



In Vaccination; What Does Cost-Effectiveness Mean Practically?

Aşılama; Maliyet-Etkinlik Pratik Olarak Ne Anlama Gelir?

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Question: In vaccination; what does cost-effectiveness mean practically? **Zeynep Gürses, MD.**

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Answer (Fatma Dilşad Aksoy, MD; Mustafa Kemal Hacımustafaoğlu, MD)

General considerations: There are different assessment methods for examining the economic cost of administering a vaccine (or other health practices, or treatment). From the point of view of vaccination, (e.g. in the implementation of a vaccination program), in the decision-making process for the country; pharmacoeconomic and cost analysis techniques are commonly used to assist in allocating limited resources efficiently and/or identifying priority approaches. Cost analysis techniques can guide healthcare providers and policy makers in making informed choices about efficient use of resources and health planning. There are different evaluation approaches for cost analysis. In this article, as a basis for the question, cost-utility, cost-benefit, cost-effectiveness analyzes will be briefly mentioned, as well as the concepts of disability-adjusted life years (DALYs) and quality-adjusted life years (QALYs), on the basis of vaccination. These terms and/or analysis may be confused, may have similarities, but there are differences between them.

Cost-utility analysis/analysis techniques; evaluates the cost of a vaccination program together with the quality of health. It provides, and often makes evaluations using the concept of quality and healthy years (QALYs). Practically speaking, they analyze to measure of vaccine administration to society, evaluating the cost of per QALY. As a result of these analyzes, it is desirable to have a lower cost for each gaining QALY conferred by vaccination, and in this case vaccination is considered cost-effective (1).

Cost-effectiveness analysis; compares the costs of a vaccination program in terms of its usefulness in aiming a specific health goal. It is one of the most used analysis methods for the application of a new vaccine. The health goal is usually accepted as the averted death and disability/disabled years that may develop when vaccination is not given. DALYs criterion is generally used in cost-effectiveness analysis. DALYs roughly represent the disease burden of a vaccine-preventable disease, and are practically considered as the years of vaccine-preventable death and/or permanent disability. If the cost of vaccination is low enough for each DALY (year of death or disability) averted by the vaccination

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program, the vaccine is considered cost-effective (or, in some situations, the QALYs gained by vaccination may be taken into account, and the lower the cost per QALY earned, the more cost effective that vaccine may be) (1,2). In general, if the cost of vaccination for each DALY prevented is equal to or less than the national income per capita [gross domestic product (GDP) per capita] in the country, the vaccination program is considered very cost-effective (1). If this value is up to three times the national GDP per capita, it can be considered as cost-effective (2). National GDP per capita can vary widely (such as 500-30.000 USD) according to countries (1). In addition, it should be taken into account that even in cost-effectiveness studies conducted in the same country at different times and conditions, different values may arise depending on the differences in the inputs considered (both the costs of the vaccination program and the benefits/gains provided by vaccination) (3-6). The cost of the vaccination program can be direct (vaccine costs) or indirect (vaccine storage and transfer, health personnel and hospital costs, vaccine side effect management, vaccination training costs). Likewise, the gains that vaccination to the country can be direct (such as death and cost of sequels due to the disease prevented by the vaccine, treatment, hospitalization and follow-up costs, long term disability costs if it develops) or indirect (such as loss of work force of parents, loss of education of the child, psychosocial effects) (1,2,6,7). Furthermore, if a vaccine prevents death or disability at an early age, it can be considered cost-effective even if the costs of vaccination are 2-3 times higher than GDP per capita, while it may not be sufficiently cost-effective for a very old person (because there are so few life years to protect). Given the above-mentioned considerations, the introduction of a new vaccine may be cost-effective for one country but may not sufficiently cost-effective for another (6,8). In the evaluation of cost-effectiveness studies in the introduction of a new vaccine, it is necessary to take the opinions of experts, and to make evaluations and comments in a multi-faceted way, which should also include ethical aspects (1).

Cost-benefit analysis; assess only the overall economic impact/benefit of a vaccination program. They combine and compare the total economic/monetary cost of implementing the vaccination program (vaccination costs; all expenses including vaccination administration, personnel expenses, vaccine side-effects expenses, education expenses, etc.) with the total monetary value of the health benefits obtained (economic benefit from the vaccine; the disease prevented and all health care costs including treatment and follow-up costs, loss of parental work, loss of education, moral costs, etc.) (1).

As a result of cost-benefit analysis, the definition of 'cost-saving' is used if the cost of the vaccine is less than the cost

of the disease and its consequences. This definition is only an economic/monetary perspective (1). After the cost-benefit analysis; if the cost of vaccination is lower than the cost of vaccine-prevented diseases, vaccination is financially/economically advantageous (cost-saving). And it is thought that when the vaccine is practically implemented, the country will be more profitable in monetary terms (compared to not administering the vaccine), so there will be net savings in disease costs. In this framework, vaccine may provide additional savings to the country's economy by reducing health expenditures and the economic burden of the disease (1,9). However, considering the prevention of the diseases in the society and improvement of health, it is not always necessary for a vaccine to be cost-saving for routine application. Even if it is not cost-saving, it may be rational to include a vaccine in a routine vaccination program in order to reduce the sequelae of death and disease and to provide social well-being (8).

The brief answer to the question within the perspective of these general considerations: Cost-effectiveness focuses on whether the cost of vaccination is acceptable on a targeted a specific health outcome (DALYs averted). Generally, this cost is considered reasonable (cost-effective), up to three times the national GDP per capita for that country.

Cost-benefit analyzes primarily evaluate the cost and benefits of vaccination from mainly an economic point of view. And after these evaluations, the vaccine is considered to be cost-saving if there is a net financial benefit due to the vaccination preventing the disease. These analyzes provide valuable information for decision makers when evaluating vaccination strategies.

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