technologies can be rationed, for instance, on the basis of cost efficiency, and poor cost efficiency may justify the rejection of financing a technology from social insurance.

inadequate. The efficiency of reforms remains questionable as long as decision-makers are reluctant to undertake responsibility for the necessity and delivery of prioritisation. Needless to say, prioritisation calls for a clear and systematic approach, which is based preferably on fair scientific evidence, and which takes into account, as well as can harmonise, the views of all the agents affected, and last but not least, which is operational in the often irrational environment of health-care schemes. [Mitton-Donaldson 2003]

Some expect the solution to, or at least the alleviation of, the shortage of resources from Evidence Based Medicine. However, as Sackett explains, Evidence Based Medicine in patient care endorses the most efficient medical interventions which maximise the patient's life span and quality of life. This, however, is likely to increase, rather than decrease, health-care costs. [Sackett et al 1996]

Maynard rounds out the above opinion on two points. On one hand, no due attention is paid in this approach to the patient's right to choose a therapy. On the other hand, in case scientific evidence is regarded as the principal or sole criterion in the allocation of resources, it may lead to significant cost increase, because opportunity costs are ignored. Eliminating inefficient treatments from heath-care practice, however, is undeniably an advantage of the use of scientific evidence, and is conducive to cost reduction. [Maynard-Bloor 1998]

In principle, priority setting in health policy is a systematic decision-making method aimed at allocating the available resources according to needs. Decision-makers have to decide which illnesses, patient groups and medical interventions are to be allocated such resources. In practice, however, priority setting is often performed in an ad hoc and intransparent way. One reason for this is that prioritisation in decision-making is a highly complex, multi-faceted task. [Baltussen-Niessen 2006]

As yet, no universal method or decision-making rule exists which could function in all contexts. As for resource allocation in health care, however, alongside sustainable financing [Kornai 1998], two generally accepted goals can be formulated: 1) health gain maximisation[2] in society in view of the available resources (aspect of efficiency); and 2) reduction of social inequalities that are manifest in health care (aspect of equity). The assertion of these two considerations can be of equal importance. [Hauck et al 2004]

[2] Health gain may be operationalised and measured in several ways, such as life years gain, quality adjusted life year, etc. [Evetovits 2005]

While the reduction of social inequalities manifest in health care is a generally accepted goal, the concept of equity is difficult to capture in practice. Even less clear is the way health-care policies should relate to those measures in which the aspects of efficiency and equity conflict and can only be asserted at one another's expense. Characteristically, this dilemma often does not even surface overtly in professional disputes, and health policy makers refrain from taking stands in the matter, which tends to lead to inconsistent decisions. [Sassi et al 2001]

Priority setting decisions are supported from the side of economics by health economics analyses, in which health consequences and the costs of certain health-care technologies are measured, evaluated and compared, as well as cost-effective health-care technologies are identified. Taking into account cost-effectiveness results is also advocated by the World Bank and the WHO. [Baltussen-Niessen 2006]

Health economic analyses do help explore the most efficient ways of resource distribution. Yet in reality, health policy decisions are often inconsistent with cost-effectiveness results. One possible explanation is that health economic analyses often ignore equity considerations, and it is indifferent who are to gain more health. In other words, the normative basis of health economic analyses is health gain maximisation, and their approach is utilitarian; the social distribution of health gain is ignored and indeed, the viewpoint of distribution itself is disregarded. [Stolk 2005]

With its specific means, health economics tries to address the problem that the value of health services is defined not merely in terms of achievable health gain but also in terms of their social distribution. Wagstaff points out that equity and cost-effectiveness considerations can be combined in case a system of weights conditional on the illnesses, the patients' age, their social and economic condition, etc. is used [Wagstaff 1991] At the same time, such weighting can also shed light on the extent of health loss which society is prepared to sustain in the interest of a more equitable health distribution. Wagstaff also avers that more equitable distribution is possible only at the price of lower average health level. He calls this the 'equity–efficiency trade off', i.e. the exchange between considerations of efficiency and equity. [Wagstaff 1991]

A number of considerations in the social distribution of health gain have been successfully identified, which include the patients' age, their social role, etc. [Nord 1999] These considerations have been widely examined in international studies, however, in many cases the empirical results are contradictory. The uncertainty as to

the intensity of preferences for certain considerations, the willingness of people to set priorities according to the given consideration, or conversely, their refusal of it as a criterion of rationing, prevails.

Despite several open questions as to the direction and intensity of preferences, there is a consensus in literature in that the above factors have a bearing on the social value of health gain, and they play a role in people's preference system even if they are made aware of a partial loss through such decision in the maximum achievable health gain. In view of this, people are likely to expect health policy decision-makers also to uphold such considerations and bring their decisions on resource allocation in line with the value judgment of the society. [Dolan 1998]

I.2 Rationale for the choice of subject and the importance of research

As is apparent from the previous chapter, health economics as a new area of science has made significant contribution to supporting policy decisions and resource allocation in health care. In the course of elaborating new methods and conceptions, however, new solutions and answers have been found as well as new questions have arisen. One such question which, in view the proliferation of health economic analyses, cannot be side-stepped is the system of criteria in the social distribution of health gain – a kind of social value judgement that often runs counter to it, limiting the choice based on benefit maximisation, a central assumption of economic thinking. The practical significance of the issue has been highlighted by analyses of concrete health policy decisions, which establish that such considerations are endorsed in health policy decisions.[3] If decision-makers do indeed aim to increase social welfare, the maximisation at the social level of health gain should be superseded, with respect to the concept of utility, and further value-creating factors related to the social distribution of health gain should be more thoroughly investigated.

Understandably enough, there is a vigorous interest in the international literature in finding modes of creating a balance between social value judgement and economic rationality in decision-making. The significance of the issue is highlighted by the

[3] See, for example, Devlin's analysis of decisions brought in the National Institute of Clinical Excellence (UK). [Devlin 2004]

research project[4] spanning several years that has been recently launched and financed by the European Union in the recent past with the participation of 10 member states and which is aimed at clarifying the methodological problems of the subject. As I have participated in this research project and my earlier works and professional activity also focussed on this area, it was a matter of course for me to carry on further researches on this subject.

With the issues of social distribution coming to the front in health economics, methods for obtaining a wider knowledge of social value judgement – such as preference measurement and attitude studies – gain more and more attention. At the time of writing this dissertation, such researches were, to my knowledge, conducted in Hungary in the area of health economics only by Akkazieva and colleagues [Akkazieva et al 2006], who made a survey of patient preferences for the health-care system reforms.

In my opinion, research in Hungary into the above issues is thus of a novel type both as regards the problematic and the area in which the methods are employed. It is my hope that this dissertation will contribute a small segment to a more thorough exploration of the subject.

I.3 Goals and methods

In my dissertation dealing with the societal aspects of the distribution of health gains I set out two goals.

a) Through a survey of the literature I intend to identify, from both theoretical and empirical angles, those social values and equity aspects which society considers important when distributing health gains among individuals (patients).

b) With my empirical studies – with different methodologies – I conducted two studies with Hungarian medical doctors to investigate the preferences and the opinion of the responders on which factors are considered important and acceptable for the distribution of health gains.

[4] European Value of a Quality Adjusted Life Year (EuroVAQ), http://research.ncl.ac.uk/eurovaq

The subjects of both studies were medical doctors. Other responders, such as the general public, and health policy decision makers, etc. would be a reasonable choice of subjects, too. Understandably, for each responder group we would get answers from a different point of view. I deemed important however to get know the preferences and attitudes of medical doctors for the following reasons:

- Patient level decisions are usually made by medical doctors in the health care system;
- Medical professionals are likely to be the most familiar with this decision making situation, as they are to make such decisions every day.

The subjects of the first empirical study were general practitioners and the study used the method of the discrete choice experiment. The aim of this study was to elicit the preferences for selected characteristics (as prioritization criteria) of the patient and of the disease that were considered to be important in the literature and in medical decision making. The discrete choice experiment that was first used in the field of marketing, is a method for getting know stated preferences and considered to be a choice-based method that is deeply rooted in economic theory. (The method of discrete choice experiment is described in more details in Chapter V.1.2.) Responders are to choose among goods considering different characteristics of the goods simultaneously. In the present study, to elicit preferences for distributional criteria, general practitioners were asked to choose among patients described by different patient and disease characteristics. Responders were told that the choice was necessary because of limited resources.

The second empirical study related to an international research project (EuroVaQ project).[5] This international project aimed to investigate the views and opinion of the general public and health policy decision makers on the relationship and relative importance of health gains derived from rescuing a life, prolongation of life time or the improvement of health related quality of life. Also, the project aimed to study those factors (e.g. age and income of the patient, family background) that are

[5] Further information is available at the official website of the project: http://research.ncl.ac.uk/eurovaq

considered to be important by responders in the allocation of health services and therefore in the allocation of health gains among patients. This survey used the Q-method that serves for the study of subjectivity: it provides insight in personal attitudes, opinions on a given issue. Regarding the way of questioning, the Q-method is more affiliated with qualitative methods; regarding the way of data collection and data analysis however this method is linked up with quantitative techniques. (A more detailed description of the Q-method is given in Chapter V.2.1.) The study in the dissertation adds a new point of view to the international project. As it is assumed that attitudes can be different in different groups, I chose another responder group and made a survey with Hungarian medical doctors.

Both empirical works investigate the societal aspects of the distribution of health gains, but with different methodological approaches. The discrete choice experiment yields quantifiable results on the strength and the directions of preferences, but because of the limitations of the method it is not able to study all the potential factors – i.e. attributes - in one experiment. The number of investigated attributes (i.e. the characteristics of the goods) has to be narrowed to 6-10 attributes as responders are not able to consider more of then jointly. On the contrary, the Q-method is able to identify families of opinions, i.e. to describe and distinguish between similar and different opinions but does not provide quantifiable outputs. One of its advantages however that distributional factors can be studied in the broadest possible circle. As the subjects and the methods of the two studies were different, I aim to investigate the main question from two perspectives but there is no way for the direct comparison of the results.

I must emphasize at this point, that it was not my intention to deal with related ethical or philosophical issues in a systematic way. I do not touch upon the question of how to aggregate the individual preferences in the social welfare function so to maximize the social benefit. In my opinion, addressing of these issues would deserve dealing with separate dissertations.

I.4 The structure of the dissertation

I set out two goals in my paper on the social aspects of the distribution of health gains, and accordingly I built up its structure to serve the realisation of these goals.

After a summary of the research, in Chapter II., I offer a brief description of the types of analysis employed in health economics and of the theoretical conception of quality adjusted life year (QALY), which is currently the most widely accepted central measure of health consequences and a source of the problems of distribution discussed in this study. In this chapter I also introduce the theoretical and practical contribution which health economic analyses (especially cost-utility analysis based on QALY) make toward decisions on resource allocation. After a review of the economic analyses, I give a brief description of examples from two countries, in order to illustrate the kind of factors which limit the usability of these analyses in decision-making. One example is that of the United Kingdom, the country where health economics was a pioneering branch of study both as regards theory and the practical use of results. The other example is that of Hungary, where the practical importance of health economic analyses are shown through a research I conducted earlier.

In Chapter III., I offer a literature-based summary of those social and equity considerations which question the relevance of the utilitarian approach to analyses, and highlight the importance of social value judgment. The literature review includes theoretical issues and summarizes the most important results of several international studies in the field.

In Chapter IV, the fundamental questions and hypotheses of the research are posed. I aim to support the first two hypotheses with the help of a preference elicitation study conducted among general practitioners. In order to answer hypotheses 3, I conducted an examination of the attitudes among medical doctors.

After the literature review and the hypothesis, I describe the empirical researches I carried out in Chapter V. As the dissertation consists of two empirical studies, for the sake of perspicuity and an easier follow, I describe these studies separately. Description of both empirical works follows the logic below:

- general, theoretical description of the research method, and the rationale for the choice of the method;

- current application of the method in the research of my own (study design, subjects, data collection, data analysis, etc.);
- presentation of the results;
- discussion of the results;
- limitations of the research.

Finally, in Chapter VI, I give a summary of the most important results of my researches and make proposals for further research as well as for the practical utilisation of such researches.

II. HEALTH ECONOMICS IN RESOURCE ALLOCATION

II.1 Health economic analyses

Scarce resources in health care force resource allocation decisions, i.e. to choose between alternative technologies (e.g. drugs, prevention programmes, medical aidances, and medical procedures) in health care. The aims of health economic analyses are 1) to find those contesting alternatives that are relevant for comparison and subject to decision making; 2) to define the relevant perspective of the analysis (e.g. health insurer, society); 3) to decrease the uncertainty of the decision. Health economic analyses can take different forms, but two criteria should always be satisfied: 1) inputs as well as outputs should be taken into consideration in the analyses, i.e. both cost and health consequences should be analyzed; 2) the analysis needs to be comparative, i.e. at least two interventions should be considered to choose from. The explicit criteria of choices of this sort (i.e. the criteria of resource allocation) are pursued by health economic analyses.[Drummond 2001]

Classification of health economic analyses is based on the type of outcome measure the analysis uses.[6] *Cost-minimization analysis* (CMA) is considered when the contesting interventions are proved to be generating the same health benefits. In this case it might be sufficient to analyse and compare the cost side only. *Cost-effectiveness analysis* (CEA) uses natural units for the measurement of health benefits: e.g. life-years gained, blood pressure. As a consequence, CEA is suitable for the comparison of those health technologies which measure the health outcome with the same natural units. The special outcome measure of the *cost-utility analysis* (CUA) is the quality adjusted life year (QALY). QALY combines health gains from improved life time and health related quality of life, and is considered to be a general outcome measure suitable for the comparison of different health technologies. Finally, the *cost-benefit analysis* (CBA) measures health benefits in money terms. Theoretically, this is the type of analysis that is able to compare any technologies; however it has not become the standard one in health economics because the valuation of human life in money is not without difficulties. [Gulácsi 2005]

[6] More and more health economic analyses of different types are made in Hunagry as well. See e.g. [Boncz 2003, Péntek 2008]

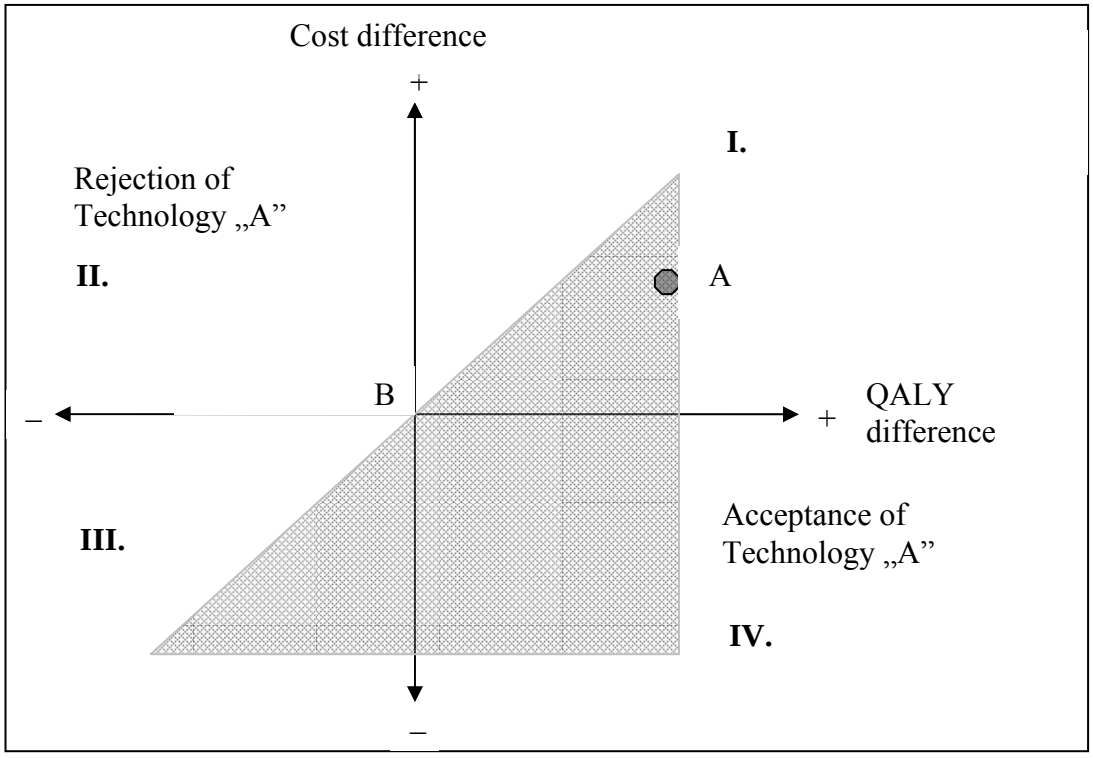
For our purposes it is the CUA that is of importance.[7] Recently, CUA has been widely used and several guidelines on health economic analyses prefer this sort of analysis. The Hungarian guideline also mentions CUA as the most preferable analysis in the health economic submission dossiers [Egészségügyi Minisztérium 2002]. As health economic analyses are comparative, the results are expressed with the *incremental cost-effectiveness ratio* (ICER). In the case of cost-utility analyses the ICER for technology A and technology B takes the following form:

$$ICER = \frac{Cost_A - Cost_B}{QALY_A - QALY_B}$$

A technology is considered to be cost-effective if it generates 1 unit of health gain with less cost than the other one. Using the incremental cost-effectiveness ratio, the technologies (Technology B at the origin) can be presented in the cost-effectiveness plane (Figure 1). Depending on the place of Technology A in the plane, different decisions can be made.

[7] For more details on health economic analyses see e.g.: [Drummond 2001, Gulácsi 2005]

Figure 1 The cost-effectiveness plane



Technologies in quarter IV should be accepted, while technologies in quarter II should be rejected. The decision about those technologies that are in quarter I or III is not straightforward. In the first case, Technology „A” generates more QALY than the other one, but costs more, too. Regarding quarter III, Technology „A” is less costly, but at the same time it results in less QALY than the comparator technology.

Hereinabove I briefly described the types of health economic analyses. In the following chapters, I will focus on the use of the cost-utility analysis. Health benefit is measured by QALYs in the CUA, and the research question of this dissertation is closely related to the criticism of the QALY concept.

II.2 The concept of the quality adjusted life year

Representatives of welfare economics usually recommend the use of cost-benefit analyses for decision making in the allocation of public sources. CBA measures the cost and benefits of alternative programmes in money terms and the decision criterion is based on the sign of the net benefit. CBA pursue to maximize the sum of welfare, and from a theoretical point of view this is the only method able to express

the absolute benefits of different programmes. In health economics, however, it has not gained ground as several issues in ethics and methodology have arisen when human life is valued in money. Consequently, new output measures (e.g. QALY) were developed in health economics. [Dolan 2002]

In the QALY concept (used by cost-utility analyses), only the health gain is captured, that is why the CBA and not the CUA would be preferred in welfare economics. To solve this theoretical problem, however, no bridging solution has been found yet. [Dolan 2002]

After all, it is the CUA that is widely spread in health economics. The QALY, as a measure of health benefit, combines the health gains deriving from reduced morbidity (gain in health related quality of life) and from reduced mortality (gain in life time).[8] [Drummond 2001] The QALY measure is characterized by three properties:

1) The health related quality of life in different health states is given by weights between [0;1], zero belongs to the state of death, 1 refers to perfect health.[9] 2) These weights are based on preferences, i.e. bigger weight is to belong to the more preferred health state. 3) Weight are measured on interval scale.[10]

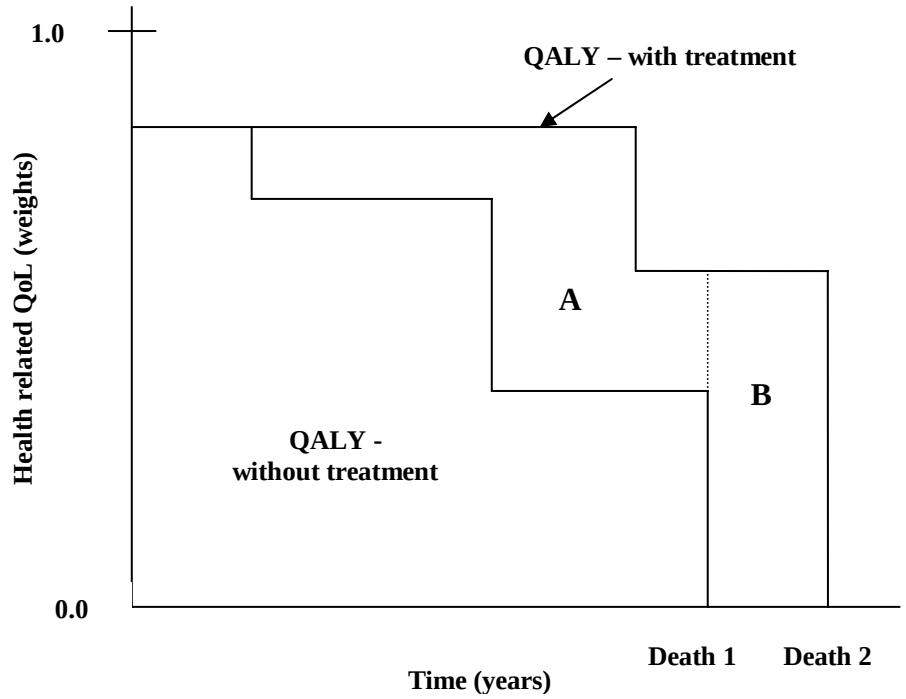
Figure 2 shows an example for the health related quality of life a patient over time with and without medical intervention: under-the-curve areas are to present the available amount of QALY in both cases. The patient is expected to live for a shorter time and in a worse quality of life without intervention. Due to the treatment, the patient experiences an improvement in her quality of life (area „A"), and also, she lives longer (area „B").

[8] The content of the QALY concept was first published by Klarman, although he had not use the „QALY" terminology, yet. [Klarman 1968] Klarman highlighted the importance of quality of life, as he revealed that the health related quality of life of transplanted patients was better than that of patients on kidney dialysis. The term of QALY appeared in the literature some 10 years later in a publication at the Harvard University. [Weinstein 1977]

[9] QALY weights can be derived with different methods (e.g. standard gamble, time-trade-off, visual analogue scale). See e.g. [Drummond 2001]

[10] Interval scale is sufficient as cost-effectiveness analyses always compare two or more technologies, i.e. they calculate the QALY difference of the therapies; and differences can be subject to any mathematical operations. [Drummond 2001]

Figure 2 QALY gain with and without treatment



Source: Drummond, 2001, Figure 6.6.

One QALY equals to one life year in full health.[11] In the cost-utility analysis, based on the criterion of QALY maximization, individual QALY gains are aggregated and maximized in the patient population. The QALY maximisation is here described on the base of Dolan. [Dolan et al 2005]

The simplest case is to assume one individual and no uncertainties. The QALY gain from the treatment of the individual ($QALY_g$) can take the following form:

$$QALY_g = T_1Q_1 - T_0Q_0 \qquad (1)$$

Where Q is the value of the health state (QALY weight), T stands for the number of years spent in the health state, and index 1 and 0 refer to the situation with and without treatment, respectively.

If uncertainty exists, the expected QALY gain for the individual is described with the following formula:

[11] One QALY equals one year in full health but e.g. two years in „half" health (weight = 0,5) amount to one QALY, too.

$$QALY_g = \Sigma_h \Sigma_t p_{1ht} Q_{ht} - \Sigma_h \Sigma_t p_{0ht} Q_{ht} \qquad (2)$$

Where h= 1, …, H (the body of possible health states); t = 1, …T (time periods, the number of subsequent periods amount to time duration T, see Eq. (1)); p_{1ht} and p_{0ht} are the probabilities for the individual to be in health state *h* in time period *t* with and without treatment, respectively. Q_{ht} is the value of health state *h* in time period *t*. In the case of a patient population, individual QALY gains are aggregated and maximized over the population.

Each member of the patient group (i = 1,...,N) is in health state *h* in time period *t* with a probability of p_{hti}. The sum of individual probabilities amounts to $\Sigma^N_{i=1} p_{hti}$, which equals to the expected number of patients in health state *h* in time period *t* in the population: n_{ht}. Following this train of thought, the aggregated QALY gain in the patient population ($QALY_G$) is described as:

$$QALY_G = \Sigma_h \Sigma_t n_{1ht} Q_{ht} - \Sigma_h \Sigma_t n_{0ht} Q_{ht} \qquad (3)$$

Parameters are measured on interval scale and the social value is linear in each element of the formula. This means that the social value of the health gain is determined by the product of the improvement in health related quality of life, the gain in life time and of the number of patients, consequently, the distribution of health gains among the individuals do not play a role. The model assumes that $Q_{hti} = Q_{htj}$ ($j \neq i$), i.e. to be in health state *h* in time period *t* carries the same value for each individual in the QALY maximization, independently of who the patient is. This assumption is a limiting one and the question arises whether other issues (e.g. the age of the patient) affect the social value of the health gain. [Dolen et al 2005]

II.3 Theory of ranking based on health economic results

As it was mentioned before, CUA is more preferred by decision makers in reimbursement and coverage decisions than CBA that is more difficult to interpret

and is usually based on the method of willingness-to-pay (WTP). [Cookson 2003] Using the results of cost-utility analyses in coverage decisions and resource allocation, however, means that some money value is finally attached to the health gain (e.g. QALY gain). The decision maker is to decide if the technology has an acceptable cost-effectiveness or not, i.e. whether the technology generates 1 QALY gain at an acceptable cost level or not. This issue of decision making led to the concept of the *cost-effectiveness threshold* (or financing threshold).

Theoretically, the cost-effectiveness threshold is the point where the value of marginal benefits equal to the value of marginal sources. In general, there are two approaches to derive and use the threshold; hence there exist two decision rules. Both approaches are based on the assumption that there exists a so called „league table" of the health technologies. In the field of health economics, the league table – assuming perfect information – is a list that contains all the potentially available health technologies and ranks those according to their cost-effectiveness. The technology with the most favourable cost-effectiveness stands at top of the list, and the one with the least favourable cost effectiveness takes place at the bottom of the list.[12] Assuming, that such a list is available, the approach to the financing threshold can be the following [Benedict 2005]:

> **Approach I.:** A fixed, externally determined health care budget represents the willingness to pay of the society for health care services. This budget is to be allocated among different health care programmes; sources are first allocated to the programme at the top of the league table with the most favourable cost-effectiveness, then for the next ones in the list, etc. Allocation mechanism stops when the budget is consumed. The ICER of the last technology – i.e. the technology with the least favourable cost-effectiveness but still financed from the budget - represents the shadow price for the budget. If the size of the budget truly reflects the society's preference for

[12] The main goal of league tables is to enhance the efficiency of the health care sector, and to maximize health benefits with the available resources. Currently, league tables have not proved to be much of a help to achieve this goal. For more details on the concept and the criticism of league tables see e.g. [Nord 1993, Gold et al 1996, Mauskopf et al 2003, Hutubessy et al 2001].

health care, this shadow price equals to the marginal value of one unit health gain (of 1 QALY).

If all health technologies are ranked in the table, this allocation mechanism would result in the most health gain at the level of the population. However, the creation of a complete league table seems to be an infeasible task. [Mauskopf 2003]

Approach II.: A fixed, externally determined price represents the societal value of unit of health gain (of 1 QALY). Health technologies with an incremental cost-effectiveness ratio bigger than this price would not be financed, and technologies with an ICER below this price would be covered. The decision rule is whether the ICER of the technology is above or below this price (the threshold). All those technologies that have a favourable ICER will determine the size of the budget necessary for the coverage of all these technologies.

An example for the use of Approach II when the cost-effectiveness ratio of a new technology is compared to the cost-effectiveness of another one widely used. It is also possible to determine an absolute value for the threshold (e.g. 30 000 GBP/QALY). In this case the cost-effectiveness of the technology is compared to this reference point, and this is the basement to decide if the technology is of good value for money or not. [Mauskopf 2003] The two examples above suggest that recently Approach II seems to be a more pragmatic one, as it is applicable without a complete league table.

Determination of the financing threshold may play a significant role in the long term sustainability of the health care systems. The aim of the threshold is to attach a value in money to health benefits and so to provide a reference point to decide which technology is of good value for money and is worth financing. If health care markets functioned in a perfect way, than it would be sufficient to observe the evaluation of the market. If it is not so – health care markets usually suffer from different market failures – other methods are needed to retrieve this value. Here is it worth mentioning, that based on theoretical considerations, such a societal financing threshold would be consistent with health economic analyses taking a societal perspective; this is however is not a

requirement in many countries. [Benedict 2005] From a normative perspective, it is the societal preference that should determine the provision of health care services, because this is the perspective that incorporates equity considerations. In most of the health economic analyses, however, it is the individual's preference for health gain that is measured, and the implicit assumption is made that this sort of evidence provides sufficient information for decision makers. [Gyrd-Hansen 2003]

Different methods are available for the determination of the financing threshold[13]; and each of them may result in different values even in the same context. Benedict identified the following methods: expert opinion, value of statistical life, human capital method, revealed preference method, stated preference method (e.g. willingness-to-pay), analyses of decisions in the past. It is worth noting however, that in those health care systems, where some financing threshold is used, it is difficult to see how these thresholds were calculated. It seems that these thresholds are more or less the results of some kind of arbitrary decisions based on financing decisions in the past or on a presumed value of the society's willingness to pay for health care programmes and services. [Benedict 2005] Nevertheless, developed countries aim to attach an explicit or implicit money value to the QALY gain, and the financing threshold is an issue in coverage and reimbursement decisions. [Brandtmüller et al 2005]

Neumann et al. made a study on the use of thresholds. They reviewed 228 CUAs published between 1976-1997 and found that 38% of the CUAs compared their results to explicit financing thresholds. [Neumann et al 2000] We can assume that nowadays thresholds are even more frequently used. On one hand, it is likely that a number of the CUAs created for submission purposes were/are not published, on the other hand, the concept of the financing threshold is a hotter issue in many health care systems, than it was during the previous decades.

