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Economics meets health care: How can it be useful?

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## 1 Introduction

2 It is well known that increasing expenditures associated with new technologies exert financial  
3 pressure on all health systems. From an initial standpoint where all innovations were deemed  
4 worthwhile, as additional gains in health resulting from such innovations were clear, health  
5 care payers moved to a more critical view, requiring that the additional health gains from the  
6 use of these new technologies match the asking price. Thus, in response to the pressure for  
7 increased health care expenditures, the development of economic evaluation approaches made  
8 “cost-effectiveness studies” a household name to many health care professionals. Taking “cost-  
9 effectiveness” as a starting point, I discuss different ways in which applying economic principles  
10 applied to the health care sector can help in making decisions and building better health care  
11 systems (Fig. 1). The first contribution is using economic evaluation methods to compare  
12 alternatives (and help make choices). The second is seeing how payment rules influence  
13 decisions and understanding how the ways in which the different participants in health  
14 activities (doctors, nurses, managers, patients, etc) adjust to the economic framework they  
15 face help them to a better design health system rules. This discussion is illustrated with price  
16 increases as a (partial) result of institutional design and with different decisions in different  
17 countries being the result of diverse conditions even under the same decision-making criteria.

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## 20 Economic evaluation: A basic introduction

21 An important first step in any discussion about the use of economic analysis in health care is to  
22 define clearly what cost-effectiveness, or economic evaluation, means. This is one contribution  
23 of health economics to the management of health care systems. A second contribution is  
24 helping to explain the “economics of health and health care”. Economic analysis is useful  
25 whenever different objectives compete for the use of scarce resources. When choices on how  
26 to use resources, be they financial resources or time resources or other scarce resources, have  
27 to be made, economic reasoning can help in the decision-making process.

28 A quote from Hill et al. (2017) illustrates the first type of use of economics in the health sector:  
29 “The UK’s National Institute for Health and Care Excellence (NICE) has on numerous occasions

1 in recent years found new cancer medicines to be **cost-ineffective** compared with current  
2 standards of care, often because the significantly **higher costs are not matched by an**  
3 **improvement in clinical efficacy of the same magnitude**” (emphasis added) (1). This quote  
4 shows that economic analysis was used to compare the effectiveness and costs of the new  
5 medicine with the current standard of care. Because the cost to the payer equals the price  
6 asked by the company providing the new medicine, the cost-ineffective assessment means that  
7 incremental gains in health (clinical efficacy) were not sufficient to justify paying the price  
8 asked.

9 One of the basic tenets of economic analysis is the notion of opportunity cost. The value of  
10 using 1 resource in 1 application is the benefit lost from using it in the best alternative  
11 application. Thus, when the price of a new medicine is high, the opportunity cost is determined  
12 by comparing the price of the medicine to the cost of whatever is not done and what that  
13 choice implies for the health of people because, in a financially pressured health system, the  
14 funds directed to the new product must result from not doing something else in the health  
15 system.

16 Economic evaluation has 4 basic approaches, 1 of which is mentioned in the quote. The most  
17 basic analysis of economic evaluation is cost minimization, which is valid for comparing  
18 alternatives only if the benefits are equal. In that case, comparing costs and selecting the  
19 option with the lower cost provides the choice, thereby producing a higher value to the health  
20 care payer. Note that clinical benefits to patients are equal in both alternatives, meaning that  
21 changes in value are driven by costs. In general, as discussed below, both benefits and costs  
22 influence the value of each alternative under consideration.

23 A simple generalization of the cost-minimization approach is to consider 1 physical measure of  
24 benefit. The ratio of costs to that 1 physical measure provides a cost-effectiveness ratio. If the 2  
25 alternatives have the same benefit, of course the comparison of the ratios of cost-effectiveness  
26 is just an analysis of costs, and the analysis is back to cost-minimization. Therefore, the  
27 interesting contribution of cost-effectiveness is to allow for the possibility that benefits differ  
28 across alternatives. The use of cost-effectiveness thus requires the identification of a measure  
29 that has meaning in terms of health (or of clinical efficacy) resulting from the alternative

