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# Use of quality of life measures in mental health economics and care planning

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Quality of life measurement is a key element in health economics and healthcare planning, particularly in chronic diseases associated to high morbidity and disability (i.e., mental disorders). This paper provides a critical review on the theoretical background of utility, on the methods for developing measures based on health preferences or values, and the composite indexes derived from them (DALY and QALY). Then the practical use in mental health is revised both in Burden of Disease studies and cost-utility analysis. There is an important requirement on the part of mental health researchers and policy makers alike to pay close attention to the underlying methods and construction of utility-based estimates of health outcome.

**Key words:**

Mental health. Quality of life. Burden of disease. Cost-utility. Methods. QALY. DALY.

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## Medida de la calidad de vida en el análisis económico de la atención a la salud mental

La medición de la calidad de vida constituye un elemento clave en los estudios de economía de la salud y de planificación sanitaria, sobre todo en enfermedades crónicas de alta morbilidad y discapacidad, como ocurre en los trastornos mentales. Este artículo efectúa una revisión crítica del fundamento teórico de la medición basada en la utilidad, los métodos de elaboración de medidas de preferencias o valores de salud y los indicadores sintéticos derivados de estas medidas (años de vida ajustados por calidad y años de vida ajustados por discapacidad). Después se revisa su aplicación práctica en salud mental tanto en estudios de carga de enfermedad como en análisis de coste-utilidad. Es necesario que tanto los investigadores y como los decisores presten especial

atención a los diferentes métodos subyacentes y a la elaboración de estimaciones de resultados sanitarios basados en la utilidad.

**Palabras clave:**

Salud mental. Calidad de vida. Carga de enfermedad. Coste-utilidad. Métodos. AVAD. AVAC.

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## INTRODUCTION

During the last two decades, we have witnessed growing interest and demand for economic analysis of the interventions and action plans in mental health promoted by the concern of governments regarding increased health cost<sup>1,2</sup>. Considerations regarding cost and cost-effectiveness are included within the health care reform process, establishment of priorities in health care programs and decisions that regulate the price or approval of drug use. There is presently wide consensus regarding the appropriateness of including the information related with quality of life in said analytic process. However, the evaluation methods of quality of life within the economic analysis are relatively new, and differ from the classical methods in a significant number of aspects, this being one of the reasons why there is still some controversy.

In spite of the development of improved indexes to determine morbidity or quality of life, non-mortal outcomes of the diseases continue to be set aside when establishing priorities or assigning resources. This is due to, on the one hand, the «rule-of-rescue» argument (that establishes the priority need of intervening in the face of all those diseases that are life threatening) and, on the other, to the heterogeneous (or not very standardized, if compared with death) nature of morbidity indicators (for example, resolution of depression symptoms when there is a decrease in systolic blood pressure in hypertension). If the economy of health, as a discipline, has contributed to the development of the measurement of results in some area, it is in the providing of a framework combining mortality and morbidity in a single standardized measurement that may be used in the population to determine choices or priorities for action and investment.

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Renouncement: The points of view herein reflected are those contemplated by the authors and not necessarily those of the organizations they represent.

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## ECONOMIC EVALUATION WAYS

Economy is the science that deals with maximizing the benefits obtained from the use of limited resources. Calculation of the cost of the few social resources necessary to implement a health care intervention is conducted, considering the opportunities discarded when making this investment. The benefits of such intervention may be interpreted in different ways. However, here we summarize them in terms of three categories: physical or natural units, utilities and monetary value.

Most economic analyses use results measured in natural units, such as the number of lives saved and cases in remission or in the field of mental health, symptom relief and improvements in functioning. This type of economic evaluation is known with the name of cost-effectiveness. The specific instruments are those used most in the measurement of the symptoms (e.g., Hamilton Depression Rating Scale) while other more generic ones have been used more to indicate functional improvements (e.g., Nottingham Health Profile, Medical Outcomes Study Short-Forms 36, or the WHO's Disability Assessment Schedule II). These measurements are capable of generating very standardized profiles for a certain individual and thus are comparable in relationship to quality of life or disability for different types of diseases. However, as occurs with the specific instruments for certain diseases, these tools are not considered to be acceptable to be incorporated in an indicator made up for the evaluation of outcomes in health.

