Rationing health care resources

Is the quality-adjusted life-year a helpful guide?

JAMES M. WARREN MB, CCFP

SUMMARY

The quality-adjusted life-year, an economic tool for allocating health care resources, lets researchers compare the cost-effectiveness of different therapies for virtually any disease. It purports to describe quantity of life, with an adjustment for quality of life, as a function of financial cost. Its goal is to maximize health care efficiency, but its methodology does not adequately meet the needs of older patients.

RÉSUMÉ

L'année de vie ajustée selon la qualité, un outil utilisé par les économistes pour allouer les ressources en soins de santé, permet aux chercheurs de comparer le ratio coût-efficacité des différentes thérapies dans pratiquement toutes les maladies. Cet outil prétend décrire la vie en termes de longévité, avec un ajustement pour la qualité, comme étant une fonction des coûts financiers. Son but est de maximiser la capacité de rendement des soins de santé, mais sa méthodologie ne répond pas adéquatement aux besoins des personnes âgées.

Can Fam Physician 1994;40:123-128.

IN ORDER TO DIRECT HEALTH care resources where they will have the most effect, health economists are studying several different mathematical models and tools. One such tool is the quality-adjusted life-year (QALY). In a recent survey, 28 of 76 health authorities in England and Wales were considering using QALYs to help them decide how to spend health dollars.[1] In America, QALYs and quality-adjusted life-months have been calculated for estrogen use among postmenopausal women, for neonatal intensive care, for dialysis, for coronary artery bypass grafting, and for prostatectomy.[2]

Some health economists believe that it is only logical to direct health care resources where they will offer the most QALYs to make the most of every dollar spent. In their view, if geriatric QALYs cost more than the QALYs of younger patients, the dollars should flow to the young. The problem with this belief is that for the demented, the mentally ill, and the "old-old," quality of life assessments cannot be made accurately. The QALY models assess these patients below their worth.[2]

Dr Warren *has an urban family practice. He does sessional work at the Vancouver General Hospital Short Term Assessment and Treatment Centre and is a Clinical Assistant Professor in the Department of Family Practice at the University of British Columbia in Vancouver.*

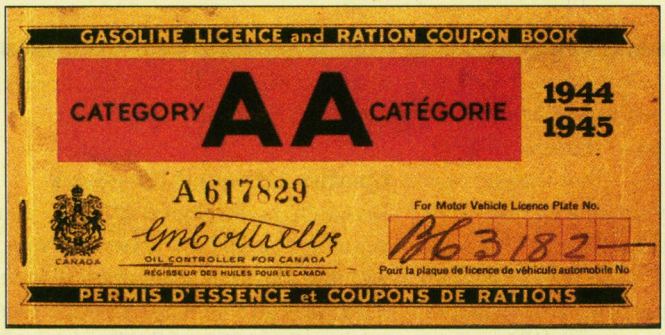
Quality-adjusted life-years

Researchers developed QALYs, as a concept, in the 1970s.[3] The concept starts with the idea that a therapy will have both a cost and an outcome. An appendectomy might cost $1000 while the removal of an early malignant melanoma might cost $100; both therapies will save a life, but the second, in this example, does it for one-tenth the cost of the first. If both patients live for a year, their respective procedures have saved one "life-year." You can then add a factor (or "utility" – a horrible term but nonetheless the one that is used) between zero and one to account for the different qualities of the lives that are saved. If the appendectomy patient is inadvertently left in a coma, the utility factor can mathematically show that the outcome is not of much value.

The rationale for using QALYs to allocate health care resources is that the concept allows the cost-effectiveness of different therapies to be compared, regardless of the diseases they treat. This comparison is necessary where resources are limited and rationed. It could help a community answer questions such as, "Should we expand our coronary artery bypass capacity at the expense of our magnetic resonance imaging program?" In

times of scarcity, decisions such as this have to be made. In the absence of a mathematical model, the decision might be based on political, discriminatory, or arbitrary reasoning. The problem with the economic model, however, is that it too can have political, discriminatory, or arbitrary biases hidden deep in its mathematical mumbo jumbo.