1 courses of action. Still, this analysis is limited to having 1 measure of health. However, it is often  
2 recognized that the health of an individual is multidimensional and has different aspects that  
3 matter. A natural generalization is then to consider not a single measure of health but an index  
4 of health that incorporates different health-related aspects . Adding utility to that health index,  
5 which can be constructed in several ways, we have a cost-utility analysis. Again, cost-  
6 effectiveness is obtained as a particular case when the utility index considers a single measure  
7 of utility. A common, and by now well-known, utility index is the quality-adjusted life year  
8 (QALY), which combines longevity with quality of life. Since cost-utility ratios may correspond to  
9 very different scales of intervention, a more general approach is to have the utility index  
10 measured in the same unit as the costs, which usually means having it expressed in the same  
11 monetary units as the costs (for the economic analysis it does not matter in which units the  
12 costs and benefits are measured, and it is often simpler to measure in monetary units). Thus,  
13 from generalization to generalization, we move from cost-minimization to cost-benefit analysis.  
14 The term cost-effectiveness has become a way to designate all variants under discussion,  
15 though readers should be aware of the existing differences and identify each different  
16 approach when looking at applications of economic evaluation (and acknowledging the  
17 different assumptions that are present in each type of analysis).

18         A second crucial element in the use or in the reading of economic evaluation studies is  
19 to identify the criterion applied to suggest a course of action. It not only matters what is  
20 included in costs and benefits and how the elements of each are valued, the criterion of choice  
21 also matters. Recalling the preceding quote, the most common criterion is the incremental  
22 cost-effectiveness ratio (ICER). The ICER simply states that when comparing a new option to an  
23 alternative one, if the increase in costs relative to the additional benefits is lower than a pre-  
24 determined threshold, then the new option should be favoured. Since the costs are measured  
25 in monetary units, the threshold will then be set automatically as the monetary value of a  
26 benefit. In a case that uses the quality-adjusted life year as the measure of benefit, the  
27 threshold is the value of a life year in perfect health. Of course, if other measures of benefits  
28 are used, the interpretation of the threshold must be adjusted accordingly. In the way  
29 economic evaluation methods were developed, this threshold results from societal valuation of

1 the benefits. Several methodological refinements have emerged that account for the existence  
2 of uncertainty of both benefits and costs at the time of decision and that allow for different  
3 time profiles for both benefits and costs (for example, building a health infrastructure may have  
4 a hefty initial cost, with the benefits distributed over time; or developing a new medicine has  
5 upfront research and development costs, again with benefits accrued over time. One may also  
6 think of interventions that have a benefit concentrated early in their development and costs  
7 distributed over the years). Thus, economic evaluation can be a useful tool to help decision  
8 makers by systematically highlighting the opportunity costs of options.

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10 The “economics of health and health care”

11 Driving prices up

12 The previous quote also highlights how understanding economics can help understand the  
13 health sector. Using cost-effectiveness analysis and ICER as elements in the decision-making  
14 process regarding adoption of new medicines, from the health care payer’s perspective, the  
15 costs are quantities of resources used multiplied by prices (or wages, in the case of human  
16 resources directly employed). Thus, the high prices of medicines are part of the costs of several  
17 therapeutic options.

18 I want to explore the case of medicines further, though the basic principles can be more  
19 generally applied to every new health technology or procedure. Because the rule of the ICER  
20 states that, below a predefined threshold (which may be known to companies in advance or  
21 just estimated by them), the new medicine should be adopted, as long as the overall cost keeps  
22 the ICER below the threshold, the decision to pay for the new product is adopted. If the use of  
23 the product (demand, in economic jargon) is insensitive to price once adoption occurs (because,  
24 for example, patients are fully insured), then economic analysis of companies’ strategies  
25 predict that prices will increase. Such price increases are implicitly allowed under the payer’s  
26 decision rule based on the ICER.

27 This analysis also helps one understand that current high prices for new medicines reflect an  
28 element of research and development costs but also an element of what can be considered  
29 “abusive prices” (a term I borrow from competition policy rules that exist in most modern