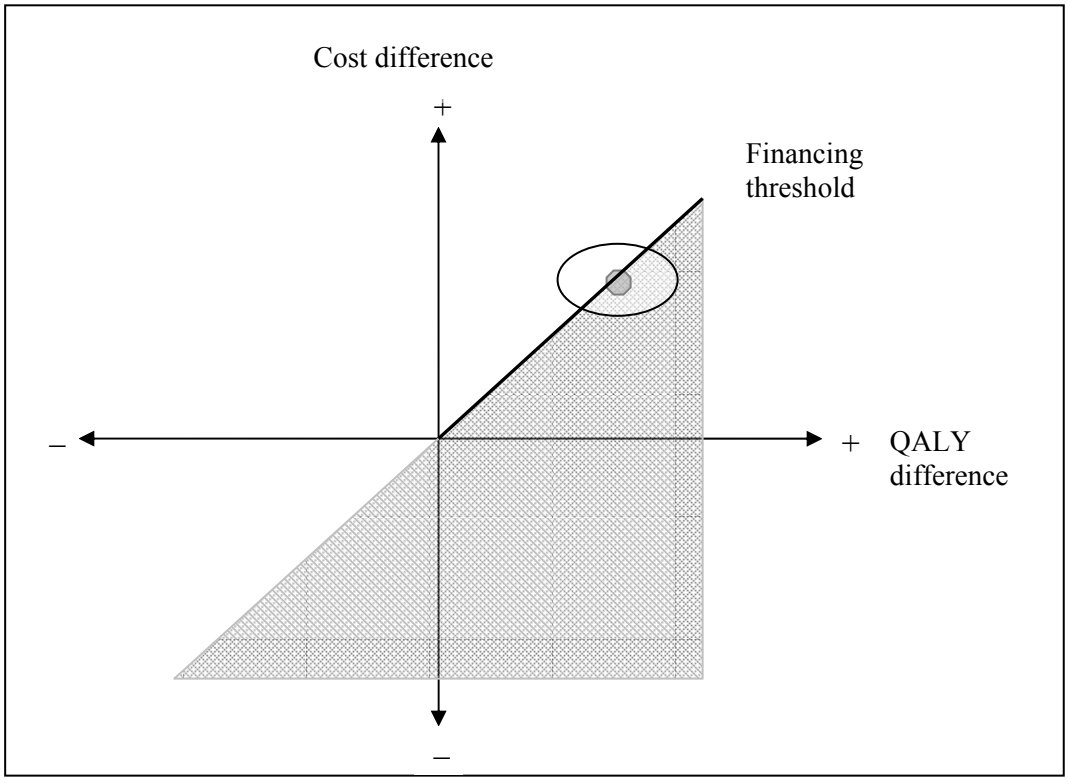
In chapter II.3.1. I will give a theoretical overview on the potential use of financing thresholds in decision making.

[13] Here, I limit myself to list the possible methods of defining a threshold. On one hand, the research question of this dissertation does not link directly to the calculation of the financing threshold, on the other hand, each method is widely discussed in the literature.

II.3.1 Financing threshold in the cost-effectiveness plane

The cost-effectiveness plane can be used to present the relationship of a health technology and the financing threshold. A technology may be above or below the threshold, or can be around the threshold. This latter case is shown on Figure 3 The incremental cost-effectiveness ratio of a technology is usually presented with an elliptical area around the point estimate, to demonstrate the uncertainty of the ICER; costs and benefits always carry some degree of uncertainty in health economic analyses. Uncertainties may derive from methodological issues, from data used in the analyses, and assumptions made in health economic models. Also, another potential source of uncertainty may be the subjective interpretation or presentation of the results of the health economic analyses. [Briggs 1999]

Figure 3 Technology on the financing threshold

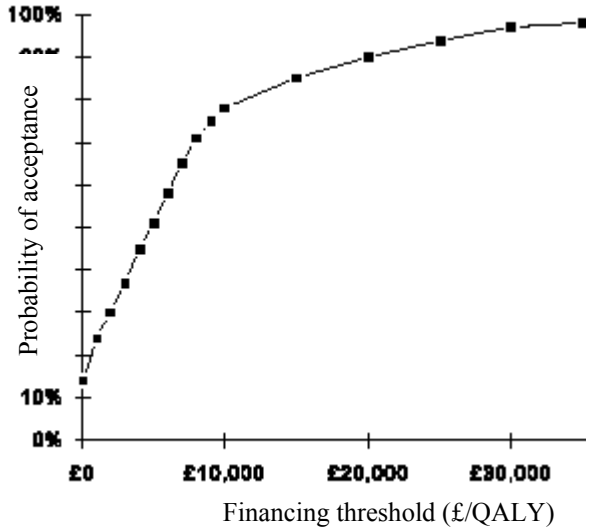


It is important for decision makers to get know the probability with which the ICER of a technology is under the threshold, that is why it is a requirement in health economic analyses to explicitly show the uncertainties in the results.[14] Therefore, the

[14] Deterministic and stochastic methods of sensitivity analyses are available to show this uncertainty.

cost-effectiveness acceptability curve was developed to present the uncertainty in the cost-effectiveness of a health technology (Figure 4). The curve shows the probability that the ICER of a technology is under the threshold for different threshold values. As the acceptable threshold increases so increases the probability that the ICER of the technology is under this value, and can be accepted by the decision makers. [Fenwick 2001]

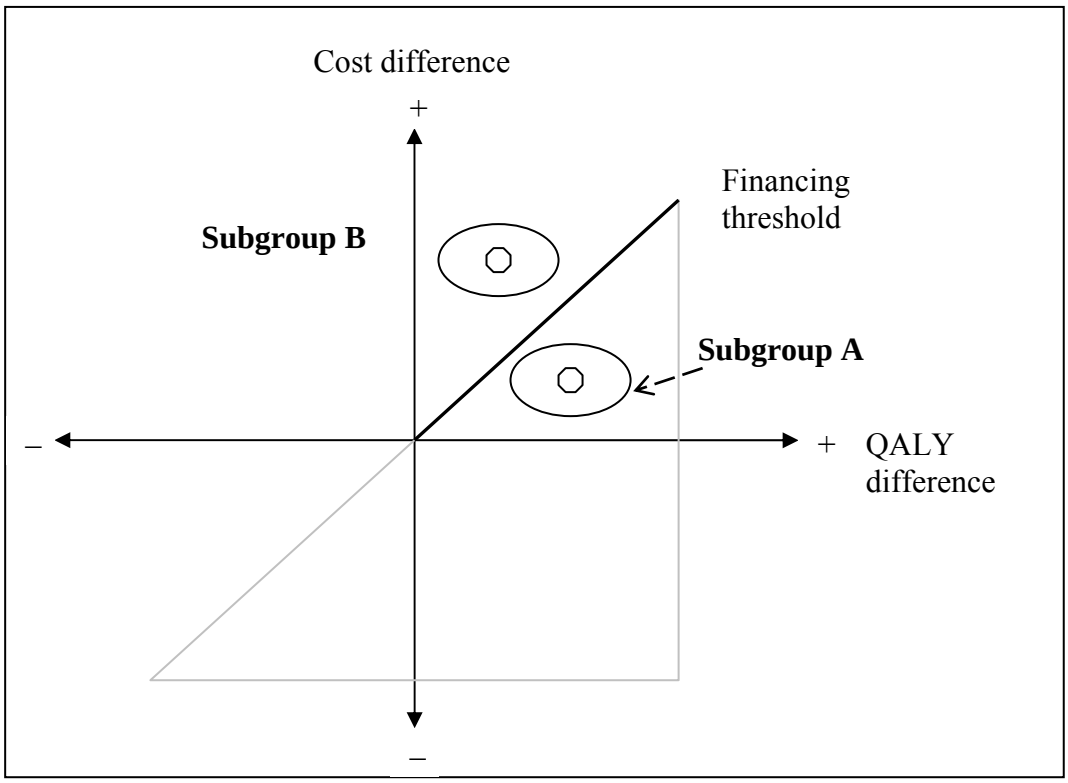
Figure 4 Standard cost-effectiveness acceptability curve



Source: Fenwick, 2001

Figure 5 shows the case when there exist two subgroups of the patients and the cost-effectiveness of the technology is significantly different in the two groups. The cost-effectiveness is favourable for group „A", but it is not for group „B".

Figure 5 Financing threshold in the case of two subgroups of patients



The situation on Figure 5 arises a particular issue for financing and reimbursement decisions and for the health policy. Is it acceptable to leave group „A" without treatment because for some reason (e.g. age of the patient, severity of the disease, co-morbidities) the cost effectiveness of the technology is unfavourable in the group?

A number of examples of this situation can be found in health policy decisions. A number of technologies are eligible only for a well-determined subgroup of patients. Beyond the cost-effectiveness of the technology, of course, there are other factors playing a role in these decisions: e.g. the technology is recommended only for patients with high risk, for those who did not react on or do not tolerate other therapies. Also, it is possible that the technology is not recommended as a first-line therapy or its use is conditioned on medical parameters.[15]

The next chapter gives the example of the United Kingdom for the use of the financing threshold in real life decision making. United Kingdom was chosen because it is one of those countries that is in an advanced phase of making health economic analysis and using their results in policy decisions. Chapter XX will

[15] See e.g. the therapeutic recommendations by the National Institute of Clinical Excellence in the United Kingdom. (www.nice.org.uk)

summarize the results of a previous case study of mine. This case study intended to give a picture on the use of health economic analyses in the Hungarian coverage policy and to see whether this sort of information are available for decision makers.

II.4 The use of health economic results in decision making – UK

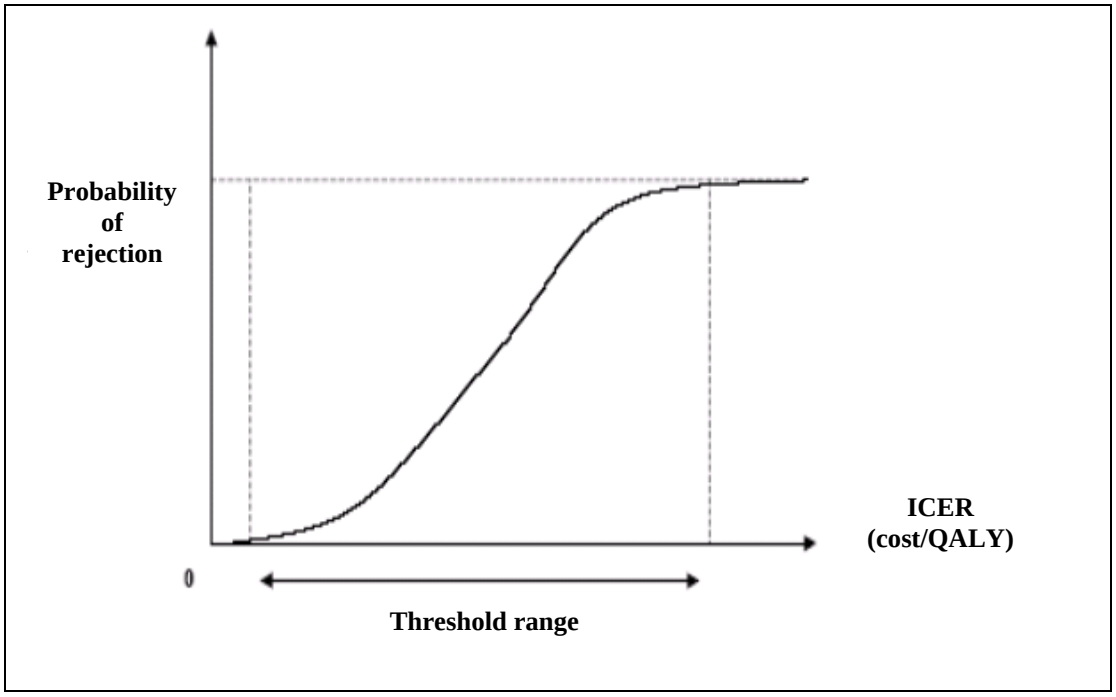
The majority of the developed countries have established institutions for health economics or health technology assessment. These institutions are to support health care decision making and several of them intend to define and use a financing threshold. In Hungary – and probably internationally, as well – one of the most acknowledged institutions is the NICE[16] (National Institute of Clinical Excellence, United Kingdom) with its well-developed and transparent decision making processes and with a great number of recommendations publicly available. The accepted financing threshold in the UK is app. between £20-30.000/QALY; in case of a higher cost-effectiveness ratio important considerations should emerge for the recommendation of the technology. [Gulácsi 2005]

The use of the financing threshold was investigated by Devlin [Devlin 2004] through the analysis of the NICE's activities and decisions. Devlin was interested in those factors that play a role in the NICE's decisions and the way these considerations (e.g. equity) balanced with the requirement of cost-effectiveness.

Assuming a single financing threshold the decision rule suggested that the recommendation or the rejection of a technology depends solely on whether the ICER is under or above this threshold representing the shadow-price of the budget constraint or the willingness-to-pay for health improvement in the society. In practice, however, it is not so easy to establish this threshold as several factors come into play and a single threshold is not sufficient. A low and a high threshold value are likely to exist: below the low value the technology is accepted, beyond the high value it is rejected. In the range of these values, however, only the probability of the rejection can be estimated (Figure 6). Between the lower and the upper limit the probability of the rejection depends on other factors that might counterbalance the cost-effectiveness considerations. [Devlin 2004]

[16] The NICE was established in 1999 to make recommendations on the use of health technologies for the National Health Service. (www.nice.org.uk)

Figure 6 Probabilistic approach of the financing threshold



Source: Devlin, 2004, Figure 2.

Equity is one of these considerations in the NICE's activity, although the factors it covers are less clear. One equity issue for the NHS is the access to care for patients independently of their ability to pay (health care services are financed through taxes). Another issue is the equal access to care in every geographical location. Beside income and location other factors like age, gender, ethnicity, etc. could also be important dimensions of equity, however, the NICE has no authority to make difference between patients based on these. [NICE 2005]

Although societal groups cannot be subjects to decision making, patient groups are frequently taken into consideration. NICE is likely to treat differently those technologies that serve for the treatment of very rare diseases[17]. Also, the initial health status of the patient (bad quality of life, poor prognosis) and the size of the relevant patient population can be of utmost importance. [Devlin 2004]

A further challenge to define a single threshold is that along with clinical efficacy and cost-effectiveness of the technology its budget impact is also taken into

[17] Orphan drugs are developed for the treatment of rare diseases. Their return is usually less favourable. Diseases with a prevalence of 1/ 50 000 or less are considered to be very rare in the UK. [NICE 2005]

consideration in the NICE's decisions. As the disposable budget of the NHS has been increasing, the context of the use of the threshold has been changing, too. [Devlin 2004]

The uncertainty around the evidences is also a difficulty in establishing a threshold. Assuming two technologies with the same cost-effectiveness ratio the technology carrying less uncertainty is more likely to be accepted by a risk-averse decision maker. [O'Brien 2002]

In summary, a financing threshold is proposed that is able to capture both the societal views and the financial considerations. An absolute value does not exist, however, because there is no empirical basement of such a threshold and there can always be situations when health policy has other priorities than cost-effectiveness. Therefore, instead of the rigorous application of a single and artificial financing threshold, the case-by-case assessment of health technologies is still suggested. Hence, the assessment of health technologies still comprises of two stages. [Rawlins 2004] This also means that coverage decisions should not be solely based on cost-effectiveness results but being aware of them. [Maynard 2004]

A study carried out in our research group shows how flexible the NICE applied the threshold in its recommendations: the cost-effectiveness of recommended technologies ranged on a wide scale. This is probably due to those considerations that were placed before the threshold criteria by the decision makers. This study was based partly on the results by Towse [Towse 2002] and we reviewed the HTA monographs (drugs only) published by the NICE between January 2004 and August 2005 looking for the ICERs of the recommended technologies. [Brandtmüller et al 2005]

Most of the technologies can be characterized by more than one cost-effectiveness ratios due to subgroup analyses, different comparator technologies and sensitivity analyses (the range of ICERs of a technology is very informative for the decision makers).

The tornado diagram in Appendix 2 is based on the lowest and highest cost-effectiveness values published in the monographs showing the expansion of these values for each technology.[18] The cost-effectiveness ratios of recommended technologies show a significant diversity: they range from the negative values of

[18] Cost per QALY was not available for each technology, in some cases other measures (e.g. cost per life year gained) were reported.

sensitivity analyses [19] to 220.000£/QALY. This suggests that the threshold of 20 - 30.000£/QALY is more of a reference point guiding the decision makers than an absolute financing threshold.

II.5 Drug coverage decisions in Hungary

My thesis was inspired by the results of one of my previous researches. [Brandtmüller et al 2006] In 2005 our research group made a study for the Financing Ministry in which we summarized the international experiences on the use of health economics analyses in decision making. Later I carried out a small scale study in Hungary about the availability of health economics evidences and their use in drug reimbursement decisions. (In 2005 pharmaceuticals were the only technologies for which coverage policy was regulated and the submission of health economics evidences were required.)

In this case study the submission dossier of 25 new original drugs were reviewed (from the 2. half of 2004 and year 2005) to investigate if these dossiers submitted to the National Health Insurance Fund Administration (NHIFA) contained relevant information in health economics. I was also interested in the aspects the decision makers took into consideration and the reasoning behind the approval or the rejection of a drug. Those documents available at the NHIFA were reviewed that the decision makers themselves used as input for their decisions:

- the reimbursement application by the pharmaceutical company;
- the recommendation of the ESKI[20] Technology Assessment Bureau,
- the opinion of colleges of medical professionals;
- the recommendation of the Technology Assessment Committee[21].

In these documents I was looking for the availability of the following pieces of information:

1) in case of a positive decision, the approved reimbursement category was the same as the one the pharmaceutical company asked for;

2) health economics evidences;

3) the size of the relevant patient population (2nd year after the coverage decision);

[19] The ICER becomes negative e.g. when positive health gain and cost saving are achieved at the same time.

[20] Egészségügyi Stratégiai Kutatóintézet (National Institute for Strategic Health Research)

[21] In Hungarian: Technológia Értékelő Bizottság

4) annual budget impact expected in the 2nd year of coverage;
5) motivation for a positive or negative coverage decision in the NHIFA's degree.

We found that the reimbursement category asked by the company was accepted in 18 cases. 2 drugs wre not accepted for being part of the „special budget" (means central acquisition by the NHIFA and central allocation of the drug among a limited number of providers under rigorous administration) for the following reasons: 1) clinical evidences were not convincing that time and guidelines had not mentioned the potential role of the drug; 2) preliminary health policy decision was considered to be needed.
Further 2 medications got lower reimbursement rate than asked for in the submission dossier because 1) the new drug did not belong to the baseline therapy of the given disease, 2) the drug was not significantly better than the comparator therapy and the daily therapeutic cost of the new drug was also higher. Additional 3 drugs were rejected because some point of the submission was against the regulations of the coverage policy.
The reasoning of coverage decisions (in the NHIFA's degree) focused on clinical considerations and the impact of the drug on health. The most frequent types of statements were as follows:

- proved efficacy/better efficacy of the drug;
- favourable effect on quality of life (e.g. less adverse event, easier administration, therapy available at home for the patient);
- the drug provides therapy for those patients who did not tolerate/react to therapies previously available;
- widening of the range of available therapies;
- significant improvement in survival is expected;
- clinical efficacy is proved also in patients with poor prognosis;
- the disease treated by the drug is of public health importance;

Notions on the favourable / unfavourable cost consequences or about the cost-effectiveness of the drug were found only a few times.
Regarding the size of the eligible patient population in Hungary, there were no data or estimation available in 4 cases. There were 9 cases when the parties agreed on the estimated number of patients. In 12 cases, the ESKI did not accept the estimated

patient number provided by the pharmaceutical company because they did not find the source of the estimation. The ESKI gave its own estimation only in 2 cases.
Imperfect information on the size of the patient population entails that is not easy to assess the expected budget impact of a treatment. This is reflected by the fact that in 16 cases there was no budget impact analysis in the documentation.
In general, we found that there were hardly any health economics data available in the dossiers. Both the industrial parties and the ESKI provided data on therapeutic costs but – based on the statements of the ESKI – in 23 cases the companies did not submit a Hungary-specific cost-effectiveness analysis that properly followed the Hungarian guideline on health economics analyses (issued by the Ministry of Health). Even if the companies submitted health economic analyses usually those presented international results and Hungarian adaptation was not carried out. Hence, it was not possible to ascertain the cost-effectiveness of the drugs. Out of the 23 cases, the ESKI did not require a cost-effectiveness analysis in 2 cases because the submissions related to orphan drugs. In 1 case data sources were missing and model assumptions were questionable in the Hungarian model. In another case the new drug was cheaper than the reimbursed one, so the cost-minimization approach was accepted. For those 2 submissions when Hungarian health economics evidences were available the findings of these analyses were taken into consideration in the coverage decision.

This case study shows that the availability of information on the cost-effectiveness of a drug, the size of the relevant patient population and the budget impact of a new drug was rather limited in Hungary in 2005. Coverage decisions were made along with a shortage of information, although requirements of a reimbursement application are legally regulated. Also, applications are aided by the Hungarian health economics guideline in which QALYs considered being the accepted and most recommended measure of health benefits.
At the time of this cases study, of course, existed different „techniques" to bridge this information gap (e.g. price-volume agreements between the industry and the NHIFA) and to ensure that the NHIFA would not overspend its drug budget. However, these agreements are and were mainly motivated by financial considerations and - to my opinion - are not able to substitute rationing decisions in health care or the methods

of priority setting. Also, these arrangements do not enhance the transparency of coverage decisions.

The English and the Hungarian examples above show two things. On the one hand, the availability of health economics evidences are limited in Hungary, although developments in the legislation moved to the direction of improving in this field. (I assume that a repeating of our case study would give a better picture by now.) On the other hand, it should be noted, that even in those countries where the method and the use of health economics analyses are much more advanced and where the scientific knowledge and skills are available in abundance, the results of health economics analyses are only one input for the decision making. Decision makers always consider aspects that are beyond the scope of cost-effectiveness and the favourable or unfavourable cost-effectiveness of a technology does not lead to positive or negative decision automatically.

III. EQUITY CONSIDERATIONS IN HEALTH DISTRIBUTION

This subchapter is built up along two guide-lines. The empirical research in the thesis focuses on the identification of social values at play in the distribution of health gain. An essential part of the empirical work is therefore to give a survey of considerations that have so far been identified in health economic literature and health economic analyses as well as of the observations made in the literature about their importance and role. On the other hand, however, these considerations are born out of various justice theories familiar from philosophy and economics. It is therefore expedient to begin discussion of the subject by offering a brief, systematic survey of these theories. The theoretical survey is justified by another point. The use of certain terms differs in economics and in health economics, which calls for a precise definition of the concepts relevant to the thesis.

III.1 Justice theories in economics

Justice theories are summed up here on the basis of Konow's work[22]. [Konow 2003] Justice theories can in general be divided into two major groups. *Distributive justice* is concerned with the justice of the ultimate distribution of goods, of the outcome (e.g. utilitarianism). *Procedural justice* examines the fairness of the distributive process itself, on the assumption that the outcome of a fair process will also be fair (e.g. social contract theories). Konow classifies justice theories in three categories, as shown in Table 1 below.

[22] Konow mentions several empirical studies on justice theories, and describes certain justice theories and their criticism in more detail. In this thesis my aim is to give a systemic outline of these theories without discussing them in detail. Those interested will find a good number of references to literature in Konow's paper.

Table 1 Overview of justice theories

Category	Basic principle	Theories[23]
1 Equality and need	Need	- Egalitarianism - Social contract theories (Rawls)
2 Utilitarianism and welfare economics	Efficiency	- Utilitarianism - Pareto Principles - Absence of envy
3 Equity and desert	Equity	- Desert theory - Equity

The theories in the category 'Equality and need' emphasize the well-being of the underprivileged members of society. The principle of need covers an aspiration to satisfy certain basic human needs of all people, even if the individual is unable to do so from his/her own resources. The principle of need prevails as long as basic needs remain unsatisfied; beyond them, however, other criteria of distribution (e.g. efficiency) may come to the fore. The theory of egalitarianism is concerned with the outcome and interprets fairness as an equal share of goods by all. Both macro and micro-level studies have demonstrated that society in general does not favour equal distribution of goods; egalitarianism gains more significance in the broader sense of 'treating equals equally'. According to Rawls' theory, in the original position (in which members of the society are ignorant of their social and financial situation as well as of their individual capabilities), society is prepared to accept two justice principles as guidelines for a basic social arrangement. One principle is the *equality* of rights and opportunities, the other (the difference principle) is known as the *maximin* rule, according to which all social primary goods (rights, opportunity, income etc.) are to be distributed equally, unless an unequal distribution is to the advantage of the least favoured.

Utilitarianism and welfare economics are based on consequentialist ethics and assume that people value outcomes that appear at the social and not just the individual level. According to these theories, the efficiency principle – the maximisation of surplus welfare – is not at odds with justice, it is indeed a type of justice. Utilitarianism advances choices which yield maximum social utility in all cases. Accordingly, resources should be allocated first to the person who derives the greatest marginal utility. This implies that individual utility can be cardinally

[23] The list of theories in the given categories is incomplete.

measurable and interpersonally comparable, and that aggregated individual utilities add up to social utility. As to the question what should be used as the measure of fair allocation, answers vary from physically allocable units, such as money and other goods, to derived values, such as happiness, joy, health and satisfaction. In contrast to utilitarianism, the Pareto Principle does not call for a strong cardinality and comparability, and endorses all changes that make someone better off without rendering others the worse off. The simplest form of fair allocation in welfare economics is the lack of envy for anyone else's position. However, several critics have pointed out that the presence or absence of envy cannot necessarily be brought into correlation with fairness as commonly perceived by people. This is because the examination of outcomes alone is insufficient; in judging fairness, due attention must also be paid to the process by which the outcome is attained.[24] The next category of justice theories concentrate on the process by which outcomes are generated.

Equity and desert as the common thread of justice theories are based on the idea that fair allocation is inseparable from the individual's activity in which the allocation is made. One of the best-known theories based on individual merit is Buchanan's. [Buchanan 1986] In his view, claims for the distribution of goods are determined by four factors: luck, individual choice, individual efforts, and birth. Others argue, however, that differences stemming from birth, luck or choice are unfair, and only those attributable to individual efforts are fair. Those who make greater efforts obtain more desert, which is to be appreciated; other factors, however, such as intelligence, physical skills, etc. are irrelevant. 'Reward' should be equal for those who get equal desert. The question can naturally be taken further. Dworkin differentiates between *option luck* and *brute luck*. Option luck resembles gambling: the individual is aware through his or her decision that the outcome may be good or bad and they have to face the consequences. Brute luck, however, is incalculable as far as the individual is concerned, who should therefore be relieved of its consequences. In light of the above, desert theory professes to the relevance of individual efforts and choices under the individual's personal control (*attribution theory*). In such cases, individual action can be correlated to the outcome, and the extent of individual responsibility and contribution is relevant to the outcome. A

[24] For instance, two persons may covet the same thing, the one doing his best to get it, the other doing nothing. If the first person gets the coveted thing, the other may envy him for it but would probably not see the situation as unjust.

similar stance is taken by equity theory which takes its origin in Aristotle's principle of proportionality. According to the principle of proportionality, the outcome should be proportional to the individual's input. The definition of the concept of individual input poses a major problem here. Konow alloys attribution and equity theories to formulate an *equity principle*, according to which, individual allocation is fair only if it is proportional to the individual input – and only to it –, over which the individual exercises control.

Rather than supporting one or another justice theory, Konow argues for an integrated approach to the theory of justice. In his view, each principle highlights an element which is relevant in a positive analysis, thus none should be exclusive. The weight of a particular justice theory is determined by the context.[25] Konow allies the integrated approach to theory with the concept of 'what is fair'. 'Fairness' implies a kind of communal morality which in individual cases calls for various solutions. Rather than a rigid employment of one particular justice theory, it accepts a 'fair' use of various justice theories depending on the situation and the context. This concept differs from pure justice theories also in that it is often less partial, and the concept of fairness as conceived by individuals may also be distorted by interest conditions (e.g. self-interest).

III.2 Equity in health economics

The concept of *equity* in health economics may be interpreted in several ways, which calls for a more thorough exploration of the concept. It is important to emphasize that no single, universal equity theory prevails in health economics: competing theories are simultaneously present and their relevance varies from case to case. What is conceived of as equitable is a matter of ethics and value system, of which public opinion, philosophy, political science and economics etc. may develop differing views. [Culyer 2001] Before expounding on the concept of equity, some definitions are cited here from health economic literature.

[25] The importance of context is stressed in several theories (e.g. by Kahneman, Knetsch and Thaler or Elster). They judge justice as depending on context, rather than formulate a principle of justice.

a) According to Whitehead, inequity in health occurs when people's health conditions display differences that are unnecessary and avoidable, and are also considered unfair and unjust. [Whitehead 1992]

b) *„Health equity is the absence of systematic disparities in health (or its social determinants) between more and less advantaged social groups."…" Health equity, an ethical concept based on the principle of distributive justice, is also linked to human rights."* [Braveman 2003, p256.]

c) *„In essence all equity approaches judge the treatment of individuals inequitable if it is capricious or relates to „irrelevant" characteristics. Commonly cited characteristics of this sort include race, religion, and gender."* [Culyer 2001, p276.]

It is evident from these definitions that the concept of equity is difficult to formulate; almost all the words in them call for further interpretation. Nor can I have a goal other than giving a survey of the major dimensions of the concept of equity.
Equity can be examined in several relations. The following conceptual ranges can be distinguished:[26] 1) equity in *health* (as a state); 2) equity in the distribution of *health care* (resources); 3) equity in *access to health care* (e.g. time requirement); 4) equity in *financial contribution* to health care. [Williams 2000, Culyer 2001]
When discussing equity, the concepts of *horizontal* and *vertical equity* invariably arise. Horizontal equity means providing similar treatment (e.g. similar allocation) to similar individuals (with similar healthcare needs); vertical equity refers to the idea that individuals differing from each other in *relevant* aspects should receive *adequately* different treatment, which should be proportionate to the extent of dissimilarity. (Both concept may be interpreted in other relations as well, such as horizontal and vertical equity in financial contribution.) It is easy to see that here the meaning of the words *relevant* and *adequate* present a challenge in the practical use of the theory. [Culyer 2001]
Distinction should be made between micro and macro levels of equity. *Micro level* refers to equity between individuals; and the individual may be either a known person or a representative (anonymous) person. The doctor–patient relationship is a

[26] Literature is abundant both on these relations and their central concepts, dealing with, among others, the definition of health and access to health care, which are outside the scope of this paper.

typically micro-level relation. In contrast, *macro level* refers to equity between various groups and it is concerned with health and health policy programmes and the resource allocation of programmes.

Williams provides a good survey of equity theories. [Williams 2000] In his work he sets up a classification of the various philosophical and economical equity theories in health distribution (see Table 2).[27] He defines health in terms of quality-adjusted life years.[28]

Table 2 Theories of equity in the distribution of health

Nature of opportunity set	**Side conditions on health outcomes**	**Nature of maximand**		
		No	**Yes**	
			Equal weights	*Unequal weights*
Ethically unconstrained	*No*		- Utilitarian - Paretian - Equality of health (fair innings) - Maximin health	- Desert - Equality of opportunity for health - Distribution according to current ill-health
	Yes	- Decent minimum of health	- Decent minimum	
Ethically constrained	*No*	Various process theories (e.g.): - libertarianism - participatory democracy - „no envy" - equal access to health care - rule of rescue	-Rawlsian maximin	-Equality of opportunity using finance only
	Yes		-Extended Rawlsian maximin	

Source: Williams, 2000, after Table 1.