Technical issues involved in utility measurement are controversial and variable.[2] Utility factors might reflect consumer preferences or might come from health status indices,[4] which are lists of health states, each of which has been assigned a value. An example of such an index is the Index of Well-being,[5] which was compiled from an extensive specialty-by-specialty review of medical reference works by listing all the ways, however minor, that diseases and injuries can affect a person's behaviour and performance. This particular index was validated by a questionnaire study of more than 10 000 residents in San Diego.



Canadians have some experience of rationing

Care that improves quality of life might not survive rationing

Some kinds of patients (children, cognitively impaired individuals, emotionally disturbed individuals), however, are often unable to provide their own utility factor, and relatives must be asked. One research group uses factors estimated by physicians.[3] The utility factor sometimes has a negative value, which reflects an outcome that is viewed as worse than death, such as chronic, unbearable pain.

The QALY is independent of age; for example, adding a single QALY for a 25-year-old is equivalent to adding one for an 84-year-old. A QALY gain of 0.5 for one person is equivalent to two gains of 0.25 each for two people.[3]

Because individuals and society prefer to receive benefits now rather than in the future, effects that occur in the future are sometimes discounted to allow for their resulting decreased value. Although analysts agree that this process of devaluing future events is appropriate, they do not agree on the appropriate discount rate. In the United States and Canada, by convention, most analysts use a discount rate of 5%.[3] This means that if a stop-smoking campaign can prevent a death from lung cancer in 20 years by spending $100 per person today, it will be viewed as approximately one third as valuable as a seat belt campaign that, for the same amount, can prevent the same number of deaths this year. The elderly might wish to choose a different future discount rate from the young, but QALY analysis does not yet allow for this.

Problems with QALY analysis

The QALY analysis is suspect at both ends of the life span. It fails completely when it is applied to birth control programs. The increase in quality of life among members of smaller families where contraception is practised is unlikely to outweigh the increase in quantity of life for those families without access to contraception. Results, when applied to the care of premature babies, must be questioned: these babies have many years over which to amortize the large expenditures that allowed their survival, but families, if given a choice, might reasonably decide that existing family members could better use the resources. As well, QALYs are biased against the elderly

because the elderly are considered to have a comparatively lower quality of life and because the elderly have fewer years than the young over which to amortize received medical benefits.[6]

Assigning values for a subjective parameter, such as quality of life, causes problems in QALY analysis. In a study where subjects were asked to rank the relative usefulness of programs to prevent different life-threatening hazards, average subjects believed that five to six times more money should be spent on what they considered to be the most effective program over what they considered to be the least effective program. The eight programs studied ranged from enforcing standards reducing workplace exposure to cancer-causing chemicals to the removal of trees and boulders from the roadside. Each subject had the opportunity to prioritize these public health programs and give them a relative economic value.

The problem was, however, that the different subjects could not agree with one another on which program was in fact the most valuable. When all the results were averaged, the average best choice barely showed more than a twofold difference over the average worst choice in the amounts that should be spent to prevent the hazards.[7] We expect that a similar study of aggregated ranking of quality of life states would also show a disagreement over which quality of life state was best and how much it should be valued.

A willingness to blame the victims affected the relative priorities. The less an assessor was likely to face a risk was associated with the greater likelihood that he or she would blame the victims.[7] For example, nonsmokers might not wish to see large sums spent on lung cancer victims and the sedentary might not wish to see their tax dollars go to sports medicine. This means that if society, perhaps by population surveys, decides the utility factors, then minority groups, including the elderly, could face discrimination.

The QALY approach presumes that all individuals would rank all health states in the same way. However, they do not. Disabled patients volunteer higher values for their health states than do healthy people who are asked how they would value their lives if they were disabled. This appears to be the result of patients adjusting to their disabilities,[8] which is less likely if an earlier QALY analysis had diverted health care resources away from a necessary treatment.

