Economics notes

Definitions of efficiency

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Decision makers are increasingly faced with the challenge of reconciling growing demand for health care services with available funds.[1] Economists argue that the achievement of (greater) efficiency from scarce resources should be a major criterion for priority setting. This note examines three concepts of efficiency: technical, productive, and allocative.

Efficiency measures whether healthcare resources are being used to get the best value for money.[1] Health care can be seen an intermediate product, in the sense of being a means to the end of improved health. Efficiency is concerned with the relation between resource inputs (costs, in the form of labour, capital, or equipment) and either intermediate outputs (numbers treated, waiting time, etc) or final health outcomes (lives saved, life years gained, quality adjusted life years (QALYs)). Although many evaluations use intermediate outputs as a measure of effectiveness, this can lead to suboptimal recommendations.[2] Ideally economic evaluations should focus on final health outcomes.

Adopting the criterion of economic efficiency implies that society makes choices which maximise the health outcomes gained from the resources allocated to healthcare.[3] Inefficiency exists when resources could be reallocated in a way which would increase the health outcomes produced.

Technical efficiency refers to the physical relation between resources (capital and labour) and health outcome. A technically efficient position is achieved when the maximum possible improvement in outcome is obtained from a set of resource inputs. An intervention is technically inefficient if the same (or greater) outcome could be produced with less of one type of input. Consider treatment of osteoporosis using alendronate. A recent randomised trial showed that a 10 mg daily dose was as effective as a 20 mg dose.[4] The lower dose is technically more efficient.

Productive efficiency—Technical efficiency cannot, however, directly compare alternative interventions, where one intervention produces the same (or better) health outcome with less (or more) of one resource and more of another. Consider, for example, a policy of changing from maternal age screening to biochemical screening for Down's syndrome. Biochemical screening uses fewer amniocenteses but it requires the use of another resource—biochemical testing.[5] Since different combinations of inputs are being used, the choice between interventions is based on the relative costs of these different inputs. The concept of *productive efficiency* refers to the maximisation of health outcome for a given cost, or the minimisation of cost for a given outcome. If the sum of the costs of the new biochemical screening programme is smaller than or the same as the maternal age programme and outcomes are equal or better, then the biochemical programme is productively efficient in relation to the maternal age programme. In health care, productive efficiency enables assessment of the relative value for money of interventions with directly comparable outcomes. It cannot address the impact of reallocating resources at a broader level—for example, from geriatric care to mental illness—because the health outcomes are incommensurate.

Allocative efficiency—To inform resource allocation decisions in this broader context a global measure of efficiency is required. The concept of allocative efficiency takes account not only of the productive efficiency with which healthcare resources are used to produce health outcomes but also the efficiency with which these outcomes are distributed among the community.[6] Such a societal perspective is rooted in welfare economics and has implications for the definition of opportunity costs. In theory, the efficient pattern of resource use is such that any alternative pattern makes at least one person worse off. In practice, strict adherence to this criterion has proved impossible. Further, this criterion would eliminate as inefficient changes that resulted in many people becoming much better off at the expense of a few being made slightly worse off. Consequently, the following decision rule has been adapted: allocative efficiency is achieved when resources are allocated so as to maximise the welfare of the community.[6]

Thus technical efficiency addresses the issue of using given resources to maximum advantage; productive efficiency of choosing different combinations of resources to achieve the maximum health benefit for a given cost; and allocative efficiency of achieving the right mixture of healthcare programmes to maximise the health of society. Although productive efficiency implies technical efficiency and allocative efficiency implies productive efficiency, none of the converse implications necessarily hold. Faced with limited resources, the concept of productive efficiency will eliminate as "inefficient" some technically efficient resource input combinations, and the concept of allocative efficiency will eliminate some productively efficient resource allocations.

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