Williams uses optimisation in the economical sense as a framework of analysis, in which he arranges the equity theories. He examines what the theories have to say about optimal distribution of health between two individuals. For that purpose, he makes the assumption of the existence of a health production opportunity set, which has a frontier. In economic sense, the health production opportunity set is determined

[27] It is not the aim of this paper to introduce all theories; only examples are cited to help interpret the table. Williams gives a detailed discussion of all cases.

[28] Though Williams's concern in his analysis was equity in *health* (QALY) distribution, the theories he discussed may also be related to other concepts, like equity in health care distribution.

by two factors: 1) the technological feasibility of opportunities; 2) their producibility from the available resources. Concerned with health, Williams adds a third factor: *ethical* considerations, which may limit the set of health opportunities. He brings up two examples: the priority of life-saving is an ethical consideration which is deeply rooted in society, and which generally tends to decrease the set of health opportunities as it detracts resources from the implementation of other opportunities, yet it is widely accepted. And liberalism holds free individual will as an absolute basic ethical principle and refuses state intervention even though it may contribute to widening the set of health.

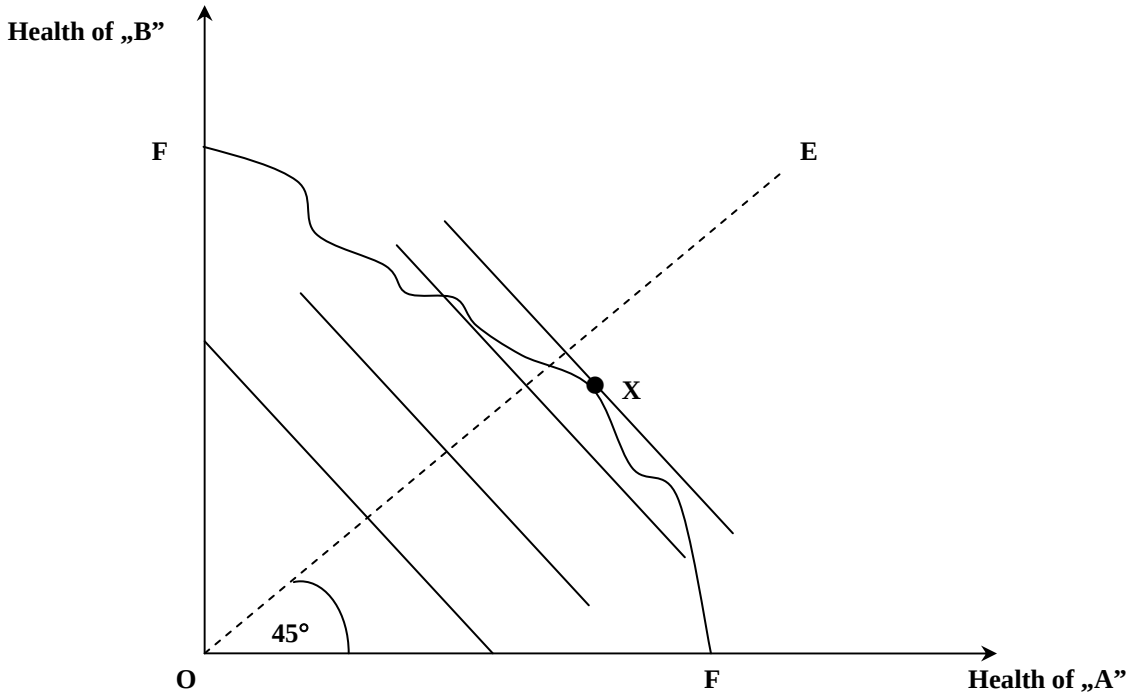
On the other hand, Williams supposes that some theories apply certain criteria of maximisation (objective function to define the optimum), while other theories offer no orientation as to optimal distribution. Utilitarianism, for instance, aims to maximise utility at a social level, and defines the mode of optimal distribution through this criterion. In contrast, the theory of participative democracy says that individuals have equal rights to participate in democratic public policy dialogues, but it does not go further to offer guidance in addressing questions of distribution.

Two things should be mentioned in connection with the objective function. On one hand, some theories introduce side conditions on health outcomes, and the criterion of maximisation can only be applied upon the fulfilment of these. For instance, a minimal level of health should be initially ensured for all, and the criterion of maximisation (utility maximisation) can only subsequently be applied (it may also happen that no maximisation criterion is used above the minimum level). On the other hand, two persons may not weight equally in the objective function, and it matters which of them receives health gain. The desert theory takes its starting-point typically in the idea that for various reasons, certain members of the society represent greater social value and are thus more deserving of health. The theory of 'equal health opportunity' proposes compensation for those who are the worse off through 'no fault of their own'.[29] It can be argued, for instance, that a person with higher education degree and working in a high-ranking position has more opportunity to lead a healthy life, owing to his/her schooling and financial situation, therefore deserves less health care than another person in the same health condition but in poor financial situation and without schooling.

[29] It is another question of course what is meant by 'own fault' and what is seen as the free choice of the individual.

Figure 7 shows a case when the optimal health distribution between A and B is sought for in a linear maximisation function and with equal weights. The frontier of health opportunity set is marked by the FF curve, with the point X at the optimum solution. No side condition is given and the two persons have equal weights.

Figure 7 Health maximization (linear maximand and equal weights)



Source: Williams, 2000, after Figure 3.

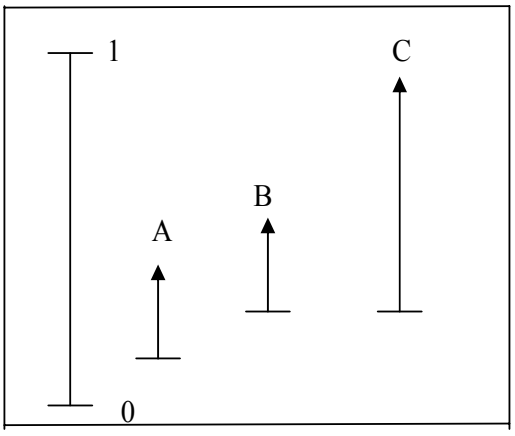
As mentioned earlier, quality adjusted life year (QALY) is currently the most accepted concept in health economical analyses for assisting resource allocation decisions. QALY comes from a utilitarian approach and has been frequently criticised because, as is evident from the practice and as supported by several empirical results, utility maximisation is but one of the many considerations in the distribution of health resources. Health economic literature has identified several other factors at play with greater or lesser weight in medical, financing or health policy allocation decisions. In the next subchapter I give a survey of such considerations, with a brief description of the results of empirical health economical examinations as to their presence and role.

III.3 The role of social values in the distribution of health

Equity considerations actually direct attention to the fact that, more than simply a choice among medical technologies, priority setting is also a choice among members and groups of society, among individuals. In the practical realisation of equity and daily decision-making, decision-makers are inevitably confronted with the issue of the criteria under which to provide health benefits to certain persons or groups and deny others access to them. Rendering such delicate and assailable decisions as acceptable as possible for the society, bringing them ever closer to social value judgment, is a most natural expectation.

Problems of prioritization among persons are demonstrated in Figure 8 (where value 0 on the vertical axis denotes the state of death and value 1 perfect health). It is assumed for simplicity's sake that decision is to be brought on treating three patient groups whose life expectancy is identical and remains unaltered by the treatment, and who differ only in their health-related quality of life. It is evident from Table 8 that patient group A is in a worse state of health (with a lower health-related life quality) than group B or C, while the improvement in health-related quality of life is expected to be greater in group C than in the other two groups. In case QALY maximisation is targeted, patient group C would be prioritised. [Nord 1999]

Figure 8 Differences in disease severity and treatment effect



Source: Nord, 1999, Figure 2.

It is conceivable, however, that society grants priority to treating patients in a very bad state of health and favours patient group A accordingly (which would be in consonance with Rawls' criteria), even though other patients would benefit equally or more from the treatment. The severity of the health state of the individual patients is therefore of importance.

Another question is whether patient group B can be discriminated against on grounds that their treatment promises less health gain, even though their initial life quality is identical with that of patient group C. This issue keeps coming up in practical, patient-level decision-making all the time. An example is the decision on transplantation priority in case of two patients with equal prospects before the intervention. No satisfactory reply is found to this question; yet the display of strong and clear social preferences for the treatment of patients capable of achieving greater health gains, as is suggested unequivocally by the QALY maximisation criterion, cannot be taken for granted. Another question of equity is the intention to reduce inequity among patients. If patient group C receives treatment, differences in health state would significantly increase as compared to the initial state of affairs. Further increase in inequity is not necessarily a desired state. [Nord 1999]

QALY is a preference-based measure, which combines the aspects of longevity and life quality in health gain quantification. Health economists have proposed QALY for the quantification of additional health gain in order to maximise social welfare. In actual fact, however, social value judgement views both the attainable health gain and the rule of health gain maximisation as insufficient and unsatisfactory. In community-level resource allocation decisions, social values, such as justice and equity are equally important. Social values may derive from several sources and can be classified in two basic categories: 1) factors that relate to the characteristics of the patient and 2) factors related to the characteristics of the intervention's effect on patient's health.[30] [Schwappach 2002]

In the following, I examine the characteristics to which social value judgments attribute an important role in health gain distribution, based on categories defined by Schwappach [2002]. As we shall see, QALY allows for certain considerations; however, social value judgments may not directly overlap the QALY linear,

[30] Other factors beyond the two categories mentioned by Schwappach may also play a role, e.g. the burden of illness on the patient's relatives.

proportional assumption (i.e. 1 QALY gained by 10 persons each may not necessarily be equivalent with 10 QALYs gained by one person). Moreover, social value judgments may have certain aspects that are absent from the concept of QALY – and thus do not affect achievable QALY gain – yet may have a bearing on allocation decisions (e.g. individual responsibility in the emergence of the disease). Schwappach set up the following categories of considerations:

1) Characteristics of patients

- age of patients
- social role of patients
- health-related lifestyle and behaviour of patients
- prior health-care consumption of patients

2) Characteristics of health effects on patients

- health level before treatment (start point)
- health level after treatment (end point)
- the change in health effect: distance between start and end points
- time horizon of health improvement (e.g. absolute or relative growth of longevity)
- health improvement versus prevention of health decline (direction of health effect).

Relying on the literature, I added to the above characteristics the number of patients in need of treatment, the cost of treatment, and the probability of successful treatment.

The concept of QALY takes into account the patient's age (indirectly, see later), the size and duration of health effect, and the probability of successful treatment. While no other factors form part of the QALY conception, they may indeed affect treatment efficiency and thus the achievable QALY gain. For instance, if life-style is directly related to the illness so as it decreases the efficiency of treatment, this factor may be taken into account in QALY calculations and sub-group analyses can be made (e.g. analysis of the sub-group of smokers in case of coronary diseases). [Schwappach

2002] In the following, I shall deal with the most important theoretical questions of the above characteristics and give some examples of empirical results.

III.3.1 Age of the patient

Of the above characteristics, issues related to the patients' age have probably been most extensively dealt with in literature. Age is one of the most obvious of patient characteristics, and also most definitive in the choice of social values. One comment on the relation of age and QALY is called for. Although QALY is generally looked upon as discriminatory against older people, i.e. it is 'ageist' (see later), QALY calculations are based on the patients' life expectancy, rather than their age. QALY favours *ceteris paribus* younger age groups merely because of their longer life expectancy, and in certain circumstances it may be discriminatory against both the old and the young. [Schwappach 2002]

Here is an example of the problem posed by the introduction of age as criterion in resource allocation decisions in the QALY model. It is assumed that medical intervention is to be applied on patients aged 20, 60 and 70 years in similar state of health. With identical effect on health and an annual 3 per cent discount rate, the QALY model yields the following assessment of the three interventions: the treatment of the 20-year-old is 1.8 times more valuable than that of the 60-year-old and 3.1 times more valuable than of the 70-year-old patient. From another angle, the treatment of 33 twenty-year-old patients equals that of 60 sixty-year-olds and 100 seventy-year-olds. Age-based discrimination of such extent is likely to conflict with social value judgment. Other factors may also play a role in the higher social appreciation of the treatment of young generations as compared to the older.

People may deem, for instance, that everyone is due some similar life expectancy, or they may assign greater importance to certain stages of life (see later). Thus, despite a probably erroneous assumption, the QALY conception may indeed yield the right overall result when prioritising younger generations. [Nord 1999]

Ageism is easier to understand if its types are briefly surveyed: 1) preference for the young on account of their greater life expectancy; 2) preference for young adults over children and the elderly on account of their greater productiveness; 3) preference for the young over the old as the latter have had more life years.

[Tsuchiya 1999] Although some empirical data attest to the refusal by respondents of age-based prioritisation, in most examinations ageism is apparent. An examination of decision-making in medical practice also proved age-based rationing both with regard to the patients' expected benefits from treatment and to patent age. [Dolan et al 2005]

Age-based weighting of health gain (QALY) is justified on two counts. [Tsuchiya 1999] One is efficiency-based age weighting, which is conjoined by two approaches to age-related value judgment:

a) the productivity consideration: social role filled at various ages defines the social value of the health of a person of a particular age;
b) the utility consideration: preference for the younger as they have greater life expectancy and can probably achieve more health gain.[31]

The other is equity-based age weighting, based on an egalitarian approach, which favours the young as they have had less life years and deserve as much as older people do. [32]

The concept of 'fair innings', introduced by Williams [Williams 1997], puts different weights to persons of different ages on an equitable basis. Equity weights are determined by a) the generally accepted QALY value in the given society due to a person during a lifetime; b) personal prospects of realizing that QALY value.

This argument implies that people are entitled to a 'normal' life span (e.g. 70–75 years in West European societies). Those failing to achieve this are deprived of a certain number of life years that society deems are due to them. In contrast, those who live longer than that, receive each consecutive year as a 'bonus' and suffer no harm in equity. 'Fair innings' implies that everybody should be given equal chance to live out their fair share of life, and until they reach that age, all must be done to prevent them dying earlier. [Rivlin 2000] In light of this, Williams proposes to assign more weight to obtainable life years where recipients are under the particular age. 'Fair innings' has been criticised from several quarters. On one hand, the concept of a 'fair' life-span is practically indefinable. On the other hand, the concept in this

[31] Though I do not wish to deal here with the concept of DALY (Disability Adjusted Life Year), it should be noted that DALY is based on the individual's social value and aims to capture the different social roles individuals play in different age groups. The greatest weights are assigned to the middle-aged, while the youngest and the oldest are assigned smaller weights. [Murray 1996]

[32] It should be noted that age-based health gain weighting cannot be handled together with weighting based on the patient's sex, education or income. Most people have the chance to experience the various ages, so it can be regarded less discriminatory. [Tsuchiya 1999]

form is related to the rationing of health care by age, and its sole relevance in defining equity is questionable. Later Williams also argued that the concept of 'fair innings' should be complemented by life quality. [Nord 2005]

In view of this, efficiency-based weighting is clearly focussed on the particular age of the patient and, in contrast to equity-based weighting, disregards the past, present and future extent of the person's life quality, nor is it concerned with life expectancy. In other words, people of the same age will be assigned identical weights. But in equity-based weighting, persons of the same age may be assigned differing weights (e.g. in case QALYs to be expected in the rest of their life is differing). The two types of weighting display a similar – decreasing – pattern in adulthood, but are widely different in childhood: the weight assigned to the newborn in DALY is zero, while in the other approach, the newborn are given the greatest weight. [Tsuchiya 1999]

Several papers have dealt with the analysis of the role of age, but as yet literature offers no reliable proof for the value of these weights. Results display differences, among others, according to the particular age group examined in the paper. Moreover, the intensity of preferences for younger age groups nurtured in a given society varies from country to country. [Nord 1999]

Johannesson, for instance, examined the role patient age plays in prioritisation decisions. [Johannesson 1996] The examination was occasioned by a health policy recommendation then current in Sweden, according to which no distinction should be made between the young and the old with regard to life-saving intervention. The survey also sought to establish the equivalent of the number of saving 30 year-olds with 100 fifty and 70-year-old persons. The result obtained with respect to the median value of replies was that saving the life of one 30-year-old person is equivalent to saving the life of 4.9 fifty-year-old and 34.5 seventy-year-old people. With the progress of age, the number of patients eligible for compensation grew exponentially. In other words, the Swedish population assigned increasingly smaller weights to increasingly aged patients.

Nord conducted a survey among an average sample of the Australian population of their attitudes to health gain maximisation or propensity towards egalitarianism. [Nord et al 1995a] The survey was aimed to explore neutrality in QALY distribution. The question to be answered was: which person should be prioritised if available

resources are insufficient to treat all. The role of age was examined in three contexts: choice according to age amongst persons in critical condition; choice according to age group amongst persons who are to achieve equal life quality through treatment; and choice between young children and infants (e.g. in case of organ transplantation). Assuming a propensity toward maximisation, younger age groups as well as infants should be prioritised in the above examples, since more QALY gain is to be expected in their cases. The results in Nord's surveys, however, showed a propensity to egalitarianism: in the case of life-threatening conditions, 42 per cent of respondents, in case of equal life quality 76 per cent, and in the choice between young children and infants 55 percent of respondents accorded equal priority to all patients. In the latter case, a further 44 per cent would have prioritised young children on the assumption that 1) intervention had better chances – which can be interpreted as a maximising attitude; 2) children were viewed more like suffering, feeling 'persons', the loss of whom, moreover, would have involved greater pain for their parents.

In Finland, Ryynänen examined attitudes to health care prioritisation criteria among doctors and nurses in relation to old patients and children. [Ryynänen et al 2000] He found that the probability of decision for the treatment of child patients was significantly greater both among doctors and nurses (the odds ratio was 4.7 in the case of doctors, 6.8 of nurses).

Studies on social preferences for age show contradictory results. Public opinion surveys have found only limited support for age as an explicit and general criterion of prioritisation. In ranking age-specific medical treatments and prioritising hypothetical patients, however, respondents showed moderate or strong preference to younger patients. [Bowling 1996, Rodríguez 2000] The wording and perspective of the questions are also important: while the public in general tends to show a positive discrimination in favour of the young, there is much less support for negative discrimination against the elderly. To sum it up, public opinion in general prioritises younger people against the elderly, but the presence and strength of these preferences varies from country to country and they are also conditional on the structure of the survey and the context of the questions. The extent and orientation of age-related preferences are therefore still insufficiently documented. [Schwappach 2002]

III.3.2 Social role of the patient

I have already broached the attitudes to the social role of patients in discussing age-related value judgments. Surveying the literature on the subject, Dolan and Schwappach concluded that examinations conducted among the general public show a reluctance or direct refusal of prioritisation criteria based on the patients' working status, retirement, wealth or poverty. [Dolan et al 2005, Schwappach 2002] On the other hand, most respondents tend to prioritise in favour of patients with dependants, especially small children, or other social responsibilities. As a counter example, Nord finds that, in case all patients have the same illness, only 33.4 per cent of Australian respondents prioritised patients with dependent children. 66.6 percent of the respondents gave equal priority to patients with or without children, which means that the findings of the paper showed distributive neutrality. [Nord et al 1995a] In Finland, Ryynänen found that doctors and nurses gave greater priority to poor patients than wealthy ones. [Ryynänen et al 2000] Attitudes to the patients' social role are also likely to display great differences in various countries and cultures.

III.3.3 Health related lifestyle of the patient

The social value of health gain may be affected by the cause why a treatment is necessary. One point of consideration may be the patient's control over the emergence of the illness and the extent to which the illness is related to the patient's lifestyle. [Dolan et al 2005]

Le Grand argues that if the illness is caused by factors beyond the patient's control the situation is unfair, while in the opposite case it is to be regarded as fair. [Le Grand 1987] Dolan also takes the view that individual responsibility should be taken into account. [Dolan-Olsen 2001]

Current examination results on the health-related lifestyle of patients as a prioritisation criterion are, however, far from unequivocal. Although respondents show a tendency to extend priority to those ill through no fault of their own, public opinion is in general strongly divided. Preferences for people conducting a healthy lifestyle might be based either on the prospect of better health outcomes in their case,

i.e. on the efficiency consideration, or on a purely moralistic approach. [Schwappach 2002]

Nord examined willingness to give identical priority to smokers and non-smokers in case of heart disease and lung cancer. Close to 60 per cent of respondents said some priority should be given in favour of non-smokers, and 40 per cent refrained from prioritising on such grounds. Nord avers this reflects a moralising attitude: non-smokers are given priority because they are not to blame for a self-inflicted condition. [Nord et al 1995a]

Ryynänen found that in Finland nurses and doctors showed neutrality in relation to patients' negligence of their health, but gave smaller priority to those who were to blame for their condition. [Ryynänen et al 2000]

In the US, Wittenberg examined the issue of personal responsibility in relation to the treatment of liver disease and asthma: in case rationing is necessary, who are to receive liver transplant and asthma treatment. [Wittenberg et al 2003] Results showed that respondents were 10 to 17 times more likely to allocate treatments to patients deemed not responsible for their conditions. In both cases, personal responsibility significantly influenced respondents' allocation decisions.

III.3.4 Prior health care consumption

Prior health care consumption of patients might be an important consideration in social judgment. It may follow from the hypothesis that everybody is entitled to have a life-saving intervention if necessary, regardless of its cost or benefit, and those in need of the intervention for the first time should be prioritised over those who have previously undergone one. [Schwappach 2002] As I mentioned earlier, Williams introduced the concept of 'fair innings' which regards the amount of QALYs gained previously as also important. [Williams 1997]

In Dolan'view, preferences in the distribution of QALYs depend on differences in four approaches to health streams[33] [Dolan-Olsen 2001]:

1) expected QALYs from health care;
2) health state without health care (no-treatment profiles);
3) amount of previous QALYs gained without health care;

[33] It should be noted that in reality the four streams are very difficult to distinguish.

4) amount of previous QALYs gained from health care.

Table 3 Taxonomy of health streams

	Retrospective health	*Prospective health*
Gained health i.e. from health care	Previous QALYs gained from health care (4)	Expected QALY benefit from health care (1)
"Free" health i.e. not from health care	Previous QALYs yielded without health care (3)	Expected QALY profile without health care (2)

Source: Dolan, 2001, Figure 1.

Dolan draws a parallel in the difference between factors 3 and 4 with Rawls' approach, who distinguishes between goods distributed in a natural way and as determined by society. [Rawls 1972] However, he points out two differences. Rawls viewed health and its personal distribution as determined solely by nature, which Dolan disapproves. On the other hand, Rawls focussed on social resolutions for ensuring the individual's right to primary goods. Dolan, in contrast, is concerned with the outcome (health state) in health distribution, rather than distributive processes or rights.

In health economics analyses, as they gradually gain ground, the amount of QALYs expected from health care (stream 1) have came to the fore, and the need for health care interventions is most frequently defined as the individual's capacity to benefit from them. [Culyer 1997]. If the aim is health gain maximisation, this is indeed the only relevant approach.

Stream 2 calls for a definition of health need as the expected ill health state over the remaining lifetime. The consequences of no treatment are to be dealt with for two reasons: a) people may feel the need to care for those with poor health prospects; b) it may figure as a consideration in equitable health distribution. If inequities in prospective health are to be reduced, QALY gains should be primarily allocated to those with the worst prospects without treatment. [Dolan-Olsen 2001] Taking into consideration previously gained QALYs (streams 3 and 4) leads in actual fact to issues related to the age and the age group of patients. (The importance attributed to health varies in different ages and phases of life.) [Dolan-Olsen 2001]

The question that arises here is whether taking into consideration previous health gained from health care is of relevance morally when making distributive decisions. Dolan offers the following answers to the question. [Dolan-Olsen 2001] The answer is 'yes' if one takes the view that everybody is entitled to a given amount of QALYs during their lifetime. The answer is 'no' if previous treatments obtained are looked upon as sunken costs, and discrimination on this ground against those previously in need of such treatments is refused. The third answer is 'it depends'. In this case too, the need for previous treatments can be taken into consideration to a varying degree. The core of the argument is whether the patient can be deemed responsible for his/her condition. An extremist view is that the patient's responsibility for a previous illness should have a bearing on the current distributive decision, regardless of his responsibility for the emergence of his current illness. Somewhat more permissive is the view that previous treatment should only be taken into consideration if the patient can be deemed responsible for both his previous and current condition, even though the two illnesses may have nothing to do with one another. And lastly, 'recidivist' patients, i.e. those who fell ill both previously and currently for the same irresponsible and self-destructive behaviour, may be punished. The counter-argument is that people's different psychological and intellectual capabilities make for a varying degree of ability to modify their behaviour, and the correlation between lifestyle and illness cannot always be substantiated with certainty.

III.3.5 Initial level of health state

Empirical examination results reveal that the public tends to give priority to the worst off, and that the initial severity of illness, irrespective of the prospective effects of treatment, is in itself a value-generating factor. [Dolan 1998, Ubel et al 1996, Ubel 1999] Evidence shows that people are willing to sacrifice a certain amount of life quality gain for the treatment of the severely ill. Because of the limited number of donors, the most obvious example of prioritisation is organ transplantation. Ubel found that in case of life-saving intervention, respondents made no distinction between patients previously in good health and those worse off. [Ubel et al 1999] Interestingly enough, less priority was granted to a patient with paraplegia to develop after the life-saving intervention.

Such decisions may probably be explained by equity considerations, as the prioritisation of patients in already better health would increase inequity among them. A special example is the care of the dying, which may be regarded as an extension of the 'rule of rescue': society in general feels it is their duty to alleviate the suffering of the dying and to provide them palliative care. In contrast, initial health state is of secondary importance in the concept of QALY, which counts in so far as those in poorer health have – theoretically – a greater chance to gain QALYs than those in a better state, thus the improvement in their health state is expected to be less. If, however, only a small extent of improvement is to be gained in poorer health states, QALY underestimates the social value of the treatment of patients in poorer health. [Schwappach 2002]

III.3.6 After- treatment level of health state

Though indicative of the benefit of treatment, the level of health to be achieved after intervention is also closely connected with the characteristics of the patients. The QALY approach is based on the concept of 'perfect health' which is defined as a universal theoretical optimum, rather operating with the individual maximum potential available to patients. Accordingly, patients whose perfect health can be restored are prioritised over those whose illness is curable, yet some other chronic condition or disability prevents achievement of a perfect health. This is why QALY has been described as discriminatory against the disabled and the chronically ill. [Schwappach 2002]

As against this, survey results show that in case of life-saving interventions, people do not discriminate between patients on grounds of their previous health states. [Abellan-Perpinan 1999, Nord 1993] In another examination, Nord found that, of patients with poor life quality, 53 per cent of the respondents prioritised those with a higher life quality after intervention, and 47 per cent refused prioritisation on such grounds. [Nord et al 1995a] In his examination related to liver transplantation, Ubel sought answer as to whom people would give the organs. [Ubel-Loewenstein 1996a, 1996b] He found that only a small proportion of respondents was prepared to give all organs to the patient group with the best prognosis. However, the greater the differences were in prognosis, the less equal chances people gave to all patients.

Seeing the empirical results, the question arises if the concept of perfect health should be replaced with 'actual health' in order to establish the achievable maximum. The results show that in prioritisation, given the limited possibilities, people generally concentrate on the greatest possible benefit to the patients, rather than a theoretical optimum. [Schwappach 2002]

III.3.7 Change in health state – extent of health gain

The appropriateness of health care resource allocation according to the extent of health gain is much debated in the literature. Health economists usually argue for the greatest possible aggregate health gain in resource allocation. Others, however, question such a principle in allocation on grounds that it is discriminatory against the elderly and against underprivileged groups less able to benefit from health services. [Dolan-Cookson 2000]

The extent of health change, or of health gain, is an important consideration in public opinion. (See e.g. [Abellan-Perpinan 1999, Bowling 1996, Cookson-Dolan 1999, Olsen et al 1998]) However, health gain is often interpreted as the end point, rather than a relative improvement, and no priority is accorded to treatments leaving the patient in a relatively poor state of health. [Dolan-Cookson 2000] Comparing this finding to the fact that in general people do not discriminate on the basis of the initial state of health, people seem to distinguish between the health state achievable owing to the treatment and the patient's limited capability of benefiting from the treatment. [Schwappach 2002]

In his qualitative examination, Dolan found that giving priority to patients capable of gaining more health from the treatment was ambiguous. [Dolan-Cookson 2000] Out of humane and moral considerations, a sizeable proportion of respondents tend to give equal chance for all to have treatment. Dolan observed what is called the threshold value, which appears in more than one form. In case of absolute threshold value, respondents said, regardless of the other patient group, that if a patient's life quality or life expectancy remains very poor after intervention, the other patient should be prioritised. In case of a relative threshold value, respondents compared the health gains in the two patient groups and if the difference was 'great enough', they prioritised those with greater benefits from the treatment. Beyond these two

approaches, there was a third shown by some respondents who opted for an equal treatment of the two patient groups if the difference between achievable health states through the intervention is too small either in a relative or absolute sense.