Synthetic indicators of evaluation of outcomes in the health field aim to reflect the changes in mortality and morbidity indexes. This is the case, for example, of the Quality-Adjusted Life Year (QALY) and Disability-Adjusted Life Year (DALY). The QALY, for example, may be understood as the product between life expectancy and an adjustment measurement of quality gained for the remaining years of life. The key characteristic of both QALY and DALY is related with the factor that makes it possible to adjust time lived in a certain health condition by quality of life or disability associated to said health condition. This quality adjustment factor is evaluated in reference to the theory of expected utility that seeks to reveal the preferences that appear associated to each one of the different health conditions (on a scale of standardized intervals that reflect different health conditions, contemplating from full health to death). In agreement with the utility model, the appropriateness of the health care condition measurements to establish priorities improves if preference measurements are incorporated and when the measurements of the most relevant items (mortality and morbidity) can be collected in a single indicator. This approach, developed more thoroughly in the following, has motivated the term cost-utility analysis understood as a model of economic evaluation.

In the final measurement of the outcomes, not only the inputs but also the outputs of the interventions are conver-

ted into monetary units, setting aside simple decision guidelines regarding cost of a single intervention (economic benefits should exceed costs) or of several interventions (choosing those that have a greater monetary benefit ratio regarding costs). In economic evaluation, this form of analysis is known as cost-benefit analysis. In spite of all that stated, certain difficulties exist when this model is introduced into the field of psychiatry and other related fields because it requires a monetary evaluation of all improvements in health, including control of symptoms, improvements in functioning and quality of life and even losses of well-being associated to side effects derived from some drugs<sup>3</sup>.

## UTILITY MEASUREMENTS

From the historic perspective, the cost-utility theory is based on the «expected utility theory» developed by Daniel Bernouilli in 1738 and formalized by Von Neumann and Morgenstern at the end of the 1940's. According to this theory, all results derived from the choice between two alternatives (preference) produces a certain grade of satisfaction or utility. Subjective utility (satisfaction derived from the alternative chosen) differs from the expected objective monetary gains in different aspects. These can be assumption of risk, certainty in choice, grade of probability, or previous experiences and knowledge. Thus, for example, the choices associated to gains are related with aversion to risk while those associated with losses are related with assumption of risk, which is even true when the expected monetary changes are the same in both choices. When the certainty is included as an alternative, low likelihood choices are overestimated and high or intermediate likelihood ones are underestimated, producing a change in assumption of risk. The economic function «value» provides a description of the relationship existing between the subjective value and objective amount that can be gained or lost. Weinstein et al. specified the aspects of the utility cost analysis in 1970. They described QALY as the net efficacy of the alternative in question expressed by compensations between additional survival and quality of life. Williams<sup>4</sup> introduced the QALY in the United Kingdom as a different model based on the classification of disease states and its associated code to weigh the «value of life» in each state. Over the last two decades, new classification systems and a complete variety of assessment techniques have been used in the cost-utility analysis.

## UTILITY MEASUREMENTS IN THE PRACTICE: APPLICATIONS IN MENTAL HEALTH.

How have utility measurements been used when elaborating mental health policies or in assigning resources? We are going to illustrate this question with three examples: as a summary measure of the disease burden for the population health (DALY attributed to mental disorder); as a measurement of the result for the cost-utility analysis in the population. (DALY avoided by a mental health intervention)

and as a measure of the result for the cost-utility analysis of treatment of depression in primary health care (QALY gained by the intervention).

