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Narrative Review

The complex interface between economy and healthcare: An introductory overview for clinicians

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ABSTRACT

In a period of generalized economic crisis, it seems particularly appropriate to try to manage a continuing growing sector such as healthcare in the best possible way. The crucial aim of optimization of available healthcare resources is obtaining the maximum possible benefit with the minimum expenditure. This has important social implications, whether individual citizens or tax-funded national health services eventually have to pay the bill. The keyword here is efficiency, which means either, maximizing the benefit from a fixed sum of money, or minimizing the resources required for a defined benefit. In order to achieve these objectives, economic evaluation is a helpful tool. Five different types of economic evaluation exist in the health-care field: cost-minimization, cost-benefit, cost-consequences, cost-effectiveness and cost-utility analysis. The objective of this narrative review is to provide an overview of the principal methods used for economic evaluation in healthcare. Economic evaluation represents a starting point for the allocation of resources, the decision of the valuable investments and the division of budgets across different health programs. Moreover, economic evaluation allows the comparison of different procedures in terms of quality of life and life expectancy, bearing in mind that cost-effectiveness is only one of multiple facets in the decision making-process. Economic evaluation is important to critically evaluate clinical interventions and ensure that we are implementing the most cost-effective management protocols. Clinicians are called to fulfill the complex task of optimizing the use of resources, and, at the same time, improving the quality of healthcare assistance.

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1. Introduction

Inadequacy of resources is the base of economy. For this reason, the need for optimization of the available resources appears of primary importance, with the objective of obtaining the maximum possible benefit with the minimum expenditure [1]. In a context characterized by frequent cuts to public spending, the introduction in the health-care field of economic evaluations represents another intent of reconsidering a sector that consumed 8.8% of Italian gross domestic product (GDP)

in 2013, excluding capital expenditure, compared with an OECD (Organization for Economic Co-operation and Development) average of 8.9% [2]. As a reflection of the economic crisis, health spending continued to shrink in Greece, Italy and Portugal in 2013 [3]. On the contrary, in the last five years health spending has been growing with a medium rate of 2.5% per year outside Europe [3].

As a consequence, it seems appropriate to try to obtain the best allocation of the finite available resources at our disposal, in order to guarantee health assistance despite the negative effects of the economic crisis and to manage in the proper way a continuing growing sector. The keyword here is *efficiency*, which means either maximizing the benefit from a fixed sum of money or minimizing the resources required for a defined benefit [1]. This has important social implications, whether individual citizens or tax-funded national health services eventually have to pay the bill. Considering that the healthcare budgets are limited and spending in one area is unavoidably at the expense of investment in another, efficiency can be interpreted as ensuring that the benefits obtained exceed the benefits forgone [1]. The latter concept could be also express as “opportunity cost” [4].

The objective of this narrative review is to appraise the most recent evidence regarding economic evaluation and healthcare spending. In

Abbreviations: EE, economic evaluation; OECD, Organization for Economic Co-operation and Development; CEA, cost-effectiveness analysis; CER, cost-effectiveness ratio; ICER, incremental cost-effectiveness ratio; WTP, willingness to pay; NICE, National Institute for Health and Clinical Excellence; CUA, cost-utility analysis; QALY, quality adjusted life year; HUI, Health Utilities Index; SF-6D, Short-form 6D; EQ-5D, Euro Quality of life 5 Dimensions.

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fact, the priority is to try to disseminate information and implement this model within the health community, with the aim of handling appropriately the financial resources, ensuring the wellbeing of the patient at the first place.

2. Methods

For this review, the best quality evidence was selected with preference given to the most recent and definitive original articles and reviews. Information was identified by searches of MEDLINE and references from relevant articles, using combinations of MESH terms “economic evaluation”, “cost-effectiveness analysis”, “cost-effectiveness threshold”, “cost-utility analysis”, “efficiency”, “health economic evaluation”, “health care economic analyses”, “value based medicine”, “NICE” “utility” and “QALY”. The search was limited to peer-reviewed, full-text articles in the English language. For most issues, papers published between January 2003 and December 2015 were considered.

Two authors (FLO and LB) performed an initial screening of the title and abstract to exclude citations deemed inappropriate for the present narrative review (e.g., experimental studies or investigational health economic analyses relative to specific treatments). Articles describing the various approaches with an apparent didactic format were retrieved and assessed. A total of 22 articles that were deemed more informative and clear by both reviewers were eventually selected and analyzed in detail [1,2,5–24]. No formal system was adopted to rate the quality of the evaluated articles. Four reviews [16–19], written by an ophthalmology research group, were excluded because they were analogous to a fifth included article [15]. For a similar reason, we excluded one review [20] and included another one [1] previously published by the same author. Two articles [21,22] were excluded as they explained how to conduct a specific economic analysis, rather than describe the general characteristics of the various methods. One article [23] was excluded because it focused on methodological and interpretative aspects of economic analysis. One article [24] was excluded as only cost-utility and cost-benefit analysis were addressed, but not cost-effectiveness analysis. A total of 13 articles were eventually included in the present review.