III.3.8 Time horizon of achieved health effect

According to the basic QALY approach, the social value of health improvement is proportionate to the number of years in which the patient enjoys the positive effect of treatment; in other words, a principle of strict proportionality prevails. For instance, the value of the treatment of a 60-year-old with a life expectancy of 20 years is double the value of a patient of similar age with a life expectancy of 10 years. This assumption is made in the QALY conception with no empirical evidence whatsoever; it is simply implied intuitively in the construction. Whether some can be discriminated against and barred from health care on such grounds is, however, questionable on ethical grounds too. [Nord 1999]

Olsen, for instance, found that respondents judged the two cases of 100 persons gaining another 10 years as a benefit of treatment and of 80 people another 20 years, as similar. [Olsen 1994] In other words, in this context 1 000 life years were seen as equivalent to 1 600 years. Doubling the life expectancy decreased the number of patients to be treated by only 20 percent, instead of 50 percent. This assumption of the QALY concept is therefore strongly questionable. It has to be noted, though, that the duration of the effect results from the combined effects of several factors, such as life expectancy, aged-based preferences, time preference etc., the individual effects of which are hard to separate. [Schwappach 2002]

III.3.9 Improvement in health versus prevention of its further deterioration

The direction of health effect, i.e. health improvement versus prevention of health deterioration, does not figure in utility assessments, so it does not affect utility. Current examination results in this area are also contradictory. Further researches are to be conducted on the value of prevention. [Schwappach 2002]

III.3.10 Number of eligible patients

According to the QALY approach, the social value of a health programme is proportionate to the number of people enjoying its health benefits. However, empirical examinations prove that people are also concerned with the distribution of health gain. They prefer those programmes that provide benefits to as many as possible; on the other hand, if the health gain to be achieved by the individual is too small, they prefer to concentrate it. There is also evidence that people show a strong tendency to distribute a certain amount of health gain to all, if possible. [Olsen 2000]

III.3.11 Cost of treatment

In QALY-based health gain maximisation, patients should be ranked inversely proportionally to treatment costs. In other words, if treating one patient costs double the treatment of another, the patient in need of the more expensive treatment should only be prioritised if the outcome is at least the double of the less expensive treatment cost of the other patient. [Nord 1999] Cost considerations are far less frequently taken into account than health economists would find it appropriate. In certain special areas of health provision society accepts cost considerations only with great difficulty or not at all. Such are life-saving interventions in line of the principle of 'the rule of rescue'. Yet apart from such obvious cases, evidence is scant about societal opinion in such questions and about the appropriateness of the QALY notion. People's willingness to discriminate against patients in need of high-cost treatments is therefore questionable. [Nord 1999]

In actual fact, available evidence (see e.g. [Nord et al 1995b]) attests to people's strong 'resistance' to the maximisation argument and the importance of the severity of illness as prioritising criterion over costs. From an economical aspect, the attitude of decreasing treatment chances for all ought to be actually viewed as irrational. Why this preference can still be regarded as rational from the aspect of utility is supported by Nord by three arguments. On one hand, the individual's awareness that in case he or she has an illness with high treatment cost they will receive the necessary intervention and will not be discriminated against on the basis of cost, is a source of benefit. Another source of benefit is avoidance of the emotional burden attached to refusal. The third

factor that may appear in the individual's benefit function is similar to the 'the rule of rescue': the majority of people have a sense of duty to help those in need.

III.3.12 Probability of successful treatment

The success of medical interventions always carries a degree of uncertainty. The health gain expressed in terms of QALY is an expected value appearing as a statistical mean. In the QALY approach, the social value of an intervention is proportionate to the probability of successful intervention. (For instance, if the utility of a successful intervention is 20 QALYs and the probability of the successful intervention is 70 per cent, the expected benefit is 14 QALYs.) Few analyses have been made in this area, so the incorporation of this consideration in resource allocation decisions is questionable. Nor is sufficient evidence available on whether the traditional QALY conception could handle this question appropriately and would not 'mislead' the decision-maker. Intuitively, from observing people's reluctance to discriminate on grounds of the patient's capacity to benefit from the treatment (or only disproportionately), and on the basis of the number of patients, one can conclude that proportionality between the success of the intervention and its social value judgment is also questionable. Further empirical examinations are called for to answer these questions. [Nord 1999]

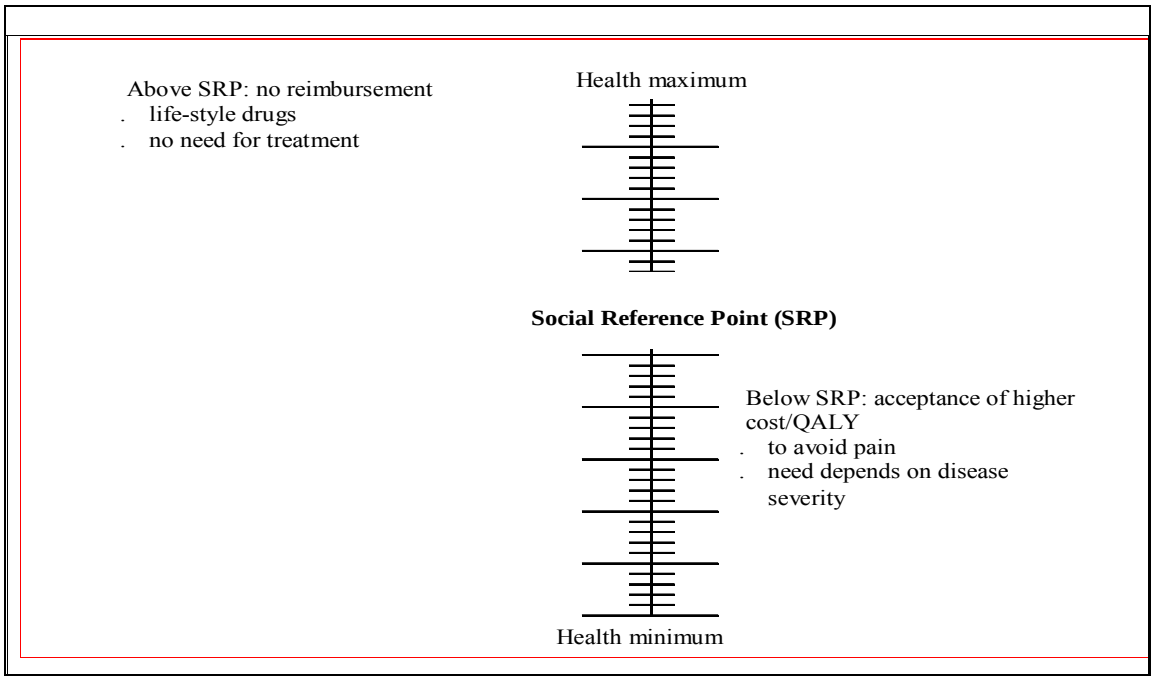
The above-mentioned empirical examinations lead to three major conclusions. 1) A significant proportion of respondents frequently refuses rationing on any ground and flatly reject it. 2) People usually reject extremist resource allocation. Even if they prioritise a patient group, they do not allocate all resources for the treatment of this group only and tend to allocate some resources also to the less preferred group. 3) The proportionality attributes of the QALY concept are untenable. People are unwilling to show a health maximising attitude if their attention is called to the fact that they have renounced a certain amount of health gain. The decision-making criteria represented by QALY, such as multi-dimensional proportionality and health gain maximisation, do not enjoy full support by the public or individuals. [Schwappach 2002]

III.3.13 Social reference point

Going through the above considerations, it is worth while addressing another issue: which are those illnesses or health conditions which elicit the society's sense of responsibility; in other words, which treatments and health improvements society is willing to allocate resources for.

There is a sort of value judgment in society of a normal life, a normal health state in various phases of life. Beyond the fact that QALY gain by those with a higher life quality is deemed less necessary than by patients with lower life quality, there might exist a social reference point on the QALY scale, below which the improvement of health state is viewed as necessary, and above which intervention is considered unnecessary, since a decreased life quality is seen, for instance, as a natural consequence of ageing and therefore acceptable. In this sense, the demarcation between individual and social responsibility may depend on the extent achievable health gain is seen as 'luxury'. Plastic surgery is classified in this category and is thus excluded from interventions financed from public funds. Social responsibility is more likely to manifest itself for health states in which, to put it in a very general way, treatment is aimed at the avoidance and reduction of pain. The development of new technologies and the changes in social expectations and value judgment, however, are bound to give rise to more and more similar dilemmas. [Stolk et al 2002] The difference between the two kinds of responsibility can be shown as a threshold value on the QALY scale (Figure 9).

Figure 9 Social Reference Point on the QALY scale – hypothetical decision



Source: Stolk, 2002, Figure 3.1.

On this basis, a patient's entitlement to treatment can be expressed as the difference of life quality between the social reference point and his/her actual health state. The difference between 'luxury treatment' and pain reduction is defined by their position with respect to the social reference point, rather than the existence or absence of the illness burden. Social reference points might differ according to patient groups and individual age, and might change in time. Society is likely to expect an increasingly higher life quality at all ages. [Stolk et al 2002]

IV. HYPOTHESES AND OPERATIONALIZATION OF CONCEPTS

IV.1 Research hypotheses

Research question

In opinion of Hungarian medical doctors, which societal and equity considerations should affect the distribution of health among individuals (patients)?

The paper aims to answer this question with two empirical studies using different methodological approaches: preference elicitation and investigation of attitudes. As the literature review of the dissertation shows, there are no straightforward answers in the international literature either, only tendencies can be seen. As I investigated preferences and attitudes, the results can be interpreted only in the circle of respondents in these studies; I do not consider adequate to transfer preferences and attitudes to other respondent groups. That is why the wording of my hypotheses mentions the relevant respondent group.

Preference elicitation among general practitioners

The subjects of the preference elicitation were Hungarian general practitioners (GPs). At the end of the day, it is medical doctors to decide which patient to treat and how, hence they play a key role in resource allocation. Furthermore, through the referral system, GPs have an impact on which treatment options will be available for the patient at higher levels of the health care system. Another reason for choosing GPs as subjects was that retrospective analyses of medical decisions (e.g. medical chart reviews) are available in abundance, however there are few examples for preference elicitation among medical doctors. I composed two hypotheses for the preference measurement.

Hypothesis 1:

General practitioners have well defined preferences about the prioritization of patients: they are expected to consider the age of the patient and disease severity the most important factors.

Hypothesis 2:

Preferences for patient prioritization are not homogeneous: based on the characteristics of the respondents (e.g. age of the GP) differences in the preferences can be shown.

Study of attitudes among medical doctors

Related to the second methodological approach – study of attitudes with Q-method – I do not propound a hypothesis for the results. The reason behind is that the Q-method - as the study of subjectivity – is not suitable for testing hypotheses. The Q-method had been widely used in the field of psychology and political sciences; however its use related to health sciences has not been widespread. Therefore, the hypothesis composed for this second study is related to the applicability of this method in the field of health care.

Hypothesis 3:

It is possible to distinguish different opinion families among medical doctors with respect to which factors are considered to be important in allocating health among patients and which patient or disease characteristics are rejected as a basement for patient prioritization.

I find the test of these hypotheses important for two reasons:

a) it is possible to show the diversity of preferences and attitudes and how they are affected by the characteristics of responders;
b) although the generalizability of the results is not possible, we might assume that other groups hold different and diverse preferences, too; therefore, a deeper understanding of social values would be important in health policy decision making.

IV.2 Operationalization of key concepts

The main concepts of this paper are defined in line with the literature, however, as these concepts may cover many aspects it is worth presenting here the meaning as the paper interpret them.

Health gain

In general, health gain means the improvement of the health state [Evetovits-Gaál 2005], and can be described with different measures (e.g. number of avoided deaths, decrease of blood pressure). In a less disease-specific context, it has two basic dimensions: health gain expressed as longer life time (more life years) and as an improvement in health related quality of life. These two dimension provide the basement of the QALY concept (quality adjusted life year). Although, my research studies are not based on the QALY concept itself, they are related to those aspects that might affect those decisions which determine the distribution of health gains among individuals.

Preference

According to neoclassical microeconomics, the consumer's decisions are based on the assumption that the consumer is able to compare two goods and chooses the one that maximizes her utility function. The theoretical basement of the preference elicitation study in this paper is also in line with Lancaster's theory. [Lancaster 1966] This economic value theory assumes that each good is a set of different characteristics that are present to a different degree in the good. It is these characteristics that provide utility for the consumer; hence these characteristics will determine the consumer's preferences and the demand for goods is derived from these characteristics. In my research, GPs are to choose among patients who are described with patient and disease characteristics. Furthermore, the preference elicitation in this paper deals with revealed preferences, i.e. respondents are asked about their preferences and not observed during their decisions.

Attitude

The concept of attitude comes from the field of societal psychology and shows a sort of psychological tendency on how much an individual likes or not likes something or finds something important or not. In the frame of attitude surveys, it is common to ask the respondent to rank or rate different aspects of the investigated issue. In the informal language, the term of preference and attitude are many times mixed, however it is only the concept of preference that is rooted in economics. [Phillips et al 2002a] The research presented in this paper investigates the attitudes toward the distribution of health gains, i.e. which are those societal or equity aspects that are acceptable or rejected by the respondents as the basement of patient level prioritization.

For an easier overview of the two empirical works presented in this paper, two separate chapters describe the methods and the findings of the studies on preference elicitation and attitudes (Chapter V.1. and V.2., respectively).

V. EMPIRICAL STUDIES

V.1 Preference elicitation from Hungarian general practitioners

V.1.1 Preference measurement – a brief overview

The measurement of preferences is based on the concepts of revealed preferences and stated preferences. In case of revealed preferences the behaviour of the subjects is observed and preferences are investigated through their real life decisions and choices. As for stated preferences, subjects are asked about their preferences. Examples for the study of revealed preferences are relatively rare in health economics due to the following reasons. [Kjaer 2005]

1) Consumers' (e.g. patients) behaviour is usually difficult to observe because the market of health care services does not exist or works imperfectly.
2) Unlike revealed preferences, the approach of stated preferences is able to capture the whole economic value of a good, including its non-use value, which derives e.g. from altruism or the mere existence of the good. Non-use value is of importance in the field health care.

Also, stated preferences give the freedom to the researcher to focus on those aspects and factors of the decision making she is interested in or to study preferences for hypothetic products; i.e. the study is less limited by the information actually available at the market. Of course, the measurement of stated preferences has its disadvantages, too. [Kjaer 2005]:

1) stated preferences may not reflect real life preferences (it might not be easy to express preferences for a hypothetic good),
2) respondents may not be motivated sufficiently to give an answer as accurate as possible,
3) asking for preferences may actuate the respondents to follow some strategic behaviour.

The systematic literature review by Ryan summarized the methods of preference elicitation in health care. [Ryan et al 2001] Based on these quantitative techniques and on the work by Kjaer [2005] did I create Table 4 for making easier the overview of the methods.

Table 4 Elicitation methods for stated preferences

Response techniques	Simple good	Complex good (conjoint analysis[34])
Ranking	**A**	**D**
Rating	**B**	**E**
Choice	**C**	**F**

„A": The respondent is asked to rank (ordinal scale) the presented products or options (e.g. he has to rank different health care services according to how important he thinks they are).

„B": In case of rating the respondent is asked to express her preference on a numerical or semantic scale. In health care for example, it is common to use the visual analogue scale for the measurement of quality adjusted life year. Rating is also frequently applied in studies about patient satisfaction.

„C": In its simplest form, respondents are instructed to choose from two options according to one characteristic (e.g. preference for the treatment of a current smoker or a non smoker). Standard gamble, time trade-off and person trade-off also belong to the choice techniques and are frequently used in health economics.

Cases „D", „E" and „F" refer to a situation when respondents have to decide on products that are described with several characteristics; hence the decision task is more complex.

The ranking exercise results in the complete preference ordering of the presented goods. Compared to ranking, the rating exercise puts more cognitive burden onto the respondents as they are asked to attach a value to each product, so they have to express the strength of their preferences as well. Choice tasks are considered to be relatively less burdensome for the responders: e.g. in case of a discrete choice

[34] „Conjoint analysis" comes from the composition of two terms: „consider" and „jointly". [Kjaer, 2005] Products are characterized by several features and respondents are asked to choose a product after considering these features simultaneously.

experiment („F") they only have to state which product they would choose (weak preference ordering). [Louviere et al 2000]

In my empirical work I decided to use the method of the discrete choice experiment to elicit the preferences of general practitioners. This decision was motivated by two things: 1) the aim of the study was in line with the properties of this method, 2) discrete choice experiment has an adequate theoretic background in economics (see Appendix 3). Therefore, I will elaborate only the method of discrete choice experiment (or with other words, discrete choice modelling) in the next chapters.

V.1.2 The discrete choice experiment (DCE)

Choice based techniques were started to be used in the 1960's in the field of psychology. Later they became common in the marketing research and made a significant contribution to the better understanding of consumers' behaviour. [Kjaer, 2005] In health economics it is Ryan who gives a general description on the steps of the discrete choice experiment (DCE) [Ryan 1999a, 1999b] that are as follows:

1. determination of attributes
2. determination of attribute levels
3. experimental design
4. data collection
5. data analysis.

1/ The first step is to determine those factors and aspects that are likely to be considered by the respondents when choosing a product (or an option). Those factors that play a role in the decision are called attributes. Regarding health care services for example, attributes can be the distance from the place of the health care provider or the waiting time until the treatment. Hence, attributes are characteristic features of the options, they describe the options and they are considered together by the decision maker. Relevant attributes are determined by the research question; however, there are some principles to follow [Keeney 1976]:

a) attributes should cover the most important aspects of the choice;

b) attributes should be easily interpretable for respondents;
c) attributes should not be redundant;
d) the number of attributes should be limited to avoid very complex and burdensome decision tasks;[35]
e) attributes should be able to take different values (levels).

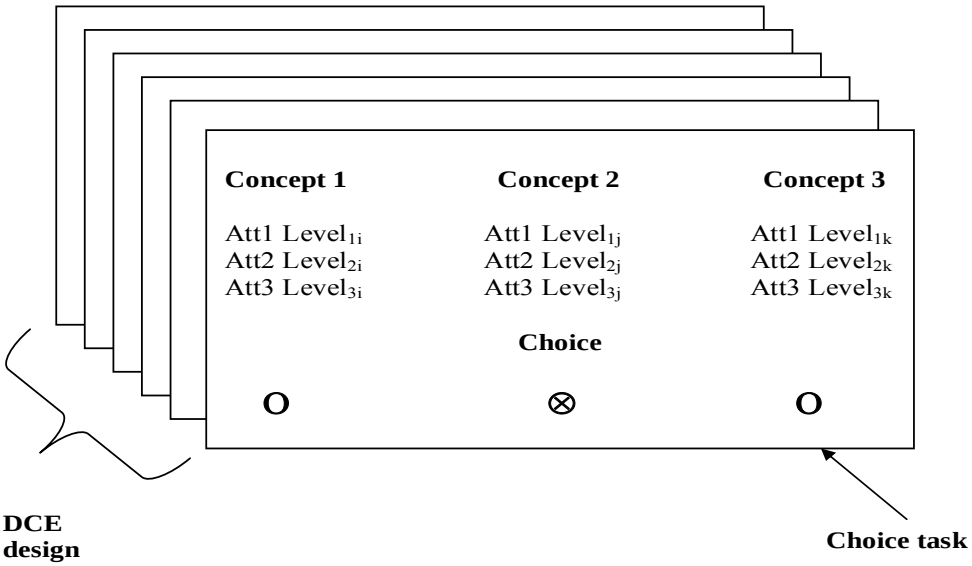
Attributes can be retrieved from several sources: from the review of the literature, from focus-group interviews with interested parties (decision makers, experts), etc.

2/ The second step is to determine the levels of each attribute. Back to our previous example, the distance attribute may take the levels of 5 km, 20 km or 50 km; and waiting time could be 10, 30 or 60 minutes. Levels of attributes should follow the following recommendations: they should be plausible and easily interpretable for the respondents, and levels should motivate the trade-off between different products or options (i.e. none of the attribute levels should be so good that respondents always choose the option with this level irrespective of other characteristics).

3/ Making the experimental design, the researcher combines the levels of the attributes in different ways to create a number of product concepts or options. These concepts or options are going to be presented in the choice tasks to choose from. The number of concepts in a choice task and the number of choice tasks in a questionnaire are also determined in the experimental design. Figure 10 gives an example: in this DCE design there are 3 concepts to choose from in a choice task, and each concept is described with 3 attributes.[36] Respondents are asked to make a decision in 6 choice tasks.

[35] Regarding the number of attributes there is no general rule, though it is usually not recommended to use more than eight of them. [Kjaer 2005]
[36] The number of concepts and attributes can be different of course, and it is also typical to use different number of levels for different attributes.

Figure 10 Example for the DCE design



The number of attributes and levels determine how many concepts can be possibly created from their combinations. Giving an example, if there are 3 attributes in the design and each attribute has 4 levels, the number of possible concepts is $4^3 = 64$ (called factorial design after the method of the calculation). Furthermore, the design called a full-profile design if all the determined attributes are used to describe the concepts. One talks about a partial profile if only a subgroup of the attributes are used to describe the concepts in a choice task (one subgroup may be used in the first choice task and another subgroup in the second choice task, etc.). [Chrzan 2000]

The number of potential concepts increases exponentially as the number of attributes and levels increases. One talks about a full factorial design when all possible concepts are presented for the respondents in the choice tasks. A full factorial design, however, is only feasible with a relatively small number of attributes and levels. Usually, the number of concepts presented in the choice task has to be limited; in this case the design is called fractional factorial design. Different methods (manual and computerized) are available for the selection of those concepts that are going to be presented. These methods are to ensure the efficiency of the design, although, some information is always lost with fractional factorial designs. [Chrzan 2000] General efficiency criteria of DCE designs are shortly described in Appendix 4.

4/ Data collection is the following step in a DCE. Depending on the aim of the research the following tasks may belong to it [Kjaer 2005]:

- inclusion of validity tests into the design;
- determination of respondents' characteristics to collect;
- making respondents understand the aim of the research and the decision situation itself;
- presentation of the choice tasks to the respondents;
- getting feed-back from the respondents on the questionnaire;
- qualitative research (interviews with respondents) for a better understanding of the results.

It is recommended to carry out a pilot study before the main research to ensure that attributes and levels are adequately determined, the questionnaire and the choice tasks are properly understood by the respondent, and it is not too burdensome for the subjects to fill out the questionnaire, etc. [Kjaer 2005]
Data collection usually applies one of the following means or a combination of them [Bennett 2001]: face-to-face interviews, telephone interview, survey via post mail or e-mail, placement of the questionnaires at central and busy places. The way of data collection is determined by the respondent group (the respondent's ability to fill out the questionnaire by herself, the easiest way to access the respondent, etc.) and by the disposable research fund.

5/ Data analysis is the final step. Basically, choice tasks carry two types of information in a DCE: the attribute levels attached to the concepts in a choice task and the decision itself: which concept was preferred and chosen by the respondent in the choice task. Nowadays, several econometric models are available for the analysis of DCE studies.[37]

Giving a general overview on DCEs, two other issues are worth mentioning. First, in DCEs it is common to offer an „opt-out" option for the respondents, i.e. subjects are allowed to decide not to choose any of the concepts presented in a choice task.

[37] Interested readers are referred to [Louviere 2000, Train 2003]

Depending on the study question should the researcher consider the inclusion of this option. [Kjaer 2005]
The second issue is the size of the cognitive burden respondents are likely to cope with. As it was mentioned before, this is mainly determined by the complexity of the questionnaire: the number of attributes and levels, the number of options in a choice task and the number of the choice tasks. Complexity is also affected by how much the respondents are familiar with the choice situation. Also, respondents with different socio-demographic characteristics may experience more or less difficulties with filling out the questionnaire. The transparent layout of the questionnaire and proper phrasing are crucial, too, to help respondents complete the questionnaire. However, even the most careful design of the questionnaire is not able to avert the occurrence of some unfavourable phenomena: some of the respondents may get tired earlier than others, some use heuristics or try to behave strategically, etc.. These problems emerge in many studies, however, and they are not typical of only the DCEs. [Kjaer 2005]

Reviewing the literature, we see that the application of DCEs has been increasing in health sciences for a couple of decades. Its use may be partly motivated by recognizing that other inputs of decision making, e.g. health technology assessment, needs assessment, may not provide sufficient information to make decisions in health care and health policy. Getting know the opinions and preferences of interested parties (patients and their family members, health care professionals, etc) can make a contribution to make decisions that serve the public better. In Appendix 5 I give some examples for studies in the international literature that used the method of DCE in health care and health policy. They show very well the diversity of the scope of these studies.

The motivation for choosing DCE for eliciting the preferences of Hungarian GPs was threefold. First, our aim was to create a decision making situation that medical doctors were likely to be familiar with (i.e. discrete choice in the treatment of patients). Second, we wanted our respondents to consider the attributes we were interested in together. Also, DCE was preferred because it is well rooted in economic theory. In the next chapter, I will proceed to present our empirical work on the GPs' preferences.

V.1.3 Subjects of the DCE

Hungarian GPs with adult enrolees were randomly sampled from a market research database (Progress Research Ltd) with stratification by gender and the location of the practice (Budapest, county town, town, village). The number of subjects was set to 200. First, potential subjects were contacted via telephone to ask for their consent to take part in the study. GPs got financial incentive to fill out the questionnaire. Due to personal contact and financial incentives, GPs did not tend to refuse to participate, so it is not likely that selection bias would bias our results.[38] Based on different considerations, this study chose to interview general practitioners for the following reasons:

- Patient level decisions are usually made by medical doctors, therefore medical professionals are likely to be the most familiar with this decision making situation.
- GPs have a gatekeeper function in the Hungarian health care system and are in a position to affect the availability of treatments.
- GPs have relatively big autonomy in their decisions.
- The research question did not focus on any specific illness, patient group, or therapy. This approach is mostly in line with the practice of GPs who are likely to have a more general view on patients than specialists.

Selected characteristics of respondents were collected to investigate if there were differences in preferences due to personal features. These were as follows:
- gender of the GP;
- year of graduation from the medical university (as a proxy variable for the age of the GP);
- number of years spent as a GP;
- number of enrolees in the practice (patient cards).

[38] Interviews were done by Progress Research Ltd. and MSD Hungary provided the financial means.

V.1.4 Attributes and levels

Several factors were identified in the literature that reflect social value judgements in allocating health care resources. Due to a long list of factors and allowing for the cognitive capacity of the respondents the complexity of the choice tasks was decreased as follows.

- We focused on factors that are likely to play role in the decision of medical professionals, i.e. such attributes were chosen that related to patient and disease characteristics.

- It was decided not to investigate the effect of socio-economic and lifestyle factors (e.g. income, self-induced disease). [39]

- Attempts were made to keep the phrasing simple and not to use concepts (e.g. QALY) that GPs were supposed to be unfamiliar with.

- We rejected to use numerical expressions as there was no interest in measuring preferences for a given value of an attribute level and it was assumed that GPs would simplify the choice task and categorize numerical expressions as high or low, anyway.

[39] Ryynänen [2000] made a study with a similar research question to ours with doctors and nurses. Beside other factors, they investigated whether the income of the patient, her responsibility for the disease, and negligent behaviour for health affected the respondents preferences for which patient to treat.

Table 5 Attributes and levels

Attributes	Levels	Effect coding		Variable
Characteristics of patients and the disease				
Age group of the couple (years)	18-35	-1	-1	
	36-60	1	0	Age2
	60+	0	1	Age3
Prevalence	Frequent	-1		Preval
	Rare	1		
Impact on quality of life	Deterioration is significant	-1		Qeffect
	Deterioration is not significant	1		
Mortality	Low	-1	-1	
	Medium	1	0	Mortal2
	High	0	1	Mortal3
Co-morbidities	Other serious chronic disease	-1		Comorb
	No other serious chronic disease	1		
Effect of medication				
Distribution of life-years gained	1-1 additional life-year for couple members	-1		LYGdistrib
	2-0 additional life-years for couple members	1		
Restoration of previous quality of life	partly (by 50%)	-1		Restor
	completely	1		
Averted complications	short time horizon	-1		Complic
	long time horizon	1		

Eight attributes were selected in our study (Table 5). The age of the patients is one of the central concepts that is exhaustively discussed in the literature. [Johannesson 1996, Nord 1999, Rodríguez 2000, Tsuchiya 1999] The prevalence of the disease also seems to be an issue in resource allocation: decision makers might give a special consideration to the treatment of rare diseases. [Devlin 2004]

Evidences suggest that the public and medical professionals tend to give priority to patients in bad condition before the treatment. [Ryynänen 1999, Ubel 1999, Dolan 1998] In our study the severity of the disease was captured by mortality and the impact of the disease on the quality of life. The available health status after the treatment is also addressed in previous studies [Nord 1993, Abellan-Perpinan 1999], although the evidences so far are not conclusive. Also, strong empirical evidences show that the size of the health gain matters in the allocation of resources. [Bowling 1996, Dolan-Cookson 2000] In our study the existence of co-morbidity is to present a difference in the available end status and the potential for restoring previous quality of life is a measure of how much the patient can benefit from the treatment. In the literature, egalitarian tendencies are observed and people do not prefer to give all the

health gains to one patient group. [Olsen 2000, Nord 1995] We investigated whether the respondents prefer equal distributions of life years gained or not. This issue was addressed in a way that the respondents had to choose among patient couples. This was it was possible to see if GPs prefer to give life years equally or not to the patients (i.e. 1-1 year to both members of the couple or 0 and 2 years). Regarding all other aspects, the members of the couple were identical and this was explicitly told to the interviewees.

Time preference is generally handled in cost-effectiveness analysis. In our study the timing of health gains is captured by complications of the disease avoidable on a short or a long time horizon.

V.1.5 Choice tasks in the DCE study - the design

The attributes and levels presented in Table 5**Error! Reference source not found.** result in 576 possible scenarios ($2^6 * 3^2$), therefore a fractional factorial design was used to reduce the number of presented scenarios. For this Paper&Pencil survey the Sawtooth® software was used to generate the questionnaires, i.e. to create and select those patient concepts with the combination of attribute levels that would appear in the choice tasks. The Sawtooth® software offers four methods for the design of the choice tasks[40]:

1) complete enumeration method;
2) shortcut method;
3) random method;
4) balanced overlap method.

These methods fulfil the criteria of an efficient design to a different degree (Appendix 4). Some method (e.g. the complete enumeration method) is more suitable for the investigation of main effects (utilities of each attribute level), while the other one (e.g. the random method) is a more proper choice when interactions between attributes and their effect on the decision are of interest. As the number of

[40] For the detailed description of the methods, including advantages and disadvantages, see [Sawtooth Software 2001].

observations in our study was not big enough to investigate interactions, only main effects were investigated. As a larger scale study has been also planned and the use of the same design method was preferred, the balanced overlap method was chosen for this study because this method is properly able to investigate main effects only.[41]
One of the requirements of a DCE design is to compare as many product concepts as possible to ensure the reliability of the results (i.e. to simulate as many different decision situations as possible). As the number of respondents could not be increased in our study and the paper & pencil survey also puts a limit on how many patient couples can be presented in the choice tasks, we increased the number of presented concepts in two ways.

a) Each choice task included 3 concepts, i.e. GPs were asked to choose among 3 patient couples in each task. We did not include a „none" option (the GP does not choose any of the 3 couples presented in the choice task) as unqualified denial of the treatment was considered to be implausible. Appendix 6 shows an example for a choice task among 3 couples.
b) We generated 4 versions of the questionnaire with the Sawtooth® software[42]. All these versions consisted of 15 different choice tasks, therefore, we had altogether 60 choice tasks (i.e. different choice situations). Each version of the questionnaire was filled out by 50-50 respondents. The allocation of the questionnaires to the GPs was random; still I tested if the respondent groups by the 4 questionnaire versions were similar: independent sample t-tests were carried out to compare each group to the others by GPs' age, the number of patient cards and by the number of years in practice.