### Overall burden of mental disorders

Those in charge of decision making and experts in public health seek rational guides to establish priorities in health, evaluate the results of the interventions and reforms in health care and monitor the changes over time locally, nationally, regionally and globally. Estimations of the health care service needs, their cost and effectiveness require indicators that go beyond the simple measurements of mortality and diagnostic indexes and that include «functioning» of the persons. In response to such need, the first study of «global burden of disease» (GBD) was conducted in the nineties by the University of Harvard in collaboration with the World Bank and WHO. The study sought to give a combination of «summary measures» that provided information on the diseases and lesions (including those with non-mortal results) in order to make a global establishment of priorities in the health research field and guide the international health planning and policies<sup>5</sup>. Besides generating stimulators consisting in mortality and morbidity by age, gender and region, the GBD STUDY introduces a new measure (of utility) –disability adjusted life year (DALY)– to quantify the disease burden. The DALY is a measure made up of the health of the population collected, under a single indicator, years of life lost by premature death and years lived with disability. One DALY may be understood as one lost year of «healthy life», and the burden of disease as the measurement of the gap between current health status and ideal situation where everyone lives until old age free of disease and disability. The DALYs are measures of results in health in a certain time, similar to the quality adjusted life years, that include weight for time passed in a health condition worse than perfect, with a ranking that ranges from 0 (perfect health) to 1 (death). This occurs in such a way that the highest values imply greater discapacity and thus worse outcome. For a demonstration of how to calculate the DALYs (for a depressive disorder), we refer the reader to the Ustun et al. study<sup>6</sup>.

The results of the 1990 GBD study brought up the substantial and previously unrecognized burden of neuropsychiatric disorders. The neuropsychiatric disorders that the GBD study presented its estimations for were: major unipolar depression, bipolar disorder, schizophrenia, epilepsy, alcohol consumption, dementia, Parkinson, multiple sclerosis, drug consumption, post-traumatic stress disorder, obsessive-compulsive disorder and panic disorder. One of the main findings of GDB, once the estimations that went beyond mortality to include morbidity (discapacity) were calculated was that mental disorders (that produce discapacity, but do not kill) are one of the main causes of burden in all the world. They score as high as cardiovascular and respiratory disorders, and exceed combined malignant tumors or HIV.

The study demonstrated how unipolar depressive disorder causes an enormous burden on society. In fact, it has been estimated as the fourth cause of burden among all the disorders, accumulating more than 50 million years of lost healthy years of life in all the world<sup>6</sup>. This high burden index is due to a combination of high prevalence of depression, high impact on functioning and early age of onset. Even though the results of the GBD study show certain variations based on country and region, the patterns and tendencies are very similar worldwide. Mental disorders constitute an important proportion of the total disease burden in both developed and underdeveloped countries.

### Sectorial analysis of cost-utility of the mental health interventions.

In spite of being one of the main objectives of the Global Burden of Disease study, it is true that up to now, only a limited connection has been established between the summary measures of health status of the population and the generation of scientific evidence from cost-effectiveness studies. This connection is suggested to be necessary if we consider that DALY is not self-sufficient as a mechanism for the assigning of resources or for the estimation of priorities within the health field. In other words, the size of the attributable burden is not sufficient alone to guide to action. In order to establish priorities and assign resources, it is more pertinent to ask which burden of a specific disorder can be avoided by the use of evidence based interventions and what is the relative cost of its implementation for the target population. This analysis could reveal the technically more efficient response against the burden attributable to a specific disorder.

Through the WHO-CHOICE (Choosing Interventions that are Cost-Effective) project, the WHO has recently embarked on a new initiative to establish cost-effectiveness databases of certain key interventions in 14 epidemiological subregions of the world<sup>7</sup>. Within this work program, a comparative analysis of cost-effectiveness of different interventions has also been contemplated in order to reduce the burden associated to the most important neuropsychiatric disorders. This program advocates a «generalized» form of cost-utility analysis in which both cost and effects of both present and new interventions are compared with the starting point of «doing nothing». Consequently, the costs and effectiveness of drug and psychological interventions in primary health care or in special care facilities are compared in a population model with an epidemiologic situation that represented the natural history without treatment of said disease. The effects have been measured in terms of DALY (e.g., reduced burden) while the costs have been expressed in international dollars.