1 economies). Abusing a dominant position by setting high prices has long been a concern for  
2 authorities who monitor competition. The setting of high prices by companies holding a patent  
3 is seen as a (short-term) cost to support innovation. Consequently, allowing such prices has  
4 prevailed over concerns about price increases. Despite this tradition, abuse of market power is  
5 now being included in policies regarding new health care products in (with medicines in the  
6 forefront). In 2014, the Southeastern Pennsylvania Transportation Authority initiated a suit  
7 against a company to challenge the extremely high prices they were charging for a drug. The  
8 case was dismissed because patent protection prevails in law. In December 2015, the US Senate  
9 Hatch-Wyden report on the pricing of a new medicine again discussed the conduct of the  
10 company in setting high prices. Also in 2015, a pharmaceutical company was fined by the UK's  
11 Competition and Markets Authority on the grounds of excessive price and abuse of market  
12 power (in this case, the challenge was over the price of a generic product that the patent holder  
13 licensed to a different producer to bypass ). price regulation of the patented product. In 2017,  
14 the US State of Maryland considered a law on pharmaceutical price gouging, again not directly  
15 challenging the patent right to set prices freely but by addressing high generic prices. Also in  
16 2017, the European Commission opened a case against a pharmaceutical company by  
17 challenging its high-price policies. Thus, even if the pricing freedom associated with a patent is  
18 not directly challenged, the application of concerns and analysis common in competition policy  
19 is beginning to enter the health care sector.

20 Explaining differences in decisions across countries

21 Another example of how economic analysis, based on economic evaluation methods, can help  
22 is related to differences in decisions across countries. For example, let us consider a new  
23 technology that is human-capital intensive, that is, it uses health professionals as the main  
24 input to produce health benefits. The differences in wages of health professionals across  
25 countries may justify different costs, even if the same proportions and numbers of health  
26 professionals are used, so different decisions regarding the adoption of the new procedure may  
27 occur naturally. Although new medicines or new devices are easily traded in international  
28 markets, leading to some international price convergence, health professionals have much  
29 lower mobility, and wages across countries can easily be substantially different without leading

1 to massive migration that would lead to wage equalization (certainly there are already  
2 important international flows of health professionals, but still far from the level that would  
3 force wage equalization across countries).

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5 Acknowledging other economic elements that matter

6 Economic analysis as discussed above, approval by a health care payer to include the option to  
7 use a new technology with patients, is made at the macro level, where the individual treatment  
8 decision remains with the medical doctor. At the micro level, the decision by a doctor to use a  
9 new technology on an individual patient can be influenced by the “economic framework” the  
10 doctor faces: The payment system can influence decisions (a current example is the use of pay-  
11 for-performance payment rules); the amount of available information can influence decisions;  
12 how patient values are incorporated in the process can influence decisions. In particular, paying  
13 a health care professional each time a patient is seen or receives treatment provides an  
14 incentive to treat, even if the treatment is unsuccessful.

15 Pay-for-performance schemes, on the other hand, reward achieving a result, not the intensity  
16 of the process that led to that result. A payment system based solely on a pay-for-performance  
17 model also faces challenges (namely, defining what is the relevant health result and being able  
18 to attribute the result to the decisions of the health care provider), but the point to be made  
19 here is that the economic framework of payment matters for treatment decisions and  
20 ultimately influences both benefits and costs resulting from these decisions. Still, payment-for-  
21 performance schemes have not produced strong results, raising the issue of how the economic  
22 frameworks interact with ethics and other incentives (implicit or explicit) present in medical  
23 decisions.

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25 Concluding remarks

26 It is widely recognised that new technologies exert more and more pressure on the financial  
27 side of health care systems. Economic evaluation methods have been developed to help  
28 address the issue. Although they have been successful in several dimensions, the results of the  
29 application of economic evaluation fall short of expectations when considering the financial

1 sustainability of health systems. Economic analysis (beyond economic evaluation) suggests that  
2 other aspects matter as well, and institutional design has important implications for explaining  
3 the observed trends of price increases.

4 Answering the financial pressure of innovations in medical practice broadly defined can benefit  
5 from economic analysis of different sorts: definitions of rules for approval of new products for  
6 use that are also based on economic effects, understanding how the different agents in the  
7 health sector adjust to the economic environment they face and explaining why comparisons  
8 across countries can be misleading when national health sector features justify, under similar  
9 rules and approaches, different decisions.

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#### 11 Reference

12 Hill A, Redd C, Gotham D, et al. Estimated generic prices of cancer medicines deemed cost-  
13 ineffective in England: a cost estimation analysis. *BMJ Open* 2017;7:e011965.  
14 doi:10.1136/bmjopen-2016- 011965.

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1 Figure 1: A graphic summary of the application of economic principles to cost issues in the  
 2 health sector