[41] The balanced overlap method is somewhere inbetween the method of complete enumeration (that pursue minimal overlap of the levels) and the random method (that freely allows the overlap of the levels and so is more appropriate for the investigation of interactions). The balanced overlap method allows some degree of overlap of the levels but not as many as the random method that is based on a sampling with replacement. Instead of this, the balanced overlap method keeps track of the co-occurrence of all pairs of attribute levels in the course of the sampling. The balanced overlap is somewhat less efficient than fixed orthogonal designs (e.g. complete enumeration) in estimating main effects (efficiency loss is 5-10%), but it is still considered to be a proper method for the investigation of main effects, and it performs better in estimating interaction terms. [Sawtooth Software 2001]

[42] The aggregate analysis of more questionnaire versions in a DCE is feasible. For theoretic background see: [McFadden 1974].

V.1.6 The pilot of the DCE questionnaire and data collection

The first version of the questionnaire, i.e. the introductory text, the attributes and levels, were tested with three medical doctors. Then the questionnaire was amended according to their suggestions. The final version of the introductory text is presented in Figure 11.

Figure 11 The introductory text of the DCE questionnaire

Introduction
In our study we use the method of conjoint analysis which works with the help of response cards. This questionnaire – unlike to other questionnaires – circuit only one question. The aim of this research is the investigation of preferences so no good or bad answers exist!

The question:

Imagine that you treat married **couples**. **Both members of the couples suffer from the same disease**. The couples do not have children.

Let us assume that there is a medication with beneficial treatment effects but without significant side effects.

The **available quantity of the medication is sufficient for the treatment of only one couple**. **This medication is the only treatment option for the couples. You are the only one who can provide the medication.**

We will show you different card-sets in the questionnaire each describing 3-3 different couples. Except for the characteristics shown on the cards the couples are not different on any other aspect.

On every page of the questionnaire we ask you to **choose that couple** from the 3 possibilities **you prefer to give this medication. Please, choose only 1 couple per page!**

You are kindly asked to read all the cards carefully! **Indicate your answer with an X put in the box below the proper card!**

Thank you for your collaboration!

The most important suggestions contributing to the finalization of the questionnaire were as follows. (The first version of the introductory text to the questionnaire is shown in Appendix 7.)

- The introductory text should call the GPs' attention to the fact that the questionnaire is about preferences, hence no good or bad answer exists.

- The introductory text should be general and it is not recommended to mention any of the attributes.
- The pilot subjects implicitly assumed that there were no alternative medication for the couples, but were not sure about it. As this assumption was in line with our intention, this feature of the treatment was expressed in the final text.
- It was recommended to emphasize that the lack of resources forced the choice between the couples
- Also, the final version made it clear that the couples were identical on every aspect but the attributes.
- The pilot subjects shared that opinion that the attributes were easy to understand and most of them were relevant for a GP.
- The interviews reported to get fatigue as they proceeded with the choice tasks (around choice tasks 11-13) and tented to develop some sort of decision algorithm. In general, however, they did not feel burdensome to fulfil the questionnaire and completed it in about 30 minutes.
- Two attributes were said not to affect the decisions (frequency of the disease, distribution of life years gained). In spite of this, we kept both attributes in the questionnaire. According to the literature, the frequency of the disease may play a role in decision making. The distribution of life years gained was included because of our own research interest.
- Pilot subjects felt important that the layout of the choice tasks, i.e. the order of the attributes and their look, be the same along the questionnaire to help the subjects go through the tasks.
- Pilot subjects did not report difficulties to choose between couples instead of individuals.

Interviewers carried out face-to-face interviews in April and May 2006.

V.1.7 Data analysis

The logit model is widely used in the data analysis of discreet choices, but the logit model has some restrictive assumptions. One drawback is the assumption that the

regression coefficients of variables are identical for all respondents. This means that respondents with identical observed qualities are assumed to have the same preferences, the same 'taste' in relation to the particular attributes. Such an assumption is, intuitively, unlikely to be accurate. It is natural that people of the same sex, age etc. opt for different things. [Rouwendal 2001] Another assumption of the logit model is the independence from one another of several decisions made by a person. It is to be expected though that some unobserved factors systematically affect the individual's choices, thus, each decision he/she makes.

The *random parameter logit (RPL) model (mixed logit)* is an extension of the logit model and resolves these restrictive assumptions. (For a brief description of the RPL model, see Appendix 8.) The RPL model can capture the random differences in preferences (in taste) and the correlation of non-observable variables in a way that, instead of fixed coefficients it allows for the random change of the regression coefficient of observed variables among the respondents. [Train 2003] The theoretical basis is offered by utility maximisation decision theory. Assuming random parameters, the utility of *n* decision-makers for alternative *j* can be described as follows: $U_{nj}=\beta'_n X_{nj}+\varepsilon_{nj}$, where X_{nj} are the observed explanatory variables characteristic of the decision alternative or the decision-maker; β_n is the vector of regression coefficients which can be characterised by their mean and standard deviation; and ε_{nj} is the random term. The RPL model is relatively flexible as random parameters may show any dispersion, normal, triangle or lognormal. [Train 2003]

The utility function observed in the preference analysis among general practitioners, the subject of the dissertation, may be described in the following additive form (A_First és A_Second are alternative specific constants):

$$\boldsymbol{Vij} = A\_First + A\_Second + \beta_1 \, Age2 + \beta_2 \, Age3 + \beta_3 \, Preval + \beta_4 \, Qeffect + \beta_5 \, Mortal2 + \beta_6 \, Mortal3 + \beta_7 \, Comorb + \beta_8 \, LYGdistrib + \beta_9 \, Restor + \beta_{10} \, Complic + \beta_k \, Interaction_k$$

(k number of interactions among attributes and observed characteristics of GPs)

In the RPL model, choice probabilities can be described as an integral over dispersion. The form of the integral, however, is in general not closed and thus it has only an approximative solution. Simulation calls for repeated random sampling from

the dispersion. It may happen though, that random sampling leaves ‘holes’, i.e. no samples are taken from certain parts of the density function. In order to avoid this, the use of the so-called intelligent sampling sequences is recommended. One of them is the Halton sequence, which breaks up the density function into parts of equal size and draws samples from the individual parts. Thus no uncovered parts remain in the course of sampling, and compared to random sampling, less draws yield stable parameter estimates. [Hensher et al 2005] Several empirical examinations found that in RPL models the simulation variance of parameter estimates was lower over 100 Halton draws than 1000 random draws. [Train 2003]

A parameter is random if the parameter estimate of the standard deviation is statistically significant; in this case there are differences in taste. If, however, parameters correlate, the dispersions are interdependent and differences may result from two things: on one hand, from the actually existing variance in random parameter estimate, and on the other, from the correlation to the other random parameter estimates. If so, the Cholesky decomposition matrix is usually examined for the identification of random parameters, which separates attribute-specific standard deviation from deviation arising from attribute interaction and thus help avoid the mixing of the effect of correlations in dispersion parameter estimates. [Hensher et al 2005] Accordingly, if the correlation among parameters justified so, we also examined the Cholesky decomposition matrix. In the matrix, attribute-specific dispersions appear along the diagonal, and estimated dispersion following from the interaction of attributes are below it.

In our model, categorical variables are shown (Table 5) which were coded by effects coding – this is generally recommended for discreet choice experiments. [Bech 2005] In this case, regression coefficients are estimated so as the sum of the effects of the particular categories is zero. As a result, the estimates regression coefficients of the categories are compared to the value estimated on the basis of all the other predictors in the model, rather than to a fixed reference category. The software used for data analysis was NLOGIT 4.0.

V.1.8 Validation

Regarding the DCE, several issues may emerge for validation[43], in my study I dealt with two of them.

- *Rationality of responses*: whether the results are in line with *a priori* expectations of the researcher. As we investigate preferences, they may be contradictory to these expectations and tastes are not disputable, of course. Still, assuming some sort of behaviour, (e.g. utility maximization) or on the base of empirical findings in the literature, it is possible to make up some expectations about the most preferred levels of the attributes.

  Assuming that the GPs would follow a utility maximizing behaviour, the following expectations were made for the attributes. The respondents would prefer 1) the patients in the younger age groups, 2) the treatment of that disease that deteriorates the quality of life significantly, and 3) has higher mortality, 4) those patients who do not suffer from other co-morbidities, and 5) who are able to regain their previous health status, and 6) those cases where complications can be averted at a short time scale. Regarding the frequency of the disease and the distribution of life years gained, we did not have a priori expectations.

- *Dominant preferences (lexicographic preference ordering)*: whether the respondents are willing to trade-off between the attribute levels. Dominant preference exists when the respondent always chooses the alternative with the most preferred level of a certain attribute irrespective of the levels the alternative takes on other attributes on. The literature does not give a clear guidance on how to treat the respondents with this sort of preference. In this study, I will analyse these respondents – if any – together with the others. If dominant preferences are found in many cases, it may be worth making subgroup analyses, as well. [Scott 2002]

  I investigated the existence of dominant preferences in case of 4 attributes separately. I was looking for those GPs who always chose that patient couple 1) who belonged to the youngest age group, or 2) whose quality of life was

[43] See e.g. Kjaer [2005]

deteriorated significantly, or 3) who were suffering from a disease with high mortality, or 4) who had the potential to restore their previous health status completely.

V.1.9 Results of the preference elicitation

Table 6 below shows the average characteristics of the GPs in the total sample. Pair-wise comparison of the respondents' subgroups by the 4 questionnaire versions showed that these groups were similar with respect to the age of the GPs, the years spent as a GP, and the number of enrolees in the praxis (see Appendix 9). As one may expect it, a high Pearson correlation ($r=0,78$; $p<0,01$) was found between the age of the GP and the number of years in praxis.

Table 6 Characteristics of GPs in the total sample

Characteristics	**N=200**
Male GPs	58%
Average age (years)	48,7
st.d.	*9,6*
Average time in praxis (year)	18,2
st.d.	*10,5*
Average number of enrolees	1804
st.d.	*520*

Due to face-to-face interviews, all the 200 questionnaires were completed (altogether 3 choice tasks were not answered and some demographic data were missing for two respondents). It took approximately 30-35 minutes for the respondents to complete the questionnaire.

No evidence was found for the existence of dominant preferences in the sample. None of the GPs preferred to choose always that patient concept that had the most preferred level of a certain attribute (youngest age group, high mortality, significant deterioration of quality of life, or complete restoration of previous health status).

A number of models (not presented here) were investigated to identify random parameters and to explore taste variations among our respondents. After testing various possible distributions, the normal distribution of random parameters was

chosen. Halton sequences were used in simulations with 500 replications. Since we found relatively high correlation between our random parameters (i.e., 0.71; 0.71 and 0.50 for Qeffect:Mortal2, Qeffect:Mortal3 and Mortal2:Mortal3, respectively), we investigated the Cholesky decomposition matrix to identify those parameters that behave randomly. Below I present the results of the RPL model we chose finally. These estimation of the RPL model always begins with the estimation of a standard multinomial model (MNL) (see Table 7) that provides initial values for the RPL model.

Table 7 Parameter estimations in the MNL model

Variable	Coefficient	St. error	P[|Z|>z]
Qeffect	-0,3006	0,021	0,000
Mortal2	-0,0407	0,032	0,197
Mortal3	0,3439	0,029	0,000
Age2	0,1307	0,030	0,000
Age3	-0,4743	0,033	0,000
Preval	0,0338	0,021	0,112
Comorb	0,1288	0,022	0,000
Restor	0,2162	0,021	0,000
Complic	0,0124	0,021	0,560
LYGdistrib	-0,2265	0,021	0,000
A_First	0,0265	0,049	0,585
A_Second	0,0573	0,048	0,236

LL*	-3275,482
LL(MNL)	-2866,972
$Chi^2(10) = 817,020$ (p = 0,000)	
$R^2=0,125$	
Number of observations = 3000	

Remarks:
1) LL*: model estimated with constants only.
2) Chi2 (df) = 2 x [LL(MNL) – LL*]
3) $R^2 = 1 – LL(MNL)/LL*$
4) Total number of observations: 3000 (200 GPs and 15 choice tasks per GP); 18 bad observations.

The results of the final RPL model is shown in Table 8. The model was statistically significant with a $Chi^2_{(18)}=848,6$ (p=0.000). Compared to the standard multinomial logit model (MNL) with 12 parameters, the likelihood ratio test produced a

$Chi^2_{(6)}$=30,42 (p=0.005).[44] This measure of improvement indicated that the goodness-of-fit of the RPL model was significantly better, and suggested that heterogeneity in GPs' preferences was an important phenomenon.

[44] A standard logit model is estimated first to derive the initial values for the RPL. The MNL model, however, does not include the heterogeneity in means estimates and the standard deviations of parameter distributions.

Table 8 Results of the RPL model

Variable	Coefficient	St. error	P[|Z|>z]
Random parameters			
Qeffect	-0.3962	0.118	0.001
Mortal2	0.1597	0.089	0.071
Mortal3	0.4328	0.095	0.000
Nonrandom parameters			
Age2	0.1469	0.032	0.000
Age3	-0.5056	0.035	0.000
Preval	0.0249	0.023	**0.277**
Comorb	0.1253	0.021	0.000
Restor	0.2110	0.019	0.000
Complic	0.0220	0.019	**0.256**
LYGdistrib	-0.2280	0.022	0.000
A_First	0.0296	0.054	**0.585**
A_Second	0.0542	0.050	**0.275**
Heterogeneity in mean			
Qeffect:Gpage	0.0033	0.002	**0.163**
Mortal2:Gpage	-0.0024	0.002	**0.164**
Mortal3:Gpage	-0.0024	0.002	**0.164**
Diagonal values in Cholesky matrix			
NsQeffect	0.0004	0.000	0.000
NsMortal2	0.0719	0.038	0.057
NsMortal3	0.0719	0.038	0.057
Below diagonal values in Cholesky matrix			
Mortal2:Qeffect	0.0724	0.038	0.055
Mortal3:Qeffect	0.0724	0.038	0.055
Mortal3:Mortal2	-0.0008	0.000	0.000
Standard deviation of parameter distributions			
sdQeffect	0.0004	0.000	0.000
sdMortal2	0.1021	0.000	0.000
sdMortal3	0.1021	0.000	0.000

N=3000 (200 groups)
LL* -3276,062
LL(RPL) -2851,760
LL $Chi^2(18)$ = 848,604 (p = 0,000)
R^2=0,129
Number of Halton sequences: 500

Remarks:

1) LL*: model without estimated parameters. It is like a model giving equal probability of choice to all couples.
2) Chi2 (df) = 2 x [LL(RPL) – LL*]
2) $R^2 = 1 – LL(RPL)/LL*$
3) Number of observations was 3000 with 200 groups (by GPs) in the RPL model; 18 bad observations.

The results show that many of the coefficients were statistically significant at a 5% level and had the expected signs. Ceteris paribus and given the levels of the attributes

used, GPs preferred to treat the youngest patients and those diseases that affect patients' quality of life most. Treatment was increasingly preferred when the mortality related to the disease increased. GPs were more likely to prefer treatment of patients without co-morbidities and those who had the potential to fully restore their previous health status. They also showed a preference for distributing life-years gained equally between the members of the couple. The prevalence of the disease nor the time horizon of available complications played a significant role in the decisions. The insignificance of the (alternative specific) constants (i.e. A_First and A_Second) indicates that GPs, as would be expected, did not prefer one couple over the other when the differences in attribute (level)s were accounted for. Nevertheless, constant terms were included in the model as a test for specification error.[45] [Scott 2001]

After thorough investigation, we found that two attributes, i.e. effect on quality of life and mortality, could not be sufficiently described by single parameter estimates. The mean random parameters of quality of life effect and high mortality were statistically different to zero at a 5% level of significance. The attribute-specific standard deviations (diagonal values in Cholesky matrix) were significant at a 5.7% level, indicating that GPs' preferences for quality of life effect and for diseases with high mortality were, indeed, heterogeneous. To determine the potential sources of taste variations among the respondents (e.g. older GPs show less strong preferences for the treatment of diseases with high mortality than younger GPs), it is common to introduce interactions of the random parameter and other variables. All possible interactions with the observed characteristics of the GPs were investigated. (The results with GPs' age as explanatory variable – interactions with GPage - are shown in Table 8. Unfortunately, none of these interactions were significant, indicating that the characteristics of the GPs collected in the study were not able to explain the taste variations.

Another RPL model is presented in Appendix 10 (the initial MNL model of which is the very same as the one in Table 7). In this version of the model the following four attributes were considered to be random parameters: old age (Age3), high mortality

[45] If the alternative-specific constants were statistically significant, this would mean in this study that responders systematically preferred e.g. the 2nd couple that is located in the middle of the questionnaire. The location of the couple, however (i.e. right, middle or left position on the paper) does not carry any meaning, couples are different only in the levels of the attributes. However, it is possible to design a DCE of such where different alternatives are described with the very same attributes. For example travelling by train or plain can be characterized with the same attributes, still there can be an explicit preference e.g. for travelling by train if the responder is afraid of flying. In this case the alternative-specific constant – meaning train or plain – can be statistically significant.

(Mortal3), effect on the quality of life of the patient (Qeffect), and the potential for restoring the previous health state of the patient (Restor). Investigating the Cholesky decomposition matrix, the parameter of Mortal3 seemed to behave randomly, meaning that based on this RPL2 model, the preferences of the GPs for high mortality are heterogeneous. This heterogeneity could be explained by the age of the GPs: the interaction between Mortal3 and the age of the GPs proved to be statistically significant at a level of 1.5%, which suggests that the older the respondent is the weaker her preference is for the treatment of diseases with high mortality. As in the majority of the tested models the observed characteristics of the respondents were not able to explain taste differences, I would refrain to draw conclusions about the potential relationship between the preferences for attributes and observed characteristics of the GPs. The fact, however, that we identified some models where the age of the GPs explained heterogeneity in tastes in a statistically significant way shows that this issue is a potentially interesting area for further research.

As a summary of the results, we can say that the magnitude of the coefficients (either fixed or random) did not change significantly in the tested models, and the sign of the coefficients never changed, meaning that the direction of the preferences for a given attribute did not change in the models. This suggests stability in our results.

V.1.10 Discussion of the results of the DCE study

We investigated the preferences of Hungarian GPs for a set of criteria that might affect patient level prioritization with a DCE. The direction and the strength of preferences for different attributes (given the specified levels) seem to be plausible and findings showed that GPs were willing to trade-off these attributes, which is an important feature of a DCE study. The importance of these criteria is widely discussed in the literature, although the preferences of health care professionals have been elicited only in few studies.

Ryynänen [2000] investigated the prioritization attitudes of doctors and nurses in Finland, using a number of attributes comparable to those in our study. Treatment of children was found to be preferred in that study. Old age in itself was not a reason for

lower priority, but treatment of demented and institutionalized patients was less preferred due to co-morbidities in old age. In our study only adult patients were included[46] in the scenarios and we find a preference for treating younger patients. Relative discrimination against the old is controversial, also in the literature. These preferences may depend on the characteristics of respondents and cultural issues. [Nord 1999] In line with international studies [Johannesson 1997, Busschbach 1993] we found no relationship between age of the respondents and preferences for treatment on the basis of age of the patients.

Our finding that respondents preferred treatment of patients with diseases associated with high mortality and those with a negative impact on quality of life, is also in line with the study by Ryynänen [2000]. Moreover, he found that both patients with a poor prognosis and those with a good prognosis did not receive priority in treatment. (While this result may be considered counterintuitive, this need not be the case if respondents understood good prognosis as a situation in which patients will recover without treatment as well, while patients with poor prognosis were considered to be 'beyond help' or for whom the health state after treatment would still be poor.) In our study, the improvement in health was explicitly related to medical treatment. Unsurprisingly, GPs preferred to treat people with a higher capacity to benefit from the treatment. The importance of the magnitude of the health gain in our study is in line with previous studies (in the general public). [Bowling 1996, Abellan-Perpinan 1999, Cookson-Dolan 1999]

Earlier studies [Nord 1993, Abellan-Perpinan 1999] suggest that after-treatment health status has a limited relevance in allocating resources, although it was stressed that eliciting these preferences may be highly sensitive to framing effects. Ubel and colleagues also found that the general public gave equal priority to patients with and without pre-existing health conditions which influence the possible after-treatment health status. [Ubel 1999] Our respondents appear to hold other preferences. One of the potential explanations is that we did not ask respondents to choose between patients in life-threatening conditions. The 'rule of rescue' might mitigate the importance of factors like after-treatment health. Moreover, subjects from the general

[46] We decided to exclude the age group of children from the study for we wanted to avoid the situation that the preference for treating a child would prevail the decisions, i.e. the responders will not be willing to trafe-off between attributes.

public might feel more uncomfortable with making such discriminatory choices than medical professionals. [Sen 1997] The study by Ryynänen [1999] provides some support for this hypothesis, as treatment of patients with co-morbidities were less preferred by nurses and doctors in that study as well.

The time horizon of avoidable complications was not significant. GPs are likely to consider other attributes more important and did not focus on events that might occur in the future. Also, the interpretation of complications (e.g. severe or not) was left to the respondents, which may be considered a limitation of this study.

Life-years gained were preferred to be distributed equally between the members of the couple, even if the magnitude of the difference was not so remarkable. This sort of egalitarian tendency is also observed elsewhere [Nord et al 1995b] and we assume it to be more prevalent if differences in gains were more significant.

A number of limitations of our study deserve mentioning. First, more attributes than here considered may be relevant in the investigation of social value judgments in the allocation of health care resources. We narrowed the scope of the study in order to avoid overburdening our respondents, in such a way as to focus on general concepts that were considered to be able to characterize the patient, the disease and treatment effect in a broad sense. Further research is encouraged to study the role of socio-economic factors, the lifestyle of the patients, etc. in prioritization decisions. Also, collecting more background information of respondents (e.g. health state) may contribute to explaining taste variations.

Second, we sought to determine attributes and levels in a way that all the possible combinations correspond to a disease in real life, nevertheless some of the scenarios were more realistic than others. (For example, a disease with high mortality and low impact on quality of life might seem unrealistic at first sight, but myocardial infarction can be thought of in this case.)

Third, in this study we investigated only the main effects, but the possibility of interaction effects cannot be excluded. Also, the generalizability of our results is limited by the fact that survey of other medical professionals, the general public or of health policy decision makers might lead to different results, and preferences can be determined by country-specific and cultural factors.

Interestingly, our findings suggest that GPs' choices were reasonably in line with QALY maximization. However, our study was not designed to separate maximizing behaviour from other considerations, so we cannot be conclusive in this respect. Still, often, respondents preferred those levels of the attributes that can be considered as the ones that generate more health gain. For example, GPs preferred treating the youngest age group. In general, young people have a larger capacity to benefit because of longer life expectancy. Obviously, it is possible that respondents were considering other age-related aspects as well (e.g. the productivity of the patient or, indeed, a simple distributional preference to treat the young). An exception in this respect is the distribution of life-years gained. Maximizing health gains, one would not make a distinction between how the gains were distributed. Still, GPs clearly preferred to give equal gain for both members of the couple, showing that equality carried additional value for them.

V.2 Attitudes of Hungarian medical doctors – the Q-study

V.2.1 Overview of the Q-method

The Q-method was introduced by William Stephenson, an English psychologist. The appellation suggests that Q-method should be distinguished from traditional statistical methods, called R-methods, based on correlation (R stands for the Pearson correlation). [Baker 2006] Beyond psychology, the Q-method is widely used in the field of communication and political sciences, and has been increasingly used in health sciences. [Brown 1993]

The aim of the method is the study of subjectivity and not that of objective facts. It belongs to qualitative methods in so much that the Q-method is to get know individual opinions, believes, faiths, tastes, judgements and motivations related to the investigated issue. Also, small sample of respondents is sufficient to explore the diversity of opinions [Baker 2006], which is the final goal of the method. [Donner 2001]

On the other hand, the technique of the data collection and the analysis is quantitative. It operates with correlations and factor analysis; however, in distinction to R-methods, it can be regarded as the „inverse" of the factor analysis. Instead of making correlations between the test results of a great number of respondents, it collects a great number of observations from a small number of individuals and it calculates the correlation between the respondents. These correlations suggest different views, opinion families or opinion groups in the sample. [Van Exel 2005]

The main elements and steps of the Q-method are the following: the Q-set (concourse of opinions), the P-set (group of respondents), the Q-sort and the factor analysis by individuals. These elements are discussed briefly below.[47]

The starting point of the Q-method is the collection of all the possible opinions, believes and views that may relate to the issue under investigation, i.e. to get know what people say or think about the topic. The concourse of opinions may be retrieved

[47] Readers interested in the Q-methodology are referred to the following website: http://www.qmethod.org and to the literature of the dissertation.

from the media, focus-group discussions, interviews, and the literature or from policy documents. The aim is to cover the opinions as broad as possible and that these opinions are representative to the whole concourse of opinions. Afterward, retrieved opinions are formulated as statements by the researcher. These statements together are called the Q-set that can be unstructured (all emerging opinions are included in the Q-set) or structured (the researcher is interested in only some aspects of the issue and only related opinions are formulated). The number of statements in a Q-set is usually between 20 and 100. Each statement is written onto a card and showed to the respondents. [Baker 2006]

The sampling of respondents is not random in the Q-method. Subjects are usually selected by personal characteristics that are expected to cause differences in opinions and views (e.g. social status or job of the individual). The literature suggests that 30-60 respondents are sufficient in a Q-study. [Brown 1980] It is important to note, that the selection of the individuals is to explore the pattern of opinions (the similarities and the differences in views) and the Q-method does not intent to estimate the proportion of people who share the same opinion in the population. [Baker 2006]

Having the Q-set, the following step of the Q-method is the sorting of the statements by the respondents. Respondents are asked to express how much they agree or disagree with each statement. Statements have to be placed on a score sheet (see an example in Appendix 11) along a scale (from -4 to +4 in the example) that shows the degree of agreement with the statement. For example, the respondent is supposed to place those cards she does not agree with at all on the left-hand side of the grid (column -4). Statements she feels neutral about should be placed under score zero, and statements she agree with the most are to be placed under score 4 on the right-hand side. The rows in the grid carry no additional information, i.e. the statements placed in the same column are agreed with to the same degree. The Q-sort is usually carried out in two steps. First, the respondent groups the statements into 3 piles („agree", „neutral" and „disagree"), then she places each statement on the score sheet as she likes. Having the Q-sort completed, the respondent is allowed to review her Q-sort again and to change cards if she wishes. The Q-sort can be made via interview or the respondent can do it by herself. [Baker 2006]

The grid usually takes the form of the quasi-normal distribution to give some hint to the respondent, although other layouts are also possible. A random number is attached to each statement to facilitate data entering. Q-sort is recommended to be followed by an interview to let the individual explain why she agreed or disagreed with the statements. Additional information help the researcher identify the opinion families and contribute to a deeper understanding of the results. [Baker 2006]

The Q-method operates with correlations and factor analysis. The correlation matrix represents the similarity of the individuals' Q-sorts. Also, the factor analysis is based on the individuals and its result allows for the distinction of the different opinion groups and makes it possible to create that specific Q-sort for each opinion group that describes the group's view on the topic on average. (More details on the statistics are available in Appendix 11.) Having the „average" Q-sort for each opinion group we can investigate the Q-statements one-by one looking for a) consensus statements and b) contention elements. Consensus statements are the ones that are similarly valued by the members of most groups (e.g. most of the individuals agree with the statement). On the contrary, contention statements distinguish one opinion group from the others. [Donner 2001]

Compared to sheer qualitative methods, the advantage of the Q-method is that the classification is not completely the result of the researcher's intellectual activity. Although, it is the researcher that formulates the statements, so they are not independent from the researcher, the respondents themselves make the classification and this way such opinion patterns may emerge that the researcher would not think of intuitively. Another advantage might be, that the method of data collection and data analysis in a Q-study makes it possible to investigate subjectivity in a structured way. [Baker 2006]

Compared to quantitative methods, the weakness of the Q-method is that the results are not able to tell us the proportion of people who belong to each opinion group in the population. The Q-method does not fulfil the criteria of independency either: the placement of one statement on the grid is not independent of the placement of other statements. The importance of this methodological shortage, however, is still debated. [Baker 2006]

V.2.2 Subjects and data collection in the doctors' Q-study

Those dimensions that are likely to play a role in these allocation decisions were retrieved from the literature in the EuroVaQ project. [Dolan et al 2005, Tsuchiya 2005, Smith 2005, Schwappach 2002] These dimensions are expected to cover all the relevant issues that might play a role in the societal distribution of health gains:

- characteristics of the patient (e.g. age, socio-economic status, relatives, employment status);
- characteristics of the disease (e.g. severity, pain, reason of the development of the disease, frequency of the disease);
- effect on the health of the patient (e.g. degree of deterioration in health, survival, health related quality of life, prevention);
- characteristics of the treatment (e.g. effective, costs, cost-effectiveness, waiting time);
- non-health aspects related to the disease (e.g. wellbeing of family members, burden on the family members).

The statements of the Q-study (the Q-set) were then formulated along these dimensions. (Original statements in English and statements in Hungarian are listed in Appendix 12.) The first version of the Q-set consisted of 37 statements. These statements were critically reviewed by the members of the EuroVaQ team. Based on these opinions, the final version of the Q-set formulated altogether 34 statements. The Q-questionnaire was piloted in three countries (Croatia, The Netherlands, and United Kingdom) in the general public.

The translation of questionnaires needs validation to ensure that the content and the meaning of the statements are the same in different languages. The EuroVaQ project required a back-and-forth translation for this purpose. Therefore, I translated the original English statements in Hungarian first. Then, a professional interpreter translated them back to English. Comparing the original and back-translated

statements in English I was able to change and finalize the statements in Hungarian.[48]

The Q-study was a web-survey in the EuroVaQ project. As the on-line version of the Hungarian Q-questionnaire was available, it was plausible to survey the doctors through the internet, too. To collect data separately from the EuroVaQ project, a new web-address was created for the doctors. [49] The on-line questionnaire was several times tested and amended with the helpof my Hungarian colleagues.

Medical doctors were contacted by my colleagues and acquaintances and were asked to participate in the survey via e-mail. The only inclusion criterion was that the responder was actively working as a doctor at the time of the surveying. Other criteria, like age, location, professional area were not used. The e-mail contained information about the aims of the research and the availability of the website. The decision making situation itself and the step-by-step guidance on the completion of the questionnaire was part of the on-line questionnaire. To get a deeper insight into the opinion of the responders, after the Q-sorting exercise the responders were shown those two-two statements they agreed with the most or the least, and were asked to give an explanation for those decisions. The survey was nameless, but information was collected on the age, the sex and the profession of the responder. Data collection took place in October and November 2008.