Up to date, our group has published the results of the application of the WHO-CHOICE methodology to the following neuropsychiatric disorders: depressive disorders<sup>8</sup>, bi-

polar disorder<sup>9</sup>, alcohol abuse<sup>10</sup> and epilepsy<sup>11</sup>. In comparison with the epidemiological situation of no treatment (natural history), it is expected that the most cost-effective strategy to decrease the burden of psychosis in developing regions is a combined intervention of antipsychotics or first generation mood stabilizer, together with psychosocial treatment. These are provided from a service model based on out-patient community care with a cost-effectiveness ratio in Sub-Saharan Africa and South Africa of 4,200-5,500 dollars and up to 10,000 dollars in the regions of middle earnings<sup>12</sup>. At present, the high purchase price of second generation antipsychotic drugs has made their use in developing regions questionable in regards to their efficiency. However this situation is undergoing change due to the fact that these drugs will be patent free soon. On the contrary, the evidence shows how the relatively modest additional cost generated from the introduction of psychosocial therapy is translated into important gains in the health field. Thus, in the case of schizophrenia and bipolar disorder, combined treatment is more profitable than drug therapy alone. If we refer to cases of mental disorders more commonly treated in primary care (such as depression or anxiety disorders), the most cost-effective strategy is that which implies an increasing step-up administration of old antidepressants (because they have a lower cost than the new ones and practically have the same effects). However, given that the price margin existing between the oldest antidepressants and the most recent generic drugs continues to decrease, SSRI generic drugs may be at least as profitable as the others and thus represent a treatment option for the future on a global scale. Considering that depression is a disorder having common recurrence, there are sufficient reasons to think that a proactive treatment program, that includes a long-term treatment with antidepressants in those patients who should follow a maintenance treatment, is a cost-effective option (if there are resources available) to significantly reduce the enormous burden of depression presently existing in developing countries<sup>8</sup>.

The purpose of the WHO-CHOICE project is to determine the relative position of different health interventions using an evaluation of its cost-effectiveness that may guide the establishment of priorities within the health sector for its classification. According to the Macroeconomy and Health Commission criterion (2001)<sup>13</sup>, the results of the analysis conducted by our group up to now indicate that: *a*) the most efficient interventions in common mental disorders may be considered as cost-effectives (each DALY saved means a cost under the average earnings per capita per year), and *b*) that the community interventions for severe mental disorders that imply the use of classical antipsychotics and mood stabilizers fulfill the requirements needed to be considered as cost-effective (each DALY saved means a three times lower cost than the GDP per capita). These conclusions thus provide new arguments regarding decision makings in health as they stress the relative value of investing in the treatment of neuropsychiatric disorders and their prevention, thus helping to eliminate one of the many still existing

barriers for an appropriate response of the health system towards this disease.

### Cost-utility analysis of treatment of depression in primary health care

It was very difficult to find examples that showed the applicability of cost-utility analysis to mental health only ten years ago<sup>1</sup>. Since then, there has been an increase in the use of the approach known as cost-per-QALY, done following the recommendations of regulatory agencies in Australia, Canada, United Kingdom and the United States, in economic evaluation of mental health care. For example, the cost-utility analysis in the field of depression is being conducted at present to evaluate (in all the United States) screening in primary care<sup>14</sup>, maintenance treatment for recurrent depression<sup>15,16</sup>, treatment guides in primary health care for women<sup>17</sup>, and quality improvement programs initiated in primary health care. Many of the cost-utility analyses used up to date<sup>18</sup> use secondary data and modeling techniques to estimate costs and effects. Others have elaborated estimations of cost-per-QALY simultaneously to the performance of clinical analyses.