3. Types of economic evaluation

In the most commonly used economic evaluations, two interventions, a standard treatment and an experimental one are compared with the scope of assessing the value of the novel procedure. When the latter is more cost-effective than the older one, the novel procedure is obviously chosen; on the other hand, if the new treatment is more expensive and less effective, the standard one is generally maintained. Uncertainty arises when the novel treatment is more effective but also more expensive than the traditional treatment [5]. The scenario becomes more complex when evaluations aim at a more comprehensive approach, i.e. the comparison between interventions of highly distinct medical areas.

Five different types of economic evaluations exist in the healthcare field: cost-minimization, cost-benefit, cost-consequences, cost-effectiveness and cost-utility analysis [5] (Table 1):

- Cost-minimization analysis: in cost-minimization analysis, two or more interventions with equivalent consequences in terms of benefit are compared [1]. It should ideally be used only when comparing treatment of equal effectiveness, and it focuses on costs alone to help choosing the cheapest option [6].
- Cost-benefit analysis: it evaluates, in monetary terms, cost and consequences of an intervention [1]; if the monetary value of an intervention exceeds the cost of the intervention, then the intervention is acceptable [7]. This analysis places money values on both inputs (costs) and outputs (general benefits) of health care and represents the best method to inform allocation decisions because it consents to compare interventions from highly heterogeneous

areas and it is based on a more comprehensive economic vision of the society [4].

- Cost-consequences analysis: this analysis reflects how decisions are made in the real world. This approach is often used when various outcomes cannot be condensed into a single measure that summarizes benefits and costs. For example, in a cost-consequences analysis, the general practitioner and nurse's salaries as well as expenditures sustained by patients are considered as costs, whereas patient health state and satisfaction with treatment are considered as consequences [1].
- Cost-effectiveness analysis (CEA): it is the most widely used analysis and it consents to compare interventions with a common health outcome. The outcomes could be measured using different ratios (for example, cost per life year gained or pain free days) [1]. This data should be obtained, when possible, from clinical trials [8]. CEAs provide a definite answer on a specific comparison, i.e. it concludes which of the compared options has a more favorable cost-effectiveness profile. However, a less cost-effectiveness procedure may still be of economic and clinical interest if it is more effective. To disentangle this possibility, one may rely on the incremental cost effectiveness ratio (ICER). Specifically, the cost effectiveness ratio (CER) expresses the ratio between the cost of an intervention (K) and the benefit endpoint gained (E). The ratio K/E describes a treatment's marginal costs per gained clinical benefit unit [9]. The ICER allows the comparison between different interventions for the same pathology. Considering respectively K_1 and K_2 as the costs of the standard treatment and the novel one, and E_1 and E_2 as the benefit endpoints of the two interventions, the ICER is calculated as [9]: $ICER = (K_2 - K_1) / (E_2 - E_1)$. This ratio permits to define the additional costs for unit of benefit gained with the new treatment with the possibility of drawing a “health economical ranking” of the different procedures [9]. Before comparing the ICERs, it's fundamental to estimate the cost-effectiveness benchmark, which expresses the insurer's maximum willingness to pay (WTP) additional treatment costs per gained benefit unit. The new treatment will be selected only if the ICER is inferior of the benchmark [9]. The objective is to establish the socially acceptable CER. As Noyes and Holloway [10] stated: “Is the additional effects of our new technology compared with the old technology worth the additional costs?”. The most suitable cost-effectiveness benchmark to be used should be adapted to the local economical situation but remains highly debated. In the affluent Western world, the thresholds used are generally more or less equivalent to the gross domestic product (GDP) pro capita [11]. The National Institute for Health and Clinical Excellence (NICE) has established a cost-effectiveness threshold range between £20,000 and £30,000 per life year gained [11]. However, this kind of analysis could be performed only if the compared interventions use a common unit of effectiveness, such as cost per life year gained [8]. In addition, a cost-effectiveness analysis might examine this intervention in terms of quantity and not of quality [8].
- Cost-utility analysis (CUA): represents an economic evaluation that aims at defining the patient's preference for being in a particular health-state [4]. In CUA all the outcomes analyzed are expressed in terms of QALY (quality adjusted life year). With this method it is possible to compare treatments used in different stages of a pathology and “opportunity cost” could be measured [4]. It consents to compare interventions from very different medical disciplines or interventional areas, such as, for instance a vaccine program and an ambulance referral system. CUAs thus represent a valuable instrument for taking decisions regarding the allocation of public health resources.

Contrary to CEA, which analyses a benefit of an intervention only in terms of quantity, CUA focuses also on quality and include also the preferences of the patient [8]. The effectiveness of an intervention is

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