V.2.3 Results of the Q-study

In a total, 80 e-mails were sent to out. Alltogether, 34 responders rank-ordered the 34 statements; as 1 of the responders said himself to be a student, 33 Q-sorts were suitable for analysis. The medical doctors (10 males) ranged between 25 and 69 years of age and came from different parts of the country.

Data were analyzed with the PQMethod 2.11 software[50]. The software uses the statistical method of factor analysis and rotates the factors with the so called VARIMAX process. Results were investigated by different solutions with 2, 3 and 4

[48] I would like to acknowledge Dr. Márta Péntek for her valuable contribution to the Hungarian version of the Q-questionnaire.

[49] The online Q-questionnare for medical doctors is available at:
http://www.yourviewonhealth.com/hungary/md/index.html

[50] The software and its manual are available at: www.rz.unibw-munchen.de/~p41bsmk/qmethod/

factors. Finally, I chose the 3-factor solution and the results of this solution are only presented in the dissertation.[51]

Table 9 shows the factor loadings for all 33 reponders in the case of the 3-factor solution. Six responders did not load on any of the factors significantly. (These responders were excluded from further analyses by the software.) For the other responders the number in bold and **X** indicate that factor load that was statistically significantly loading on a given factor[52] (i.e. **X** shows the opinion group the responder belongs to). The three factors had 11, 8 and 8 defining variables, i.e. responders belonging to each, respectively, and together explained the 50% of the total variance in the Q-sorts.

[51] Regarding the 2-factor solution I felt the results a bit rough, although the factors were easy to distinguish. In the case of the 4-factor solution there were 11 responders that did not belong to any factor, that is why I did not find this solution a proper one either (see Appendix 13) (Originally there were 5 factors with an eigen value > 1.)

[52] Based on a Q-sort of 34 statements and $p<0.01$, the factor loading of a Q-sort must be equal to or higher than 2,58/sqroot(34) = 0.44 to be statistically significant. The composite sort of a factor is determined as the weighted average of the the Q-sorts belonging to the factor, with factor loadings as weights.

Table 9 Factor loadings with 3-factor solution

Responders	Factor 1	Factor 2	Factor 3
1 hu_md_01	0,4172	-0,4914	0,2913
2 hu_md_02	0,3338	0,0676	**0,5914X**
3 hu_md_03	**0,7092X**	0,3307	0,3213
4 hu_md_04	0,4173	0,1524	**0,6654X**
5 hu_md_05	0,5168	0,5022	0,3014
6 hu_md_06	**0,6161X**	0,1796	0,1945
7 hu_md_07	0,3228	0,3587	0,476
8 hu_md_08	**0,6445X**	0,1728	0,057
9 hu_md_09	**0,3466X**	-0,0117	0,3324
10 hu_md_10	0,6073	0,3253	0,5933
11 hu_md_11	0,1632	0,1839	**0,6822X**
12 hu_md_12	**0,6881X**	0,2376	0,2856
13 hu_md_14	0,0634	**0,4965X**	0,2116
14 hu_md_15	0,2146	**0,4132X**	0,297
15 hu_md_16	0,2242	0,2872	**0,6543X**
16 hu_md_17	0,4053	**0,5058X**	0,1989
17 hu_md_18	0,1949	0,168	**0,5454X**
18 hu_md_19	**0,5525X**	-0,0014	0,3578
19 hu_md_20	**0,5512X**	0,192	0,1286
20 hu_md_21	-0,0771	**0,3794X**	0,3138
21 hu_md_22	**0,6475X**	0,2345	0,2475
22 hu_md_23	0,3841	**0,5623X**	0,2311
23 hu_md_24	0,058	0,2904	**0,4923X**
24 hu_md_25	0,3847	**0,5708X**	-0,0016
25 hu_md_26	**0,5730X**	0,317	0,4721
26 hu_md_27	0,1903	**0,5959X**	0,0478
27 hu_md_28	0,2363	0,533	0,4878
28 hu_md_29	**0,6059X**	0,1196	0,5062
29 hu_md_30	0,2398	0,1446	**0,7534X**
30 hu_md_31	0,5696	0,1437	0,5719
31 hu_md_32	0,2268	**0,4586X**	0,2828
32 hu_md_33	0,3746	0,2699	**0,7488X**
33 hu_md_34	**0,4543X**	0,2995	0,2742
% Var.	**19%**	**12%**	**19%**

The Q-method provides different outputs.

a) Within each factor (opinion group) the software calculates the so called normalized factor scores (Z-score) for each statement; these scores show the degree with which the valuation of the given opinion group is different from the main average. On a given factor, the Z-scores of the highest values indicate those statements that are agreed the most by the responders in the group. Statements with the lowest Z-scores are disagreed with the least in the group. These scores help the analyser to overview which statements were agreed or disagreed with or were neutral in a given group. The statements having a Z-score > | 1 | are called *characteristic* statements. (Z-scores of each factor are given in Appendix 14.)

b) *Distinguishing statements* are those that distinct a factor from the other factors (i.e. opinion groups) because the group agrees or disagrees more with the statement or – unlike other groups – finds a statement neutral. (Distinguishing statements for each factor together with the ranks and the Z-scores are presented in Tables 1-3 of Appendix 15.)

c) C*onsensus statements* are those in the case of which the opinion groups share a similar attitude and opinion about the issue. Groups tend to agree or disagree with the statement in a similar way or all groups find the issue neutral (see Table for in Appendix 15).

d) Based on the Z-scores, it is possible to generate for all the 3 factors the Q-sort that is characteristic of the given factor on average. The scoring sheet can be filled out in a way that is characteristic of the given factor: the two statements with the highest Z-scores are placed in column (+4), the two statements with the lowest Z-scores are placed in column (-4), etc. Typical Q-sorts of the 3 factors are given in Table 10.)

In the following, I describe the factors, using the characteristic and distinguishing statements of each and the written comments of those respondents who belong to the factor. Quotes are presented in Italics between quotation marks.

Opinion group 1

Medical doctors in this factor believe that rescuing someone from death has a priority over other interventions [8# +4 (short for statement 8 ranked at +4); 17# -2; see Table 2]: *"Life saving is the most important thing"; "The most important task of medical care is to avert life threatening condition"*. On the other hand, they feel highly important to prevent diseases (27# +4): *"This is the theoretical principle of medical science"; "It costs less and provides better quality of life"*. They are against the idea that circumstances other than health status of the patient should play a role in allocating health services. They most disagree with the prioritization of people who contributed more to the health care system (3# -4) or with the discrimination of people who do not work (5# -4): *"It would cause absolute inequality in the society"; "Contribution to public expenditures is about this. If the statement were true, we would not talk about social insurance anymore"; "We cannot ground the availability of health care on the patients' ability to pay again (see middle ages, the beginning of modern history)"*. Also, they are of the opinion that differences in income should not affect the treatment of the patients (16# -3): *"These two things have nothing to do with each other, it is a completely insensate assumption"; "According to the Hungarian constitution, all people are entitled to medical care of the highest quality"*. According to the group, it is need that should drive the access to health care not geographical circumstances or socio-economic status (29# +3; 4# +2): this is required *"to ensure equality and justice"*. This group of respondents slightly disagree with taking into consideration the effect of the disease on the family members of the patient (9# -1; 13# -1). Although, they are not willing to discriminate patients according to their financial situation, they tend to concern the costs and benefits of medical interventions. They agree that treatments generating more health should have priority (15# +3; 19# +3; 32# +2): *"This needs no explanation, it is clear in economics"*; *„It is the most advantageous for the patient, the health care provider and for the financier"*. They are willing to consider situations where high costs are associated with very low benefits (6# +1): *„18 million Forint [HUF] is too much for a patient living for 1 month"*. Also, they do not pursue to cure those people who are in a worse condition but can hardly benefit from treatment (11# -3; 22# +2; 33# -2). Unhealthy lifestyle of the patient and her responsibility for her own illness matter for this group of doctors (21# -3; 25# +1): *„The patient is indeed responsible*

for his health"; *"Yes indeed, everybody should care for themselves to live a healthier life"*; "*At the moment, it is only the health care system that is accountable for the success of the prevention and the treatment. Patients do not have any responsibility for it. This way we are beating the air"*.

Opinion group 2

This group of doctors think that prevention would be highly important (27# +4): *"This is the basement of everything"; "Prevention is more important than anything"*; *"Prevention is important, fewer people would be ill"*. Life saving is of priority, too (8# +3): *"Life is the most important thing"*. As a distinctive characteristic of this group, they most agree with the statement that patients should be prioritized based on medical expertise (12# +4): *"That is why we continued studies. To become able to decide this"; "Medical treatment should be judged on a professional basement"*. They would not give priority to patients with dependent children (31# -4): *„It is the disease that should matter, not the family circumstances of the patient"*. They do not choose the patient with lower quality of life if the treatment is of little help (11# -4): *"It is not quality of life that matters but the disease"; "No, because everybody is the same, one cannot make a distinction"*; but they would treat the patient in worsening condition with priority (18# +3). On the other hand, compared to the other factors, they are less willing to consider the health benefits of the treatment (19# +1; 32# -1): *"It is not possible to tell in advance how the patient will react to the treatment"*, and they do not appear to consider the costs in patient level decision making (6# -1; 15# +1): *"We do not consider this"*. This opinion group think that young patients should not be preferred to older people (23# -3; 26# -3): [because of] *"Equal judgment"*, and they are the only ones who agree with the idea that elective interventions should be provided on a first come first served basis (28# +2): *"I am a democrat"; If it is not about emergency care, I do not find any reason to treat somebody out of his turn"*. They do not seem to care about if the patient's behaviour or lifestyle played a role in the development of the disease (21# 0; 25# 0). Similarly to other factors, they feel that it is need that should drive the access to health care not geographical circumstances or socio-economic status (29# +3; 4# +2). Regarding the role of paid work in priority setting, they take a middle position between the other two factors (5# -2).

Opinion group 3

Similarly to the other factors, these respondents think that prevention of diseases (27# +3) is important: *"Prevention of the diseases (based on developed protocols) is a more efficient way of curing than to treat diseases already manifested. Of course, this is not true for all the diseases, that is why proper regulation is needed. Furthermore, it puts bigger burden on the society because the person who does not die of AMI at the age of 45-60 is likely to die of cancer about 20 years later. The treatment of the latter one is much more costly and the pension should be paid, too. However, if we took into consideration this argument, we could not speak about cure, health care and humaneness"; "At a long run it is much cheaper to prevent severe diseases than to treat and see after them"*.

Rescuing people from a certain death (8# +3) is of high importance, too: *„In case of life saving, we usually do not know how much health gain we can reach. That is why life saving is to be done first"*; [it is important] *"Because it saves life. I do not understand what should be explained about it"*. However, they do not pursue the 'rule of rescue' by any means (17# +1): *"It is needless to prolong the suffering"*. Also, they agree that access to health care should be based on needs (29# +4); age or gender should not play a role in prioritization decisions (4# +2): *"All people should have access to the most important health care services, even if not to all services. This should be independent of the habitation or the income of the patients, because this is the only way to ensure their right to work"; "It is fair in this way"; "This would be the proper way in an ideal society, because all people are the same"*. They think that differences in income are not a reason for positive or negative discrimination (16# -4): *"Why should we prioritize like this? Because the other one might be able to buy the treatment for himself? Or the one who is better off has paid the social insurance contribution in all his life and the other one did not?"*. These respondents are of the opinion that people are responsible for their own health and should bear the consequences, as well (21# -4; 25# +2): *"People are responsible for their health. It is valuable as anything else. If somebody does not care about it, although he could, than he behaves irresponsibly, as the problem could have been prevented. The statement is not acceptable even in an idealistic health insurance system based on complete solidarity. The other insurees who spent time, energy, money and showed self-discipline to conserve their health would be put at a*

disadvantage if people who did not do these things would get the same treatment. Also, in general, it may result in irresponsible behaviour and decreases the motivation for health-conscious behaviour"; "Why should the society help that person who caused harm for himself? It is not fair!".

They feel it important to provide treatments with more health benefits (15# +4; 19# +3): *"Bigger health gain for the same price is beneficial both for the society and the individual"; "The running of the health care system is very expensive. Many times it is wasteful. To constraint expenditures, the health gain of different treatments should be determined and based on this, the treatments should be ranked for reimbursement"*, these respondents are willing to consider the costs of the treatment if the expected benefit is very low (6# +2). They disagree the most to consider if the patient has a partner or not (7# -3): *"Why should we give [the transplant organ] to the person with partner? How would we define partnership, anyway?"*. Unlike other factors, they are of the opinion that patients should be allowed to by priority treatments if others are not affected negatively (24# -3). They appear to be the least interested in how much the patient contributed to the health care system or she has paid work or not (5# 0; 3# +1), or putting it in a different way, they do not feel such a revulsion at these statements as e.g. Factor 1 does. They would not give priority for the patient in the worst condition (1# -2; 11# -2).

Table 10 Statements and factor arrays (average Q-sorts by factors)

No.	Statement	Factor 1	Factor 2	Factor 3
1	If two groups of patients can benefit from a treatment equally and group A's health is fairly good and group B's health is poor, group B deserves priority.	1	0	-2*
2	If one treatment results in one life year gained for certain and another in a 50% chance of gaining two life years, priority should be given to the first type of treatment.	0	-1	-1
3	People who have contributed more (e.g. through premiums or taxes) to the health care system should be treated with priority over people who have contributed less.	-4*	0	1
4	Patient characteristics like age, gender or income should play no role in prioritizing between people.	2*	2*	2*
5	People who are in paid work and so contribute financially to society should be prioritized over people who do not work.	-4*	-2*	0*
6	If a treatment adds one month to the life of a patient and costs 7.500 Euros, one should consider whether the money could have been better spent on other health care.	1*	-1*	2*
7	If two patients are waiting for a transplant organ, one with partner and the other single but otherwise identical, the first organ to become available should go the patient with partner.	-1	-2	-3
8	Rescuing people from a certain death should take priority over all other kinds of health care.	4	3	3
9	Treatment of illnesses that put the highest burden on patients' families should receive higher priority.	-1*	2	0
10	A treatment which benefits patients in the short-term should have priority over a treatment with similar benefits for patients in the future.	0	-1	0
11	Priority should be given to people whose quality of life is low over those whose quality of life is moderate, even if treatment can only improve their quality of life by a small amount.	-3*	-4*	-2*
12	Doctors should be the ones to judge which patients get priority on the basis of their medical expertise.	2	4*	1
13	People who depend heavily on members of their family or neighbours for care should be treated with priority.	-1	0	-1
14	Adding one year to the end of life for someone who will otherwise die at age 30 is more important than adding one year to the life of someone who otherwise would die at age 80.	1	1	0
15	When having to choose between two treatments that both cost the same, funding should be given to the treatment that results in the biggest health gain.	3	1*	4
16	In general, if people from different income groups are suffering from the same condition, people from low income groups should be given priority.	-3	-2	-4
17	There is no sense in saving lives if the quality of those lives will be really bad.	-2	0	1*
18	If two people have the same current condition but the health of one of the two is worsening while that of the other is stable, the former should be treated with priority.	0*	3*	1*
19	Priority should be given to those treatments that generate the most health.	3	1*	3
20	It is more important to extend one person's life by one year than to extend 12 people's lives by one month.	0	-2	-1
21	Whether an illness is the result of an unhealthy lifestyle should not be relevant, everyone is just as worthy of treatment as everyone else.	-3*	0*	-4*
22	Priority should be given to treatments that restore health to an acceptable level, there's no use in improving health when the final result is still a very poor state of health.	2*	2*	2*

23	Younger people should be given priority over older people, because they haven't had their fair share of health yet.	0	-3	-1
24	People should not be allowed to buy themselves priority treatment, even if it doesn't affect others negatively.	0	1	-3*
25	People who are in some way responsible for their own illness should receive lower priority than people who have the same illness simply due to chance.	1	0	2
26	Priority should be given to younger people, because they may benefit from treatment for longer.	-1	-3*	0
27	It is more important to prevent ill health than it is to cure ill health once it occurs.	4	4	3
28	For non-emergency treatments where there are waiting lists, patients in need of care should be treated on a first come first served basis and not be prioritised in other ways (e.g. the severity of the illness).	-2	2*	-2
29	Access to health care should be based on need, not on geographical, social or economic circumstances.	3	3	4
30	Priority should be given to people with rare diseases, even when these diseases do not necessarily cause more health damage than more common ones.	-2	-3	-3
31	Parents with dependent children should be given priority over similar people without dependents.	-1	-4*	-1
32	People who benefit more from a treatment, because it is more effective for them, should receive priority over people who benefit less from this treatment.	2	-1*	0
33	It is more important to provide treatments that prolong life than treatments that improve quality of life.	-2	-1	-2
34	The amount of health care people have had in the past should not influence access to treatments in the future.	1*	1*	1*

*Remarks: Ranks of the those statements got a colourful (pink, blue or yellow) background that are distinguishing statements for the given factor ($p < 0,05$). *indicates where the distincion is statistically significant at a level of $p<0.01$.*
*Ranks in green colour show the consensus statements, i.e. those statements that do not distinguish the groups at a level of $p<0,01$. *indicates where the statement does not distinct the groups at a level of $p<0.05$ either.*

V.2.4 Discussion of the results of the Q-study

Our Q-study revealed three opinion groups of medical doctors on the aspects of allocating health services in the population. These aspects cover issues such as the age, the socio-economic status or the life-style of the patient, burden on the family members, contribution to societal expenditures by the patient, access to treatment, need for care, the patient's potential for benefit from the treatment, the importance of life saving versus quality of life, costs and cost-effectiveness of the treatment. Beyond the statistical analysis of the Q-sorts, word for word quotations from the respondents were used to highlight the similarities and differences between the factors.

It seems that medical doctors share similar opinion about what are the most important aspects of allocating health care services. There are three statements that

are highly ranked (+4 or +3) by all the three factors: rescuing people's life should take priority over other interventions (8#); prevention of the disease would be more important than curing it (#27); and it is need that should drive the access to health care (#29).

Life saving is usually considered to be the most important and primary task of a doctor. Prevention of diseases is generally deemed to be an optimal solution both for the individual and the society, as higher quality of life and less costs are expected. The need principle is justified by the belief that people are equal. The latter finding is further supported by a consensus statement (#4 +2), as each factor believe that the age, gender and income of the patients should not play a role in patient level prioritization.

The Q-analysis revealed three more consensus statements. None of the factors prioritized the patients with low quality of life over those with moderate quality of life, if expected health gain was marginal for the previous one (#11). The importance of quality of life emerged from #22, too: factors tended to prefer those treatments that restore health to an acceptable level. Finally, all the factors seem to be neutral for the past utilization of health care (#34): *„The solidarity principle should prevail in the allocation of health care"*.

Not surprisingly, the similarities we found between the factors seem to reflect the basic principles of medicine. These principles provide a common basement for medical doctors, and differences between opinion groups come from other aspects of patient level prioritization. Table 11 overviews the most important characteristics of the opinion groups. The table does not contain the consensus statements.

Table 11 Comparison of opinion families

Factor	Factor characteristics
F1	• Prioritization of treatments resulting in more health gain (#15; #19) • Neutral for small health gain costing a lot (#6) • Denial of taking family burden into consideration (#9) • Individual responsibility is important (#21) • Denial of taking paid work and contribution to health care system into consideration (#3; #5)
F2	• Physicians are to make decisions (#12) • Treatment of worsening health condition is preferred to that of the stable one (#18) • Neutral for small health gain costing a lot (#6) • Waiting list on a first come first served basis (#28) • Neutral for treatments resulting in more health gain (#15; #19; #32) • Neutral for/slight denial of taking paid work and contribution to the health care system into account (#3; #5) • Neutral for individual responsibility (#21) • Denial of prioritization of the younger and parents with children (#26; #31)
F3	• Preference for treatments resulting in more health gain (#15; #19) • Tendency for considering small health gains if they cost a lot (#6) • No need for rescuing life by any means (#17) • Neutral for taking paid work into consideration (#5) • Individual responsibility is more important than for the other 2 factors (#21; #25) • Denial of the treatment of the patient in the worst condition (#1) • Buying of priority treatment should not be forbidden (#24)

There are some limitations of the Q-study described above that should be mentioned. Out of 80 e-mails there were 33 questionnaires suitable for analysis (rate of 41%). However, it has to be emphasized again that this sample size is sufficient for the Q-method and the Q-method does not aim to have a sample representative of the potential responders. It is important to note that these results cannot be transferred to other responder groups such as the general public, groups of other professions, etc. Also, the Q-method is suitable for the distinction of opinion groups but is not able to tell the distribution or the weight of these groups in the study population. One of the potential disadvantages of the web-based surveys is that it might be difficult to fill out an on-line questionnaire for those who do not use the internet frequently. In my opinion, this is not likely to cause significant problems in this research: medical doctors can be assumed to be familiar with internet use. Furthermore, the structuring of the questionnaire and the layout of the website tried to exploit all the possibilities to be user friendly and to provide help for the responders. Finally, it can be a

limitation of this study that responders were asked to give a reason for their decision only in the case of those 4 statements that were ranked as +4 or -4 by them (the statements they agreed or disagreed with the most). During face-to-face interviews there had been more opportunities to reveal the attitudes and opinions of the responders.

VI. SUMMARY

In my dissertation I dealt with the societal aspects of the distribution of health gains. Because of scarce resources, the prioritization among patients is inevitable. Prioritization has always been an issue in medical care: always has to be decided which patient is in bigger need for health care, and which patient should have access to different health care services (e.g. medication, operational procedures, and screening programmes). Prioritization criteria have been different in different societies and ages (access to health care might have been determined by the financial situation of the patient, etc.). Nowadays, however, in modern societies citizens and ensurees expect to access to the broad circle of services and expect that health policy decisions be made on a professional (medical, economic, etc.) basement. Enhance of expectations and constraint resources are difficult to harmonize and put pressure on any health care system, irrespective of whether we are talking about a national health care system, private or social insurance.

Prioritization in health care has different levels. At the level of health policy it has to be decided who, under which conditions, and to which health care services are entitled to. For example, health policy is to decide which services are covered in the social insurance (benefit package) and to determine those services which are going to available only at the private markets (e.g. aesthetic surgery is a typical example for the latter). Similarly, it is possible that some patient group is excluded from the covered population. Another circle of policy decisions is when a given health care service is covered for the patient group by the insurer but only if the treatment follows medical protocols and uses predefined and covered health technologies.

Health care providers (institutes and individuals) play a role in prioritization, too. Treatment decisions are made by medical professionals at the individual patient level. Basically and primarily, these medical decisions are guided by professional rules and consider the interest of the individual patient at the first place. However, each and single treatment decision is a decision about allocating resources, too. All the resources given to a patient is opportunity cost at the same time. In this broader context, the costs of treating a patient become a considerable issue in medical decisions as well. This factor however has to do with ethics, philosophy and different

aspects of social policy, which are closely related to value judgements, equity views and expectations typical of a given society.

The objective of this dissertation was to review the international literature and identify those social values and equity considerations (e.g. age of the patient, severity of the disease, social role of the patient) that might be of importance in the allocation of health gains among individuals. The second part of the dissertation presented the results of two empirical studies conducted with Hungarian medical professionals as subjects. Both studies – with different methodologies – sought an answer to the following basic question: *„In the opinion of Hungarian medical doctors, which societal considerations should affect the distribution of health gains among individuals (patients)?”*.

The subjects of the first empirical study were general practitioners and the study aimed to elicit their preferences for selected characteristics (as prioritization criteria) of the patient and of the disease. This study was a discrete choice analysis that is a method for getting know stated preferences and considered to be a choice-based method that is deeply rooted in economic theory. The second study related to an international research project (EuroVaQ project) that investigated the views of health policy makers and of the general public on the factors (e.g. age, family background and income of the patient) that are considered to be important in allocating health among patients. The study in the dissertation chose another responder group and made a survey with Hungarian medical doctors. This survey used the Q-method that serves for the study of personal attitudes, opinions, and value judgements, etc.

The researches described above on preferences and attitudes in health gain distribution have served a number of lessons. Similar researches ought to be conducted also in a wider range. The main thoughts are summarized below.

- With respect to resource allocation in health policy, insufficient transparency of decisions is a frequent problem. One reason for this is that, according also to the literature, social expectations and values connected with resource allocation are not sufficiently clarified. As tools for facilitating decision-making, similar researches could enhance transparency of decision-making in public policy. Acceptability of

decisions could be increased by clarifying the role equity considerations play in decision-making.

• Several examples for the explicit use of equity considerations are found abroad. Guidelines on the most important basic principles have been developed in Sweden and the United Kingdom. The motivation behind the guidelines is the safeguarding of human rights and reduction of discrimination. Since the subject is still insufficiently researched and poses a multitude of ethical issues, basic principles primarily point to those characteristics on the basis of which no prioritisation of patients is to be made (e.g. race and sex), allowing for the consideration of such characteristics only if a given group's different response to medicinal treatment is scientifically established. The guidelines of the NICE declares for example that the age of the patient should not be a factor of prioritization in itself, however, if the age of the patient is a risk factor during the treatment or is related to higher risk of complications, it should be considered. This might mean that certain treatments will not be available for a given age group. [NICE 2008]
Albeit that several open questions still exist, it should be stressed, that such recommendation now form part of decision-making. In the United Kingdom, guidelines on social value judgments formulated by NICE should be followed by the relevant advisory and decision-making bodies.[53]

• The guideline of the NICE states that recommendations are necessary: alongside considerations of medical and efficiency evidence, social considerations also play a role in health-care decision-making. On the other hand, there is no consensus whether, from an ethical viewpoint, fairness of distribution is served better by the utilitarian approach (health maximisation at a societal level from available resources) or by the egalitarian approach (all should have a 'fair' measure of access to available resources). While the former approach may easily work against minority interests, the latter is hard to maintain given the limited resources. According to the position taken by NICE, the problem can be resolved by supporting procedural fairness, i.e. decision-making along transparent principles established in advance. In line with this position, the guidelines of the NICE are freely available for the ample circle of

[53] One of the tasks of the National Institute for Health and Clinical Excellence (NICE) is to develop recommendations and guidelines in all areas of health and health-care for the National Health Service.

stakeholders, i.e. for professional bodies, patients and their associations, for the health industry and the general public. For the sake of transparency, this publicity is considered to be essential by NICE.

- In making decisions on resource allocation, health economists in general follow two main lines of thinking with respect to equity and social considerations. One calls for a numerical expression by preference elicitation tools of the weight a person described by specific characteristics (e.g. age, marital status) is given in social distribution, that is, individuals should be accorded different importance. The other trend holds that there is no need for a system of numerical weights, it is sufficient to acquaint decision-makers with social preferences and it is up to them to which extent they take them into consideration. In practice, health policy decisions are closer to the latter approach, partly because no sufficient body of scientific work is available on the basis of which an equity system of weights can be developed, and partly because, in my opinion, decision-makers prefer a degree of flexibility in the decision-making process. As mentioned in the previous point, agents in both science and health policy abroad take a keen interest in equity and social considerations in health distribution. It would be a great step forward if more researches were conducted in Hungary too, guidelines would be developed, and decision-makers could recognise that well-elaborated guidelines facilitate decision-making and increase acceptance of the decisions.

- The subjects of the studies presented in this dissertation consisted of medical doctors. A very important issue of health care prioritization, however, who is to make these decisions, i.e. the health policy decision makers, medical doctors, or scientists dealing with ethics, philosophy or social policy, the general public or some subgroup of it? This question is not to be answered here, but shows that for a wider knowledge of social expectations, examinations should be conducted in a variety of respondent groups. Therefore, exploration of opinions held by various groups of health workers, the general public, and health policy decision-makers may mark out further directions for research.

• Owing to methodological limitations, the preference elicitation described above examined only a narrow range of social considerations. The exploration of the role other factors, such as patients' social and economic characteristics, life-style, health consciousness, etc., play in prioritisation decisions is called for.

• Both the preference elicitation and the attitude study yielded useful results: one of them being the proof that the methods employed could be successfully used in areas of health-care.

• The successful use of discrete choice experiment and Q-method offers several, so far unexplored possibilities. In recent decades, several health reform ideas have been developed in Hungary without knowledge of the opinions and preferences either of the medical profession or the general public. Beyond issues concerning the entire health care system, these methods can be utilised also in more concrete cases. There are a fair number of studies in Western Europe, in which various methodologies were applied, including the discrete choice experiment I used, for the examination of considerations in organising specific health services deemed important by the inhabitants and patients who use them. Examples are the examination of preferences for screenings of colorectal cancer and mammal cancer [Gyrd-Hansen 2001], and preferences of the elderly in organising social services [Ryan 2006], or the preferences for out-of-hours care by general practitioners. [Scott 2003] Similar researches should be conducted also in Hungary, the results of which would contribute towards the development of a health-care scheme better adapted to patient needs.