An example of cost-utility analysis by models is that made by Revicki et al.<sup>19</sup>, who compared the treatment for major depression with: *a*) new antidepressants (nefazodone and fluoxetine); *b*) tricyclics (imipramine) and for treatment failure cases, and *c*) a step-up approach that includes initial treatment with imipramine followed by nefazodone. In order to obtain estimations of medical costs over the lifetime and their results in health (expressed in QALY), a clinical decision analysis model that simulates clinical management pathways and recurrence patterns in major depression was developed for these treatment alternatives. In this regard, only minimum differences were found, in terms of costs and QALY, between nefazodone and fluoxetine and both antidepressants were considered cost-effective in comparison with the treatment with imipramine and step-up treatments with imipramine. Cost ratios per QALY gained with these new antidepressants have been considered as low enough (below 20,000 dollars per QALY gained) to merit the inclusion of these treatments in the health care system. For example, the extra cost (marginal ratio) for the entire life of nefazodone versus imipramine (1,321 dollars) was 0.32 additional QALYs with a ratio of 4,065 dollars per each additional QALY. One of the limitations of this type of analysis, especially relevant in mental health, is that the results do not include indirect costs such as, for example, a change in work productivity (very important from a social perspective) that are also not easily generalized to other clinical populations.

The benefit expected from expressing the results of the economic evaluation in these terms is found in the capacity of aligning the estimated cost per QALY for a wide range of interventions and diseases in order to determine an acceptable efficiency level in comparison with a preestablished

threshold (of, say 50,000 dollars) or even constructing league-tables that summarize the best and worst possible options within the health care sector. In practice, there are important problems when confiding in these tables for the assignment of resources (due to the heterogeneous and contextual nature of the cost-utility studies), since there may be criteria that are separated from the efficiency that determine if a particular intervention is considered susceptible to reimbursement or should be included in a certain basic health care package.

## CONCLUSIONS

The economic perspective of quality of life differs significantly from that developed for the medical sector. In medicine, quality of life is a functional status while in economy of health «quality of life» is a utility function. In the first case, a scale of subjective position may provide information regarding the present health status of a patient in several dimensions related with the construct «quality of life», while in economy of health, the evaluation is based on the preference of the individual between two different health stages. Cost-utility analysis was designed as an economic tool to improve decision making within the health field through the elaboration of a common index that integrates costs and results, in such a way so as to make it possible to make comparisons between different diseases. As has been demonstrated in the previous section, there have been several uses given to utility measurements within the health field, each one of which has contributed to the debate in material of medical priorities and efficiency regarding the different interventions.

The fact that quality of life may be measured in such a way as to facilitate the comparison of quantitative data (for example, costs) is a crucial question in the present debate. Most of the economists in health, even those who are critical of the presently available instruments<sup>20</sup>, consider that this is possible and understand that the problems proposed are those characteristic of a technique in the initial stage. Other experts, especially from the biostatistics and clinical fields, are even more critical and question the total correctness of these techniques when examining values that are placed within the measurement of quality of life that include mortality. Furthermore, some of the utility measurement instruments do not fulfill the quality criteria in regards to reliability, validity and generalization<sup>21,22</sup>. The quality criteria of most of the available utility measurements (for example, Quality of Well-Being Scale, Torrance Health Utility Index, the Rosser-Kind Matriz, EuroQol, GBD disability weights) have not been sufficiently tested, especially in regards to consistency, sensitivity to change, validity and reliability (test-retest, Inter-subjects), and inter-rater reliability. Factors such as changes of preferences in matters of health over time arouse serious doubts on the reliability of such measurements, especially in questions of mental health. For example, a recent study has shown how the use

of the approach based on preferences for the construction of EuroQol scores for schizophrenia (and, by extension, other utility measurements) show results that do not greatly differ from those obtained through other simpler descriptive systems<sup>23</sup>. Basically, the approach of expected utility is based on a series of normative assumptions about attitudes in the face of risk and time preferences, whose descriptive validity has been strongly criticized, the absolute validity of that model being questioned<sup>20,24</sup>.

Consequently, both the investigators in the mental health area and those responsible for decision making must pay special attention to the underlying methods in these analyses. Furthermore, there are difficulties to extrapolate and interpret the data and results obtained in different health care systems. It is especially necessary to adapt these cost-effectiveness analysis strategies in mental health to the national or regional context in which the performance of these interventions are proposed. In this sense, our group is presently developing the adaptation of the WHO-CHOICE method for the comparative analysis of interventions in mental health in Spain using the population model.

Finally, it is important to state that the information provided by the cost-per-QALY or by DALY should not be used as the only criterion when making decisions, but should be used as a supplementary data source to be considered together with the commonly used information.

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