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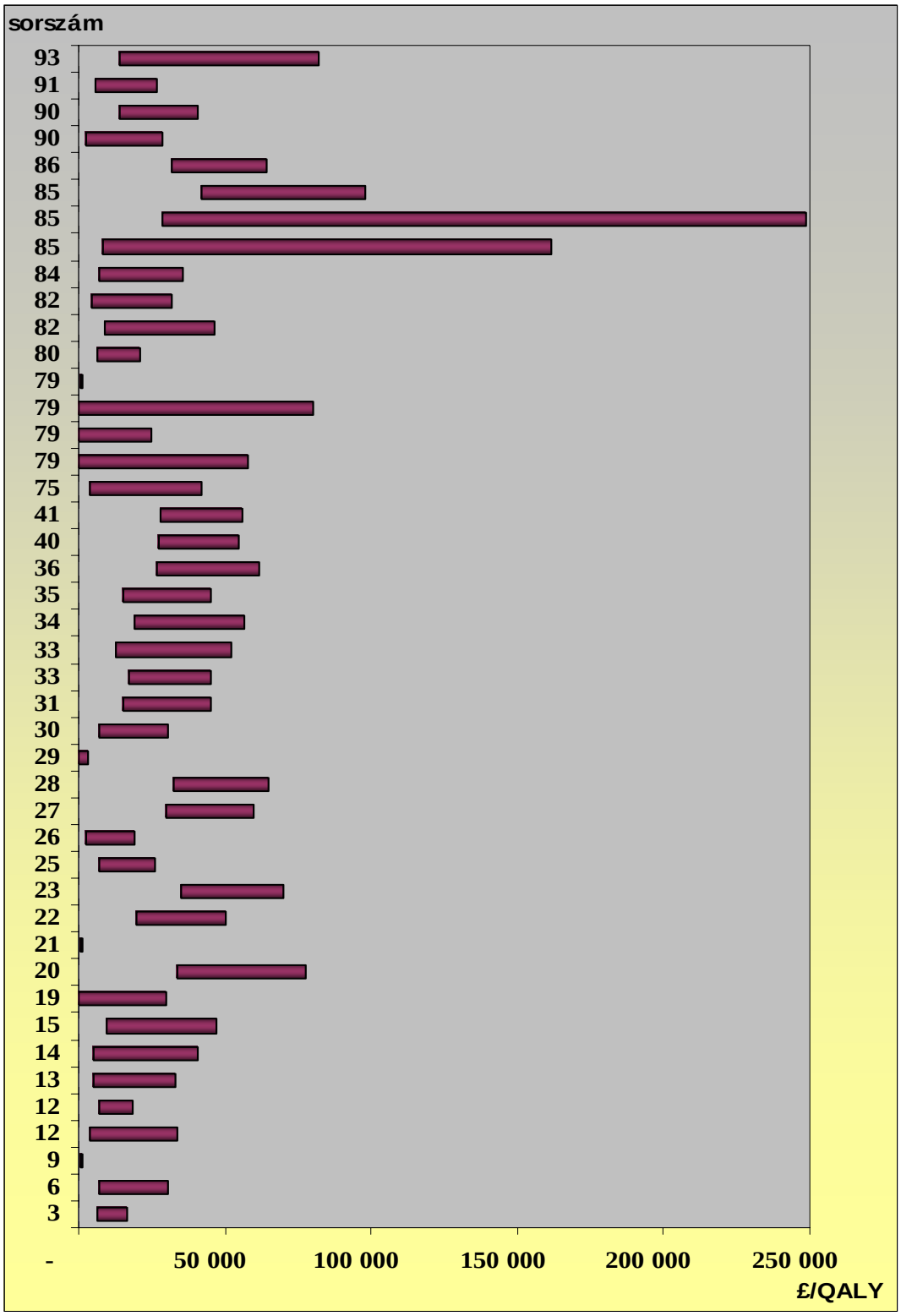
Appendix 1 List of abbreviations

English term	Abbreviation
Discrete choice experiment	**DCE**
Quality adjusted life years	**QALY**
Mixed logit [model]	**ML**
National Institute for Clinical Excellence	**NICE**
Cost-effectiveness analysis	**CEA**
Cost-utility analysis	**CUA**
Cost-benefit analysis	**CBA**
Cost-minimization analysis	**CMA**
National Health Services [UK]	**NHS**
Incremental cost-effectiveness ratio	**ICER**
National Health Insurance Fund Administration [Hungary]	**NHIFA**
Random parameter logit [model]	**RPL**

Appendix 2 Cost-effectiveness of technologies recommended by NICE



Source: technologies no. 3-41: Towse, 2002. Table 4; technologies no. 75-93: NICE HTA monographs (www.nice.org.uk), data collection

Appendix 3 Economic theory of DCE

Among choice based techniques, the method of discrete choice experiment is considered to have the strongest basis in economic theory. One of the pros is that the decision making situation is well known by most of the people from daily life: respondents have to choose one good out of two or more. Compared to this exercise, people are usually less familiar with ranking and rating. [Ryan 1999a].

DCE, on one hand, roots in the probabilistic choice theory, within that it belongs to the random utility theory, and on the other hand, it is consistent with the economic theory of Lancaster and the neo-classical economic theory. [Lancaster 1966, Manski 1977]

The basic idea behind the probabilistic choice theory is that individual choices always carry some degree of uncertainty. Instead of determining that option the individual chooses, these models estimate the probabilities with which different options are chosen by the individual. These models may have two distinct approaches.

1) The model of *random decision rule* [Tversky 1972] assumes that the utility of an alternative is deterministic, while the decision rule is probabilistic, i.e. the behaviour of the individual is probabilistic by nature: individual behaviour changes due to exogenous and endogenous factors. Consequently, the probability of choice can be estimated for each alternative, however, individuals do not necessarily choose the alternative with the highest utility. This sort of uncertainties and anomalies can be observed in decisions, indeed. Also, people may not choose the very same alternative under the same circumstances either.

2) According to the *random utility theory*, it is the decision rule that is deterministic and the utility of the alternative is probabilistic. [REF] Its probabilistic nature derives from the assumption that the researcher is not able to give an exhaustive description of individual behaviour. This approach is consistent with neo-classical economic theory as it regards the individual as a rational one who maximizes utility: the individual is able to determine which is the best alternative for him and makes the same decision under the same circumstances. The link with the probabilistic choice behaviour comes from the imperfect information the researcher has on the utility

function of the individual. First, the researcher is not able to get know all those features (attributes) of the alternatives that may affect the decision. Second, he will not perfectly know the individuals themselves (e.g. taste variations). [Ben-Akiva 1985]

Let us assume that the individual is to choose between alternative *i* and *j*. The utility function of the individual for alternative *i* can be formulated as follows:

$$U_i = V_i + \varepsilon_{i;}$$

where U_i is the real but unobservable utility, V_i is the observable component of the utility, and ε_i represents those factors that are not observable by the researcher so he treats them as random. [Hanemann 1984] Choosing between two alternatives, the probability that the individual will choose alternative i against alternative j is as follows:

$$P_i = \text{Prob}\,(U_i > U_j) = \text{Prob}\,(V_i + \varepsilon_i > V_j + \varepsilon_j) = \text{Prob}\,(V_i - V_j > \varepsilon_i - \varepsilon_j), \text{ahol} \quad \forall\, i \neq j$$

Apparently, the higher the choice probability of an alternative is, the bigger the difference in the observable utilities of the alternatives is. The probability of choice can be interpreted as the strength of the preferences for an alternative.

The economic theory by Lancaster [1966] provides another theoretic basement of DCE. This theory regards the good as the combination of several features and characteristics that are present to a different degree. The consumer values these characteristics of the good and those will determine the consumer's preference for the good. In this sense, the demand for the good is derived from its characteristics. DCE applies this very approach when alternatives are described with their attributes and respondents are asked to choose one alternative after considering these attributes.

Appendix 4 Efficiency criteria of the DCE design

Huber established the 4 principles of an efficient DCE design, calling them as „D-efficiency". [Huber 1996] Improving one of the principles, ceteris paribus, the design improves. In general, however, it is not possible to create a design that fulfils all the 4 criteria in full, some trade-off always exist. The criteria are as follows:

1. **Level balance**: each attribute level appears approximately with an equal number of times in the design.
2. **Orthogonality**: attribute levels are chosen independently of other attribute levels, so that the effect of an attribute level can be measured independently of other levels' effects.
3. **Minimal overlap**: each attribute level shows up as few times possible in a given choice task. If an attribute took the same level in all the concepts in a single choice task than the decision would not carry information about that attribute.
4. **Utility balance**: the utility of the concepts in a single choice task is approximately equal. This is a relatively new criterion the application of which is not without difficulties as it requires precursory information on respondents' preferences.

Appendix 5 Preferences in health – studies in the literature

Reference	Country	Scope of the study	Attributes	Subjects (number)	Method
Ryan 1997	United Kingdom	Management of miscarriage	Strength of pain, time in hospital, time to recovery, costs of care for the patient, after-care complications	Women from the general population (n=196)	Discrete Choice Experiment
Ryan 1999b	United Kingdom	In Vitro Fertilization (IVF)	Attitude of the personnel, same personnel during the process of care, time on waiting list, cost of IVF for the patient, chance of a successful intervention, patient follow-up	Visitors of a reproduction clinic (n=331)	Discrete Choice Experiment
Farrar 2000	United Kingdom	Development of clinical services	Strength of evidence on clinical efficacy, magnitude of health gain, contribution to professional development, contribution to teaching and research, strategic importance	Hospital experts (n=130)	Discrete Choice Experiment
Ryynänen 2000	Finland	Priority setting criteria in health care	Age of the patient, disease severity, prognosis, patient's responsibility for the disease, financial situation of the patient, demented patient, institutionalized patient, cost of care	Nurses (n=151) Doctors (n=241)	Discrete Choice Experiment
Gyrd-Hansen 2001	Denmark	Screening for colon cancer and breast cancer	Screening cost for the patient, number of screenings, risk of false positive result, decrease in the risk of cancer due to the screening	Men and women about colon screening (n=422) women about breast screening (n=207) from the general population	Ranking
Phillips 2002	USA	HIV test	Location and price oft he HIV test, method of sample collection, accuracy of the test, waiting time for the result, secrecy, way of counselling	Participants in HIV testing (n=365)	Discrete Choice Experiment

Appendix 5 (Cont.)

Reference	Country	Scope of the study	Attributes	Subjects (number)	Method
Scott 2003	United Kingdom	Out of hours care in general practice	Location of care, who provides care, time to access of care, doctor-patient relationship	Parents (n=3326)	Discrete Choice Experiment
Ratcliffe 2004	United Kingdom	Treatment of osteoarthritis (OA)	Intensity and frequency of joint pain, motility, risk of minor/moderate side effects, risk of severe side effects	OA patients (n=412)	Discrete Choice Experiment
Albus 2005	Germany	Medical and psychosocial support in HIV	Way of information giving, type of counselling, access to counselling	HIV patients (n=163)	Rating
Dolan-Tsuchiya 2005	United Kingdom	Prioritization of patients based on their past health experiences and future health prospects	Age and past health experiences of the patient, life expectancy, future health prospect of the patient without treatment	General population (n=128)	Ranking
Akkazieva 2006	Hungary	Health care system reforms	Efficiency, market elements, additional services, freedom to choose doctor, use of clinical evidences, patient rights	Rheumatic patients (n=86)	Discrete Choice Experiment
Ryan 2006	United Kingdom	Social care for older people	Eating, personal needs, safety, social contact, autonomy of life	Institutionalized patients aged 60+ years (n=326)	Discrete Choice Experiment
Robinson 2007	United Kingdom	„Worth" of death depending on the characteristics of the departed	Age, individual responsibility for the cause of dying, degree and time of anguish before dying	General population (n=313)	Discrete Choice Experiment

Appendix 6 Example for a choice task in the DCE

Which couple would you treat? (Please tick the appropriate box below!)

Couple 1	**Couple 2**	**Couple 3**
Age of the couple: 18-35 years	Age of the couple: 36-60 years	Age of the couple: 60+ years
The couple suffers from a frequent disease	The couple suffers from a rare disease	The couple suffers from a frequent disease
The disease deteriorates the QoL significantly	The disease does not deteriorate the QoL significantly	The disease does not deteriorate the QoL significantly
The disease has medium mortality	The disease has high mortality	The disease has low mortality
The couple suffers from other serious chronic disease	The couple does not suffer from other serious chronic disease	The couple does not suffer from other serious chronic disease
The therapy prolongs the life with 1 additional year for both members of the couple	The therapy prolongs the life with 2 additional years for one of the members of the couple	The therapy prolongs the life with 2 additional years for one of the members of the couple
Medication restores QoL by 50%	Medication restores QoL completely	Medication restores QoL by 50%
Medication averts complications emerging at a long time	Medication averts complications emerging at a long time	Medication averts complications emerging at a short time
☐	☐	☐

Appendix 7 Introductory text of the DCE questionnaire – first version

Introduction
In our study we use the method of conjoint analysis which works with the help of response cards. This questionnaire – unlike to other questionnaires – investigate and circuit only one question.

Imagine that you treat married couples. **Both members of the couples suffer from the same disease**. The couples do not have children.

Let us assume that you dispose of a medication one dose of which is able to prolong the life of the couple with 2 years. **You have** only **one dose of medication**. **You are the only one disposing of it**.

I will show you different card-sets each describing different couples. I ask you to **choose that couple** from each card-set **you prefer to give this medication.**

Thank you for your collaboration!

Appendix 8 The Random Parameter Logit Model

In case of discrete choice experiments, one of the widely used models is the multinomial model (MNL); e.g. the conditional logit model that was developed by McFadden and can be considered one of the first types of models. [McFadden 1974, 2001] In the field of health economics another type of model that is preferred is the multinomial probit model. Also, the so called mixed logit (ML) model is expected to gain bigger scope in the future.[54] The multinomial model is considered to be a robust model and its estimation is relatively easy, however, it has some limitations [Train 1998], that is why it was not chosen for our analysis. The multinomial model

1) assumes that the preferences of the respondents are homogeneous, so all the respondents with the same observed characteristics would evaluate the attributes in the very same way;
2) assumes the independence of irrelevant alternatives (IIA), which means that if one of the attributes changes for an alternative then the choice probability for the other alternatives will change proportionally;
3) is not able to take into consideration that the respondent might make several choices one after the other (i.e. multiple observations from the same individual), and in this case there might be factors that are not observable still are typical of the choices of the same individual, hence these decisions are not independent of each other;
4) makes the interpretation of statistically insignificant parameters ambiguous. On one hand, the parameter might not be significant because the attribute is not important for the respondent, so it does not affect the decision. On the other hand, it might occur that the parameter is not significant because of the heterogeneity of preferences: the attribute does affect the decision, but counteractive preferences of the respondents for the attribute extinct the effect of each other.

[54] Interested readers are advised to turn to the following literature, e.g.: Train 2003, Hensher 2005

Limitations above can be avoided by the mixed logit model (furthermore ML)[55] that is an extension of the logit model and allows the parameters of the observed variables to vary randomly among the respondents. The ML estimates the moments of the respondent-specific parameters and makes it possible to investigate the heterogeneity existing in the preferences and tastes of the respondents. The variance in the non-observed and respondent-specific parameters results in correlation among the alternatives in the stochastic part of the utility function. So, the ML releases the IIA assumption and is suitable for making estimations in case of multiple observations from the same respondent. The term of „mixed" logit refers to the fact that the choice probability is the mixture of logit expressions and some distribution (mixing distribution); i.e. the ML is the integral of logits over some distribution.[56] Instead of ML model, other terms like „random coefficient logit", „random parameter logit", and error-components logit model[57] are used. The dissertation will use the term of random parameter logit (RPL) that is described shortly hereafter.

Let's assume that the number of respondents in a DCE is N, the number of choice situations is T, and the number of alternatives is J. The utility of individual *n* in choice situation *t* for alternative *j* can be formalized in the following way:

$$U_{njt} = \beta'_n X_{njt} + \epsilon_{njt} \qquad \begin{matrix} n = 1, \ldots, N \\ \text{where, } j = 1, \ldots, J \\ t = 1, \ldots, T \end{matrix}$$

and x_{njt} is the vector of observed variables describing individual *n* and/or alternative *j*; β_n is the vector of individual-specific coefficients and is not observable; ε_{njt} is a random term that is assumed to be distributed IID extreme value and it is independent of β_n and X_{njt}. It should be noted that β_n vector of coefficients is characteristic of individual *n* expressing her taste. In general, $\beta_n = b + \eta_n$ where *b* is the mean of the coefficients and η_n is the stochastic deviation from it expressing the individual's taste. This model specification makes it possible to investigate different tastes of different individuals but assumes that the taste of a given individual does not change over the sequence of decisions.

[55] The outline of the mixed logit model is based ont he following publications: [Revelt-Train 1998, Train 2003, Hole 2007].
[56] The mixing distribution can take any form, e.g. normal, triangular, lognormal, etc.
[57] Different terms suggest different approaches of the ML model, for more details see e.g. Train K, 2003.

In the model, the density function of β is $f(\beta|\theta)$, where θ stands for the parameters of the distribution. Conditional on knowing β_n, the probability that respondent n will choose alternative i in choice situation t is the following:

$$L_{nit}(\beta_n) - \frac{\exp(\beta'_n x_{nit})}{\sum_{j=1}^{J} \exp(\beta'_n x_{njt})}$$

which is the standard logit formula. Still on condition that β_n is known, the probability of the observed sequence of choices with the individual is:

$$S_n(\beta_n) = \prod_{t=1}^{T} L_{ni(n,t)t}(\beta_n)$$

where $i(n,t)$ refers to the alternative chosen by individual n on choice occasion t. The *unconditional* probability of the observed sequence of choices can be given as the integral of the conditional probabilities over the distribution of β:

$$P_n(\theta) = \int S_n(\beta)\, f(\beta|\theta) d\beta$$

Therefore, the unconditional probability is a weighted average of a product of logit formulas evaluated at different values of β, where the weights are given by the density f. The log likelihood in the RPL model can be written in the same way as in the standard logit model:

$$LL(\theta) - \sum_{n=1}^{N} \ln P_n(\theta)$$

However, in the mixed logit (RPL) case the expression above cannot be solved analytically (like in the case of the standard logit), therefore simulation methods are to be used for an approximated solution. The simulated log likelihood is given by:

$$SLL(\theta) = \sum_{n=1}^{N} \ln\left[\frac{1}{R}\sum_{r=1}^{R} S_n(\beta^r)\right]$$

where R is the number of replications (draws from $f(\beta|\theta)$ for the simulation) and β^r is the r^{th} draw. The estimated parameters maximize the simulated log likelihood function (SLL).

Appendix 9 Characteristics of GPs' subgroups by the questionnaire versions

In the preference elicitation study there were 4 questionnaire versions. Each of them was completed by 50-50 GPs. The allocation of the questionnaires was random; still I investigated if these respondent groups were similar according to the characteristics we collected. Table 1 shows the average characteristics of the respondent groups.

Table 1 Average characteristics of the GPs by questionnaire versions

	Version 1	Version 2	Version 3	Version 4
Male GPs	56%	58%	56%	60%
Average age (year)	47,3	48,3	50,9	48,5
st.d.	*8,29*	*8,90*	*11,02*	*9,67*
Average time in praxis (year)	16,9	17,8	19,9	18,2
st.d.	*10,43*	*9,42*	*11,52*	*10,55*
Average number of enrolees	1730	1805	1827	1850
st.d.	*517,08*	*514,88*	*497,47*	*557,37*

Independent samples t-test was used to compare these groups by the age of the GPs, the number of years spent as a GP and by the number of patient cards in the praxis. All the possible comparisons showed that at a significance level of 5% there was no reason to reject the hypothesis that these groups were similar (see Table 2).

Table 2 T-tests for the comparison of respondents' subgroups by questionnaire versions (V, V2, V3, V4)

V1 vs V2	Levene test		T-test						
	F	Sign.	t	df	Sign. (two-tailed)	Difference of means	SE	95% Conf. Interv. lower	upper
GP's age (year)	0,250	0,618	-0,599	97	0,551	-1,0	1,728	-4,5	2,4
Time in praxis (year)	2,489	0,118	-0,472	97	0,638	-0,9	1,996	-4,9	3,0
Patient cards	0,205	0,652	-0,719	96	0,474	-74,9	104,261	-281,9	132,0

V1 vs V3	Levene test		T-test						
	F	Sign.	t	df	Sign. (two-tailed)	Difference of means	SE	95% Conf. Interv. lower	upper
GP's age (year)	1,110	0,295	-1,842	97	0,069	-3,6	1,963	-7,5	0,3
Time in praxis (year)	0,167	0,684	-1,377	97	0,172	-3,0	2,209	-7,4	1,3
Patient cards	0,198	0,658	-0,951	96	0,344	-97,4	102,484	-300,9	106,0

V1 vs V4	Levene test		T-test						
	F	Sign.	t	df	Sign. (two-tailed)	Difference of means	SE	95% Conf. Interv. lower	upper
GP's age (year)	0,275	0,601	-0,671	97	0,504	-1,2	1,811	-4,8	2,4
Time in praxis (year)	0,230	0,633	-0,637	97	0,526	-1,3	2,108	-5,5	2,8
Patient cards	0,340	0,561	-1,111	96	0,269	-120,8	108,719	-336,6	95,0

V2 vs V3	Levene test		T-test						
	F	Sign.	t	df	Sign. (two-tailed)	Difference of means	SE	95% Conf. Interv. lower	upper
GP's age (year)	1,768	0,187	-1,288	98	0,201	-2,6	2,003	-6,6	1,4
Time in praxis (year)	3,219	0,076	-0,998	98	0,321	-2,1	2,104	-6,3	2,1
Patient cards	0,870	0,353	-0,222	98	0,824	-22,5	101,250	-223,4	178,4

V2 vs V4	Levene test		T-test						
	F	Sign.	t	df	Sign. (two-tailed)	Difference of means	SE	95% Conf. Interv. lower	upper
GP's age (year)	0,785	0,378	-0,097	98	0,923	-0,2	1,858	-3,9	3,5
Time in praxis (year)	0,976	0,326	-0,200	98	0,842	-0,4	2,000	-4,4	3,6
Patient cards	0,035	0,853	-0,428	98	0,670	-45,9	107,309	-258,9	167,0

V3 vs V4	Levene test		T-test						
	F	Sign.	t	df	Sign. (two-tailed)	Difference of means	SE	95% Conf. Interv. lower	upper
GP's age (year)	0,291	0,591	1,157	98	0,250	2,4	2,074	-1,7	6,5
Time in praxis (year)	0,651	0,422	0,770	98	0,443	1,7	2,209	-2,7	6,1
Patient cards	1,048	0,309	-0,221	98	0,825	-23,4	105,654	-233,1	186,3

Appendix 10 Random Parameter Logit Model 2

Table 1 RPL Model 2: random parameter estimations

Variable	Coeff.	St. error	P[|Z|>z]
Random parameters			
Age3	-0,8431	0,1498	0,000
Mortal3	0,6857	0,1404	0,000
Qeffect	-0,4398	0,1202	0,000
Restor	0,1704	0,1130	0,132
Non-random parameters			
Age2	0,1372	0,0325	0,000
Mortal2	-0,0246	0,0308	0,424
Preval	0,0315	0,0238	0,186
Comorb	0,1172	0,0218	0,000
Complic	0,0050	0,0209	0,812
LYGdistrib	-0,2260	0,0238	0,000
A_First	0,0360	0,0544	0,509
A_Second	0,0580	0,0515	0,260
Heterogenitás az átlagban			
Age3:GPage	0,0073	0,0029	0,012
Mortal3:GPage	-0,0066	0,0027	0,015
Qeffect:GPage	0,0035	0,0024	0,151
Restor:GPage	-0,0010	0,0024	0,660
Diagonal values in Cholesky matrix			
NsAge3	0,0000	0,0001	0,723
NsMortal3	0,0068	0,0027	0,013
NsQeffect	0,0712	0,0404	0,078
NsRestor	0,0169	0,3253	0,959
Below diagonal values in Cholesky matrix			
Mortal3:Age3	-0,0066	0,0027	0,015
Qeffect:Age3	0,0035	0,0024	0,151
Qeffect:Mortal3	-0,0745	0,0405	0,066
Restor:Age3	-0,0010	0,0024	0,660
Restor:Mortal3	-0,0310	0,2078	0,882
Restor:Qeffect	0,0484	0,1367	0,723
Standard deviation of parameter distributions			
sdAge3	0,0000	0,0001	0,723
sdMortal3	0,0095	0,0001	0,000
sdQeffect	0,1031	0,0021	0,000
sdRestor	0,0599	0,1136	0,598

LL*	-3276,062
LL(RPL)	-2834,738

Chi2(20) = 882,6471 (p=0,000)

R2=0,135

Number of observations = 3000 (200 groups)

Number of repetitions for simulation = 500 (Halton draws)

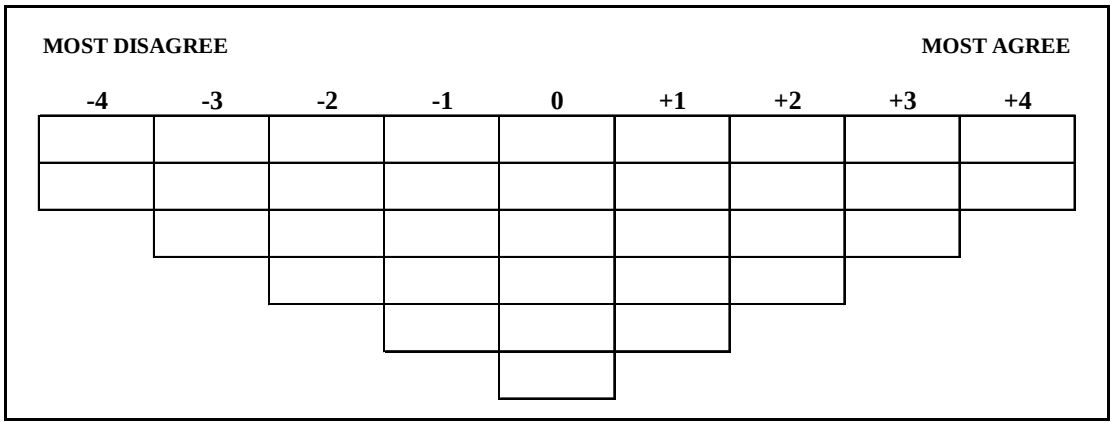
Table 2. Correlations between random parameters

	Age3	Mortal3	Qeffect	Restor
Age3	1,000			
Mortal3	-0,697	1,000		
Qeffect	0,034	-0,542	1,000	
Restor	-0,017	-0,359	0,931	1,000

Appendix 11 Q-method: Statistical background

Statistics behind the Q-method are briefly summarised here based on the publication by Brown. [Brown 1993] The starting point of the Q-method is a grid (see an example on Figure 1): respondents are to place each Q statement on it according to how much they agree or disagree with the statement. The result of the Q-sort for each respondent is that a number between -4 and +4 belongs to each statement. Note, the size and the layout of the grid depend on the number of statements the researcher composed. In our study there are places for 34 statements. Having less of them, the endpoints could also be different (e.g. -3 and +3).

Figure 1 Score sheet for the Q-sorting



Let us have two respondents having done the Q-sorting (V1 and V2). The difference between their Q-sorts can be expressed numerically (Table 1).

Table 1 Difference of Q-sorts in case of two respondents

Statement number	V1	V2	$(Diff_{V1-V2})^2$
1.	1	-1	4
2.	0	3	9
3.	2	-2	16
4.	1	-1	4
5.	-2	2	16
…	…	…	…
34.	1	0	1
Total	**0**	**0**	**Σ $Diff^2$**

Column V1 and V2 show the placement of each statement (card) on the grid for respondent 1 and 2, respectively. The last column contains the squared difference of the scores of each statement. The sum of column V1 and V2 always equal to zero because of the symmetric structure of the grid. The maximum of the sum of the squared differences depends on the size of the grid. In our example: $\mathbf{max\ Diff^2} = 4x8^2 + 6x6^2 + 8x4^2 + 10*2^2 = 640$. If the two Q-sorts are identical then $\Sigma\ Diff^2 = 0$, if they are complete adversary of each other then $\Sigma\ Diff^2$ takes its maximum. Another figure typical of the grid is the sum of the squared scores: $\mathbf{F^2}$. In our example: $F^2 = 4x4^2 + 6x3^2 + 8*2^2 + 10x1^2 = 160$, that is ¼ of max $Diff^2$. Based on these figures we can calculate the correlation (r) between the 2 Q-sorts to show how different or similar they are:

$$\mathbf{r = 1 - (\Sigma\ Diff^2 / 2xF^2)}$$

Having identical Q-sorts r = 1, in case of completely different ones r = -1. Q-method usually collects data from more than 2 respondents. Similarly, a correlation matrix of *n x n* can be calculated for *n* respondents, which is the initial step to carry out a factor analysis.

In case of the Q-method, the respondents themselves „sit" on each factor. Respondents with big factor weights on a given factor are those who have similar Q-sorts, that is they share similar views on the issue and they belong to the same „opinion of family". So, respondents with big weights on different factors belong to different opinion groups.

Factor analysis, however, is not the final step of the Q-method. The goal is to reproduce those Q-sorts (placement of the statements on the score sheet) that are generally characteristic of the opinion groups. Let us assume that the factor analysis resulted in 3 different opinion groups. In this case we need to generate 3 Q-sorts each characterizing the general view of one of the 3 groups. This is done by generating new weighting numbers (**w**) from the factor weights (**f**) for those respondents who „sit" on the same factor: $\mathbf{w = f / (1 - f^2)}$. These weights are to show in a single opinion group how strongly each respondent belong to the group. Let us assume that respondent V1 and V2 sit on the same factor (e.g. Factor I) with factor weight 0.82 and 0,72, respectively. Then their new weights would be 2.50 and 1.50 (see Table 2).

Table 2 Weighting of respondents – strength of belonging to the opinion group

Respondents on Factor I	Factor weights (f)	Weights (w)
V1	0,82	2,50
V2	0,72	1,50

The Q-methodology uses these weights to create the Q-sort generally typical of a given opinion group. It is possible to calculate for each statement the sum of the weighted scores of those respondents who belong to the same opinion group. In case of respondents V1 and V2 the sum of these weighted scores are as follows for e.g. statements 1 and 3 (see also Table 1 and Table 2):

Statement #1: 2,50 x 1 + 1,50 x (-1) = 1

Statement #3: 2,50 x 2 + 1,50 x (-2) = 2

Following this, the weighted average score of each statement is normalized (normalized Z-score with a mean of zero and a standard deviation of 1), and the Z-scores of each statement can be compared among the factors. In general, those statements are *characteristic* for a factor the Z-score of which is bigger than 1 in absolute value. [Van Exel 2005] Having the Z-scores, the statements can be placed on the score sheet in the following way: the two statements with the highest scores should be placed in column (+4), from the remaining ones the next 3 statements with the highest scores are to be placed in column (+3), etc. Applying this method to all the statements by opinion groups, the typical Q-sort of each group can be reproduced, showing the hypothetical Q-sort of a hypothetical respondent belonging to the given factor by 100%.

Appendix 12 Q-method: Statements in the Q-set in English and Hungarian

Card number	Original statement in English	Statement in Hungarian
1	If two groups of patients can benefit from a treatment equally and group A's health is fairly good and group B's health is poor, group B deserves priority.	Ha két betegcsoport („A" és „B") egyformán javulhat egy gyógykezeléstől, és az „A" csoport betegei viszonylag jó egészségi állapotban vannak, míg a „B" csoportban levő betegek egészségi állapota rossz, a B csoport kezelését kellene előnyben részesíteni.
2	If one treatment results in one life year gained for certain and another in a 50% chance of gaining two life years, priority should be given to the first type of treatment.	Ha egy terápia biztosan meghosszabbítja 1 évvel az életet, egy másik pedig 50%-os eséllyel 2 évvel hosszabbítja meg az életet, akkor az előbbit kell előnyben részesíteni.
3	People who have contributed more (e.g. through premiums or taxes) to the health care system should be treated with priority over people who have contributed less.	Azoknak az embereknek, akik többel járultak hozzá az egészségügyi ellátórendszerhez (pl. több adót vagy társadalombiztosítási járulékot fizettek), az egészségügyi ellátás során előnyt kellene élvezniük azokhoz képest, akik kevesebbel járultak hozzá.
4	Patient characteristics like age, gender or income should play no role in prioritizing between people.	A beteg személyes jellemzőinek - mint pl. életkora, neme, jövedelme - nem szabadna szerepet játszaniuk abban, hogy ki kap elsőbbséget az egészségügyi ellátás során.
5	People who are in paid work and so contribute financially to society should be prioritized over people who do not work.	Azoknak, akik fizetett állásban vannak, és ezáltal anyagilag hozzájárulnak a társadalmi kiadásokhoz, előnyt kellene élvezniük az egészségügyi ellátásban azokkal szemben, akik nem dolgoznak.
6	If a treatment adds one month to the life of a patient and costs 7.500 Euros, one should consider whether the money could have been better spent on other health care.	Ha egy gyógykezelés 1 hónappal hosszabbítja meg egy beteg életét és ez 18 millió Forintba kerül, akkor meg kéne fontolni, hogy ez az összeg nem költhető-e el jobban más egészségügyi ellátásokra.
7	If two patients are waiting for a transplant organ, one with partner and the other single but otherwise identical, the first organ to become available should go the patient with partner.	Ha két beteg vár szervátültetésre, és az egyik párkapcsolatban él, a másik egyedülálló (de minden más tekintetben egyformák), akkor az első beültethető szervet a párkapcsolatban élő betegnek kellene adni.
8	Rescuing people from a certain death should take priority over all other kinds of health care.	Az életmentő beavatkozásoknak elsőbbséget kellene kapniuk minden más egészségügyi ellátással szemben.
9	Treatment of illnesses that put the highest burden on patients' families should receive higher priority.	Elsőbbséget kellene adni azon betegségek kezelésének, amelyek a legnagyobb terhet rójják a beteg családtagjaira.
10	A treatment which benefits patients in the short-term should have priority over a treatment with similar benefits for patients in the future.	Két, hasonlóan eredményes gyógykezelés közül annak kéne elsőbbséget kapnia, amelyik rövidtávon segít a betegeken azzal szemben, amelyiknek az eredménye a jövőben várható.

Card number	Original statement in English	Statement in Hungarian
11	Priority should be given to people whose quality of life is low over those whose quality of life is moderate, even if treatment can only improve their quality of life by a small amount.	A rossz életminőségben élő embereknek előnyt kellene kapniuk a közepes életminőségben élőkkel szemben még akkor is, ha a gyógykezelés csak kis mértékben képes javítani az életminőségüket.
12	Doctors should be the ones to judge which patients get priority on the basis of their medical expertise.	Az orvosoknak kellene megítélniük az orvosi tapasztalataik alapján, hogy melyik beteg kezelése kapjon elsőbbséget.
13	People who depend heavily on members of their family or neighbours for care should be treated with priority.	Azoknak az embereknek a kezelését kéne előnyben részesíteni, akik erőteljesen rászorulnak családtagjaik vagy a szomszédjaik gondoskodására.
14	Adding one year to the end of life for someone who will otherwise die at age 30 is more important than adding one year to the life of someone who otherwise would die at age 80.	Fontosabb annak az embernek meghosszabbítani az életét 1 évvel, aki egyébként 30 évesen meghalna, mint annak meghosszabbítani 1 évvel az életét, aki egyébként 80 évesen halna meg.
15	When having to choose between two treatments that both cost the same, funding should be given to the treatment that results in the biggest health gain.	Ha két gyógykezelés ugyanannyiba kerül, akkor azt a kezelést kellene finanszírozni, amelyik több egészségnyereséget okoz.
16	In general, if people from different income groups are suffering from the same condition, people from low income groups should be given priority.	Általánosságban, ha különböző jövedelmi helyzetű emberek szenvednek ugyanabban a betegségben, akkor az alacsony jövedelemmel rendelkezőket kéne előnyben részesíteni.
17	There is no sense in saving lives if the quality of those lives will be really bad.	Nincs értelme valakinek megmenteni az életét, ha az életminősége a továbbiakban nagyon rossz lesz.
18	If two people have the same current condition but the health of one of the two is worsening while that of the other is stable, the former should be treated with priority.	Ha két embernek a jelenlegi egészségi állapota azonos, de az egyik állapota romlik, míg a másiké stabil, akkor az előbbi ember kezelését kell előnyben részesíteni.
19	Priority should be given to those treatments that generate the most health.	Azokat az egészségügyi ellátásokat kellene előnyben részesíteni, amelyek a legtöbb egészség-nyereséget eredményezik.
20	It is more important to extend one person's life by one year than to extend 12 people's lives by one month.	Fontosabb egy ember életét 1 évvel meghosszabbítani, mint 12 ember életét 1-1 hónappal meghosszabbítani.
21	Whether an illness is the result of an unhealthy lifestyle should not be relevant, everyone is just as worthy of treatment as everyone else.	Az, hogy valaki az egészségtelen életmódja miatt betegedett meg, nem kellene, hogy számítson. Mindenkinek egyformán jár a gyógykezelés.
22	Priority should be given to treatments that restore health to an acceptable level, there's no use in improving health when the final result is still a very poor state of health.	Előnyben kellene részesíteni azokat a gyógykezeléseket, amelyek az egészségi állapotot elfogadható szintre javítják fel. Nincs értelme azoknak a kezeléseknek, amelyek eredményeként az egészségi állapot továbbra is nagyon rossz marad.
23	Younger people should be given priority over older people, because they haven't had their fair share of health yet.	A fiatalabbak kezelését előnyben kellene részesíteni az idősebbekkel szemben, mivel ők még kevesebbet élhettek egészségben.

Card number	Original statement in English	Statement in Hungarian
24	People should not be allowed to buy themselves priority treatment, even if it doesn't affect others negatively.	Még akkor sem lenne szabad megengedni, hogy az emberek elsőbbségi ellátást vásárolhassanak maguknak, ha az másokat nem érint hátrányosan.
25	People who are in some way responsible for their own illness should receive lower priority than people who have the same illness simply due to chance.	Azoknak, akik valamilyen módon felelősek a betegségükért, kevésbé kellene elsőbbséget kapniuk azokhoz képest, akik véletlenül betegedtek meg.
26	Priority should be given to younger people, because they may benefit from treatment for longer.	A fiatalabbak kezelését előnyben kellene részesíteni, mert ők hosszabb ideig élvezhetik a kezelés hasznát.
27	It is more important to prevent ill health than it is to cure ill health once it occurs.	Fontosabb a betegségek megelőzése, mint a már bekövetkezett betegségek gyógyítása.
28	For non-emergency treatments where there are waiting lists, patients in need of care should be treated on a first come first served basis and not be prioritised in other ways (e.g. the severity of the illness).	Nem-sürgősségi ellátások esetében, ahol várólista van, a kezelésre szoruló betegeket érkezési sorrendben kellene ellátni, és egyéb szempontoknak (pl. a betegség súlyossága) nem kéne befolyásolniuk a sorrendet.
29	Access to health care should be based on need, not on geographical, social or economic circumstances.	Az egészségügyi ellátáshoz való hozzáférést a szükségleteknek kellene meghatároznia, és nem a földrajzi, társadalmi vagy gazdasági körülményeknek.
30	Priority should be given to people with rare diseases, even when these diseases do not necessarily cause more health damage than more common ones.	A ritka betegségben szenvedő emberek kezelését előnyben kellene részesíteni, még akkor is, ha ezek a betegségek nem feltétlenül okoznak nagyobb egészségkárosodást, mint a gyakori betegségek.
31	Parents with dependent children should be given priority over similar people without dependents.	A gyermekeket nevelő szülők ellátását előnyben kellene részesíteni a hasonló, de gyermeket nem nevelő emberek ellátásával szemben.
32	People who benefit more from a treatment, because it is more effective for them, should receive priority over people who benefit less from this treatment.	Azokat az embereket, akiken egy kezelés jobban segít, mert náluk hatásosabb, előnyben kellene részesíteni azokkal szemben, akiknek kevesebb haszna van a kezelésből.
33	It is more important to provide treatments that prolong life than treatments that improve quality of life.	Fontosabb gondoskodni azokról az ellátásokról, amelyek az életet hosszabbítják meg, mint azokról, amelyek az életminőséget javítják.
34	The amount of health care people have had in the past should not influence access to treatments in the future.	A beteg által a múltban már igénybevett egészségügyi ellátások mértéke nem kéne, hogy befolyásolja, hogy mennyi ellátáshoz férhet hozzá a jövőben.

Appendix 13 Q-method: Factor loadings with 4-factor solution

Respondent	Factor 1	Factor 2	Factor 3	Factor 4
1 hu_md_01	0,3528	-0,3619	-0,1763	0,4092
2 hu_md_02	0,2432	0,1328	0,1088	**0,6330X**
3 hu_md_03	**0,6424X**	0,3922	0,0989	0,3805
4 hu_md_04	0,4106	0,0632	0,4356	0,5622
5 hu_md_05	0,4262	**0,5749X**	0,097	0,3574
6 hu_md_06	**0,5522X**	0,2679	-0,0254	0,2851
7 hu_md_07	0,2721	0,3424	0,2794	0,4368
8 hu_md_08	**0,6495X**	0,1722	0,0925	0,0737
9 hu_md_09	0,3639	-0,0723	0,2372	0,2747
10 hu_md_10	0,5139	0,3814	0,1917	0,6298
11 hu_md_11	0,1704	0,0501	0,5189	0,5231
12 hu_md_12	**0,7151X**	0,1597	0,3221	0,2204
13 hu_md_14	0,1123	0,3256	**0,4981X**	0,0222
14 hu_md_15	0,1955	0,3607	0,294	0,2257
15 hu_md_16	0,1908	0,2158	0,4209	**0,5526X**
16 hu_md_17	0,4374	0,3861	0,409	0,0779
17 hu_md_18	0,1497	0,1461	0,2667	**0,4989X**
18 hu_md_19	**0,5069X**	0,0469	0,0648	0,405
19 hu_md_20	**0,5688X**	0,1523	0,1832	0,1027
20 hu_md_21	-0,1486	**0,3945X**	0,165	0,2865
21 hu_md_22	0,5266	0,4036	-0,143	0,4094
22 hu_md_23	0,3294	**0,5717X**	0,1974	0,2228
23 hu_md_24	0,1174	0,0817	**0,6125X**	0,2637
24 hu_md_25	0,3502	**0,5840X**	0,1135	0,0061
25 hu_md_26	0,5005	0,3571	0,1769	0,499
26 hu_md_27	0,123	**0,6388X**	0,0788	0,0667
27 hu_md_28	0,2227	0,4268	0,486	0,3512
28 hu_md_29	**0,5957X**	0,076	0,3051	0,4613
29 hu_md_30	0,1596	0,1521	0,2799	**0,7259X**
30 hu_md_31	0,4273	0,3018	-0,038	**0,7068X**
31 hu_md_32	0,1414	**0,5124X**	0,1069	0,3082
32 hu_md_33	0,236	0,3674	0,1466	**0,8058X**
33 hu_md_34	**0,4533X**	0,2493	0,2657	0,2239
% E.V.	16%	12%	8%	18%

Appendix 14 Q-method: Normalized factor scores by factors

Table 1 Z-scores for Factor 1

No.	Statement	Z-score
8	Rescuing people from a certain death should take priority over all other kinds of health care.	**2,162**
27	It is more important to prevent ill health than it is to cure ill health once it occurs.	**1,805**
15	When having to choose between two treatments that both cost the same, funding should be given to the treatment that results in the biggest health gain.	**1,549**
29	Access to health care should be based on need, not on geographical, social or economic circumstances.	**1,344**
19	Priority should be given to those treatments that generate the most health.	**1,265**
4	Patient characteristics like age, gender or income should play no role in prioritizing between people.	**1,019**
22	Priority should be given to treatments that restore health to an acceptable level, there's no use in improving health when the final result is still a very poor state of health.	**0,889**
32	People who benefit more from a treatment, because it is more effective for them, should receive priority over people who benefit less from this treatment.	**0,848**
12	Doctors should be the ones to judge which patients get priority on the basis of their medical expertise.	**0,745**
14	Adding one year to the end of life for someone who will otherwise die at age 30 is more important than adding one year to the life of someone who otherwise would die at age 80.	**0,568**
25	People who are in some way responsible for their own illness should receive lower priority than people who have the same illness simply due to chance.	**0,393**
34	The amount of health care people have had in the past should not influence access to treatments in the future.	**0,37**
6	If a treatment adds one month to the life of a patient and costs 7.500 Euros, one should consider whether the money could have been better spent on other health care.	**0,231**
1	If two groups of patients can benefit from a treatment equally and group A's health is fairly good and group B's health is poor, group B deserves priority.	**0,189**
2	If one treatment results in one life year gained for certain and another in a 50% chance of gaining two life years, priority should be given to the first type of treatment.	**0,043**
10	A treatment which benefits patients in the short-term should have priority over a treatment with similar benefits for patients in the future.	**0,037**
24	People should not be allowed to buy themselves priority treatment, even if it doesn't affect others negatively.	**-0,04**
20	It is more important to extend one person's life by one year than to extend 12 people's lives by one month.	**-0,059**
18	If two people have the same current condition but the health of one of the two is worsening while that of the other is stable, the former should be treated with priority.	**-0,079**
23	Younger people should be given priority over older people, because they haven't had their fair share of health yet.	**-0,315**
7	If two patients are waiting for a transplant organ, one with partner and the other single but otherwise identical, the first organ to become available should go the patient with partner.	**-0,393**
13	People who depend heavily on members of their family or neighbours for care should be treated with priority.	**-0,467**
26	Priority should be given to younger people, because they may benefit from treatment for longer.	**-0,495**
31	Parents with dependent children should be given priority over similar people without dependents.	**-0,569**
9	Treatment of illnesses that put the highest burden on patients' families should receive higher priority.	**-0,622**
17	There is no sense in saving lives if the quality of those lives will be really bad.	**-0,658**
28	For non-emergency treatments where there are waiting lists, patients in need of care should be treated on a first come first served basis and not be prioritised in other ways (e.g. the severity of the illness).	**-0,664**
33	It is more important to provide treatments that prolong life than treatments that improve quality of life.	**-0,792**
30	Priority should be given to people with rare diseases, even when these diseases do not necessarily cause more health damage than more common ones.	**-0,88**
21	Whether an illness is the result of an unhealthy lifestyle should not be relevant, everyone is just as worthy of treatment as everyone else.	**-0,898**
11	Priority should be given to people whose quality of life is low over those whose quality of life is moderate, even if treatment can only improve their quality of life by a small amount.	**-1,311**
16	In general, if people from different income groups are suffering from the same condition, people from low income groups should be given priority.	**-1,572**
5	People who are in paid work and so contribute financially to society should be prioritized over people who do not work.	**-1,601**
3	People who have contributed more (e.g. through premiums or taxes) to the health care system should be treated with priority over people who have contributed less.	**-2,044**

Table 2 Z-scores for Factor 2

No.	Statement	Z-score
27	It is more important to prevent ill health than it is to cure ill health once it occurs.	**2,187**
12	Doctors should be the ones to judge which patients get priority on the basis of their medical expertise.	**1,916**
29	Access to health care should be based on need, not on geographical, social or economic circumstances.	**1,854**
8	Rescuing people from a certain death should take priority over all other kinds of health care.	**1,581**
18	If two people have the same current condition but the health of one of the two is worsening while that of the other is stable, the former should be treated with priority.	**1,458**
4	Patient characteristics like age, gender or income should play no role in prioritizing between people.	**0,824**
28	For non-emergency treatments where there are waiting lists, patients in need of care should be treated on a first come first served basis and not be prioritised in other ways (e.g. the severity of the illness).	**0,775**
22	Priority should be given to treatments that restore health to an acceptable level, there's no use in improving health when the final result is still a very poor state of health.	**0,731**
9	Treatment of illnesses that put the highest burden on patients' families should receive higher priority.	**0,598**
19	Priority should be given to those treatments that generate the most health.	**0,589**
34	The amount of health care people have had in the past should not influence access to treatments in the future.	**0,456**
24	People should not be allowed to buy themselves priority treatment, even if it doesn't affect others negatively.	**0,213**
15	When having to choose between two treatments that both cost the same, funding should be given to the treatment that results in the biggest health gain.	**0,139**
14	Adding one year to the end of life for someone who will otherwise die at age 30 is more important than adding one year to the life of someone who otherwise would die at age 80.	**0,118**
13	People who depend heavily on members of their family or neighbours for care should be treated with priority.	**0,036**
25	People who are in some way responsible for their own illness should receive lower priority than people who have the same illness simply due to chance.	**-0,146**
3	People who have contributed more (e.g. through premiums or taxes) to the health care system should be treated with priority over people who have contributed less.	**-0,153**
1	If two groups of patients can benefit from a treatment equally and group A's health is fairly good and group B's health is poor, group B deserves priority.	**-0,162**
21	Whether an illness is the result of an unhealthy lifestyle should not be relevant, everyone is just as worthy of treatment as everyone else.	**-0,163**
17	There is no sense in saving lives if the quality of those lives will be really bad.	**-0,232**
33	It is more important to provide treatments that prolong life than treatments that improve quality of life.	**-0,25**
32	People who benefit more from a treatment, because it is more effective for them, should receive priority over people who benefit less from this treatment.	**-0,456**
10	A treatment which benefits patients in the short-term should have priority over a treatment with similar benefits for patients in the future.	**-0,528**
6	If a treatment adds one month to the life of a patient and costs 7.500 Euros, one should consider whether the money could have been better spent on other health care.	**-0,545**
2	If one treatment results in one life year gained for certain and another in a 50% chance of gaining two life years, priority should be given to the first type of treatment.	**-0,6**
5	People who are in paid work and so contribute financially to society should be prioritized over people who do not work.	**-0,741**
7	If two patients are waiting for a transplant organ, one with partner and the other single but otherwise identical, the first organ to become available should go the patient with partner.	**-0,852**
20	It is more important to extend one person's life by one year than to extend 12 people's lives by one month.	**-0,918**
16	In general, if people from different income groups are suffering from the same condition, people from low income groups should be given priority.	**-0,999**
23	Younger people should be given priority over older people, because they haven't had their fair share of health yet.	**-1,179**
30	Priority should be given to people with rare diseases, even when these diseases do not necessarily cause more health damage than more common ones.	**-1,197**
26	Priority should be given to younger people, because they may benefit from treatment for longer.	**-1,287**
11	Priority should be given to people whose quality of life is low over those whose quality of life is moderate, even if treatment can only improve their quality of life by a small amount.	**-1,416**
31	Parents with dependent children should be given priority over similar people without dependents.	**-1,649**

Table 3 Z-scores for Factor 3

No.	Statement	Z-score
15	When having to choose between two treatments that both cost the same, funding should be given to the treatment that results in the biggest health gain.	**1,597**
29	Access to health care should be based on need, not on geographical, social or economic circumstances.	**1,496**
19	Priority should be given to those treatments that generate the most health.	**1,293**
27	It is more important to prevent ill health than it is to cure ill health once it occurs.	**1,265**
8	Rescuing people from a certain death should take priority over all other kinds of health care.	**1,223**
4	Patient characteristics like age, gender or income should play no role in prioritizing between people.	**1,097**
6	If a treatment adds one month to the life of a patient and costs 7.500 Euros, one should consider whether the money could have been better spent on other health care.	**1,049**
22	Priority should be given to treatments that restore health to an acceptable level, there's no use in improving health when the final result is still a very poor state of health.	**1,013**
25	People who are in some way responsible for their own illness should receive lower priority than people who have the same illness simply due to chance.	**0,896**
17	There is no sense in saving lives if the quality of those lives will be really bad.	**0,797**
18	If two people have the same current condition but the health of one of the two is worsening while that of the other is stable, the former should be treated with priority.	**0,57**
34	The amount of health care people have had in the past should not influence access to treatments in the future.	**0,535**
3	People who have contributed more (e.g. through premiums or taxes) to the health care system should be treated with priority over people who have contributed less.	**0,446**
12	Doctors should be the ones to judge which patients get priority on the basis of their medical expertise.	**0,363**
32	People who benefit more from a treatment, because it is more effective for them, should receive priority over people who benefit less from this treatment.	**0,357**
9	Treatment of illnesses that put the highest burden on patients' families should receive higher priority.	**0,328**
10	A treatment which benefits patients in the short-term should have priority over a treatment with similar benefits for patients in the future.	**0,233**
5	People who are in paid work and so contribute financially to society should be prioritized over people who do not work.	**-0,006**
26	Priority should be given to younger people, because they may benefit from treatment for longer.	**-0,061**
14	Adding one year to the end of life for someone who will otherwise die at age 30 is more important than adding one year to the life of someone who otherwise would die at age 80.	**-0,235**
2	If one treatment results in one life year gained for certain and another in a 50% chance of gaining two life years, priority should be given to the first type of treatment.	**-0,269**
31	Parents with dependent children should be given priority over similar people without dependents.	**-0,315**
13	People who depend heavily on members of their family or neighbours for care should be treated with priority.	**-0,615**
20	It is more important to extend one person's life by one year than to extend 12 people's lives by one month.	**-0,632**
23	Younger people should be given priority over older people, because they haven't had their fair share of health yet.	**-0,772**
33	It is more important to provide treatments that prolong life than treatments that improve quality of life.	**-0,915**
1	If two groups of patients can benefit from a treatment equally and group A's health is fairly good and group B's health is poor, group B deserves priority.	**-0,953**
28	For non-emergency treatments where there are waiting lists, patients in need of care should be treated on a first come first served basis and not be prioritised in other ways (e.g. the severity of the illness).	**-1,057**
11	Priority should be given to people whose quality of life is low over those whose quality of life is moderate, even if treatment can only improve their quality of life by a small amount.	**-1,233**
7	If two patients are waiting for a transplant organ, one with partner and the other single but otherwise identical, the first organ to become available should go the patient with partner.	**-1,233**
24	People should not be allowed to buy themselves priority treatment, even if it doesn't affect others negatively.	**-1,264**
30	Priority should be given to people with rare diseases, even when these diseases do not necessarily cause more health damage than more common ones.	**-1,621**
21	Whether an illness is the result of an unhealthy lifestyle should not be relevant, everyone is just as worthy of treatment as everyone else.	**-1,677**
16	In general, if people from different income groups are suffering from the same condition, people from low income groups should be given priority.	**-1,703**

Appendix 15 Q-method: Distinguishing and consensus statements

The statements listed in Tables 1-3. are distinguishing the given factor from any other factor at a significance level of 5%. Asterisk (*) indicates significance at p<.01. Both the factor Q-sort value and the normalized score are shown. Table 4. presents the consensus statements.

Table 1 Distinguishing statements for Factor 1

No.	Statement	Factor 1		Factor 2		Factor 3	
		Rank	Z	Rank	Z	Rank	Z
8	Rescuing people from a certain death should take priority over all other kinds of health care.	**4**	**2,16**	3	1,58	3	1,22
32	People who benefit more from a treatment, because it is more effective for them, should receive priority over people who benefit less from this treatment.	**2**	**0,85**	-1	-0,46	0	0,36
14	Adding one year to the end of life for someone who will otherwise die at age 30 is more important than adding one year to the life of someone who otherwise would die at age 80.	**1**	**0,57**	1	0,12	0	-0,23
25	People who are in some way responsible for their own illness should receive lower priority than people who have the same illness simply due to chance.	**1**	**0,39**	0	-0,15	2	0,9
6	If a treatment adds one month to the life of a patient and costs 7.500 Euros, one should consider whether the money could have been better spent on other health care.	**1**	**0,23***	-1	-0,55	2	1,05
20	It is more important to extend one person's life by one year than to extend 12 people's lives by one month.	**0**	**-0,06**	-2	-0,92	-1	-0,63
18	If two people have the same current condition but the health of one of the two is worsening while that of the other is stable, the former should be treated with priority.	**0**	**-0,08***	3	1,46	1	0,57
23	Younger people should be given priority over older people, because they haven't had their fair share of health yet.	**0**	**-0,31**	-3	-1,18	-1	-0,77
7	If two patients are waiting for a transplant organ, one with partner and the other single but otherwise identical, the first organ to become available should go the patient with partner.	**-1**	**-0,39**	-2	-0,85	-3	-1,23
9	Treatment of illnesses that put the highest burden on patients' families should receive higher priority.	**-1**	**-0,62***	2	0,6	0	0,33
21	Whether an illness is the result of an unhealthy lifestyle should not be relevant, everyone is just as worthy of treatment as everyone else.	**-3**	**-0,90***	0	-0,16	-4	-1,68
5	People who are in paid work and so contribute financially to society should be prioritized over people who do not work.	**-4**	**-1,60***	-2	-0,74	0	-0,01
3	People who have contributed more (e.g. through premiums or taxes) to the health care system should be treated with priority over people who have contributed less.	**-4**	**-2,04***	0	-0,15	1	0,45

Table 2 Distinguishing statements for Factor 2

No.	Statement	Factor 1		Factor 2		Factor 3	
		Rank	Z	Rank	Z	Rank	Z
12	Doctors should be the ones to judge which patients get priority on the basis of their medical expertise.	2	0,74	**4**	**1,92***	1	0,36
18	If two people have the same current condition but the health of one of the two is worsening while that of the other is stable, the former should be treated with priority.	0	-0,08	**3**	**1,46***	1	0,57
28	For non-emergency treatments where there are waiting lists, patients in need of care should be treated on a first come first served basis and not be prioritised in other ways (e.g. the severity of the illness).	-2	-0,66	**2**	**0,78***	-2	-1,06
19	Priority should be given to those treatments that generate the most health.	3	1,27	**1**	**0,59***	3	1,29
15	When having to choose between two treatments that both cost the same, funding should be given to the treatment that results in the biggest health gain.	3	1,55	**1**	**0,14***	4	1,6
13	People who depend heavily on members of their family or neighbours for care should be treated with priority.	-1	-0,47	**0**	**0,04**	-1	-0,61
25	People who are in some way responsible for their own illness should receive lower priority than people who have the same illness simply due to chance.	1	0,39	**0**	**-0,15**	2	0,9
3	People who have contributed more (e.g. through premiums or taxes) to the health care system should be treated with priority over people who have contributed less.	-4	-2,04	**0**	**-0,15**	1	0,45
21	Whether an illness is the result of an unhealthy lifestyle should not be relevant, everyone is just as worthy of treatment as everyone else.	-3	-0,9	**0**	**-0,16***	-4	-1,68
33	It is more important to provide treatments that prolong life than treatments that improve quality of life.	-2	-0,79	**-1**	**-0,25**	-2	-0,91
32	People who benefit more from a treatment, because it is more effective for them, should receive priority over people who benefit less from this treatment.	2	0,85	**-1**	**-0,46***	0	0,36
10	A treatment which benefits patients in the short-term should have priority over a treatment with similar benefits for patients in the future.	0	0,04	**-1**	**-0,53**	0	0,23
6	If a treatment adds one month to the life of a patient and costs 7.500 Euros, one should consider whether the money could have been better spent on other health care.	1	0,23	**-1**	**-0,55***	2	1,05
5	People who are in paid work and so contribute financially to society should be prioritized over people who do not work.	-4	-1,6	**-2**	**-0,74***	0	-0,01
16	In general, if people from different income groups are suffering from the same condition, people from low income groups should be given priority.	-3	-1,57	**-2**	**-1**	-4	-1,7
26	Priority should be given to younger people, because they may benefit from treatment for longer.	-1	-0,49	**-3**	**-1,29***	0	-0,06
31	Parents with dependent children should be given priority over similar people without dependents.	-1	-0,57	**-4**	**-1,65***	-1	-0,32

Table 3 Distinguishing statements for Factor 3

No.	Statement	Factor 1		Factor 2		Factor 3	
		Rank	Z	Rank	Z	Rank	Z
27	It is more important to prevent ill health than it is to cure ill health once it occurs.	4	1,8	4	2,19	**3**	**1,26**
6	If a treatment adds one month to the life of a patient and costs 7.500 Euros, one should consider whether the money could have been better spent on other health care.	1	0,23	-1	-0,55	**2**	**1,05***
25	People who are in some way responsible for their own illness should receive lower priority than people who have the same illness simply due to chance.	1	0,39	0	-0,15	**2**	**0,9**
17	There is no sense in saving lives if the quality of those lives will be really bad.	-2	-0,66	0	-0,23	**1**	**0,80***
18	If two people have the same current condition but the health of one of the two is worsening while that of the other is stable, the former should be treated with priority.	0	-0,08	3	1,46	**1**	**0,57***
3	People who have contributed more (e.g. through premiums or taxes) to the health care system should be treated with priority over people who have contributed less.	-4	-2,04	0	-0,15	**1**	**0,45**
32	People who benefit more from a treatment, because it is more effective for them, should receive priority over people who benefit less from this treatment.	2	0,85	-1	-0,46	**0**	**0,36**
5	People who are in paid work and so contribute financially to society should be prioritized over people who do not work.	-4	-1,6	-2	-0,74	**0**	**-0,01***
1	If two groups of patients can benefit from a treatment equally and group A's health is fairly good and group B's health is poor, group B deserves priority.	1	0,19	0	-0,16	**-2**	**-0,95***
24	People should not be allowed to buy themselves priority treatment, even if it doesn't affect others negatively.	0	-0,04	1	0,21	**-3**	**-1,26***
21	Whether an illness is the result of an unhealthy lifestyle should not be relevant, everyone is just as worthy of treatment as everyone else.	-3	-0,9	0	-0,16	**-4**	**-1,68***

Table 4 Consensus statements

No.	Statement[#]	Factor 1		Factor 2		Factor 3	
		Rank	Z	Rank	Z	Rank	Z
4*	Patient characteristics like age, gender or income should play no role in prioritizing between people.	2	1,02	2	0,82	2	1,1
11*	Priority should be given to people whose quality of life is low over those whose quality of life is moderate, even if treatment can only improve their quality of life by a small amount.	-3	-1,31	-4	-1,42	-2	-1,23
22*	Priority should be given to treatments that restore health to an acceptable level, there's no use in improving health when the final result is still a very poor state of health.	2	0,89	2	0,73	2	1,01
29	Access to health care should be based on need, not on geographical, social or economic circumstances.	3	1,34	3	1,85	4	1,5
34*	The amount of health care people have had in the past should not influence access to treatments in the future.	1	0,37	1	0,46	1	0,54

[#] *All listed statements are non-significant at P>.01, and those flagged with an * are also non-significant at P>.05.*

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