A QALY analysis might only partly reflect an individual's true preference.[8] One might quite reasonably choose to live 5 years of almost normal life followed by a swift death rather than experience 1 year of dreadful life followed by 10 years of poor quality life (rating a utility factor of say, 0.5) and perhaps not such a swift death. A QALY analysis, adding up each year separately, would indicate that the second situation was more desirable.

Distribution of resources by best value for money, however assessed, might be inequitable because, for a given degree of suffering, those whose illnesses happen to be cheaper to treat will be treated in preference to those whose treatments are more expensive.[9] Advocates of QALY counter that more patients with cheaper illness will be treated for the same cost.[10]

Moreover, QALY analysis does not necessarily account for the magnitude of the problem being addressed. Such analysis suggests that the treatment of rhesus-negative mothers with antepartum anti-D is 44 times more cost-effective than hospital hemodialysis.[3] It is not hard to accept that antepartum treatment of rhesus-negative mothers is a good thing, and well within the scope of most modern health care systems. This does not mean, however, that hospital hemodialysis is bad. After the rhesus-negative mothers have all been treated, resources must be directed to other treatments, including, in its turn, hospital hemodialysis. The danger is that effective treatments will be rejected, not because we lack the money to pay for them, but simply because they do not score highly on a cost-effectiveness scale.

A worrying aspect of QALY analysis is that it does not take into account a person's value to his family. An economic model should include the increase in value that flows to the healthy members of a family in which the health of a sick individual improves. Put another way, the burden of all members of a family caring for an ailing individual will be lightened if a medical maneuver successfully treats the ill family member. This reasoning is of

particular relevance to families caring for ailing elderly members. Health economists appear, so far, to remain content to represent quality of life by a decimal number and have not yet done the same for value to family.

Humans are not fish in a fish farm subject to computer manipulation of food, light, and temperature to maximize weight gain and survival. Salmon expire within hours of reproduction, while humans survive for decades more. The evolutionary reason for the difference lies in the nature of human society, which is able to pass more than just genetic information from one generation to another. The value of this nongenetic transfer must be accounted for in any economic theory, but has not so far been included in QALY analysis.

An ominous extension of QALYs would be income-adjusted QALYs, which would add a factor to adjust for a patient's ability to be productive and pay taxes (and presumably pay indirectly for some of the therapy). A policy of the most good for the most people could become a policy of the most good for the most productive people.

Conclusion

As logical as QALY analysis is, it is dangerous in many situations. Society must look at outcomes and direct medical resources where they will do the most good. Outcomes include effects not only on the patient, but also on the patient's family and society at large.

Despite interest in the development of QALYs, there are significant problems with the theory. It does not work when it is applied to the beginning or the end of life; utility factor assignment is controversial; it could produce an unethical or an inequitable resource assignment; its analysis of error is not commonly apparent; and it does not account for the effects of changes in an individual's health on his or her family. The arithmetic is controversial, and there is little agreement on ways to measure quality of life.

Society has not yet had an adequate opportunity to debate health care resource allocation, yet cost-of-care arguments are already being used to decide individual treatments. The elderly will be among the first to feel the effects of health care rationing. We have a responsibility to ensure that the methodology used is adequate to meet the challenge. ■

Requests for reprints to: *Dr J. Warren, 1016 – 750 West Broadway, Vancouver, BC V5Z 1H9*

References

1. Dean M. Is your treatment economic, effective, efficient? *Lancet* 1991;337:480-1.
2. La Puma J, Lawlor EF. Quality-adjusted life-years. *JAMA* 1990;263:2917-21.
3. Torrance GW, Feeny D. Utilities and quality-adjusted life years. *Int J Technol Assess Health Care* 1989;5:559-75.
4. Berg RL, editor. *Health status indexes.* Chicago: Hospital Research and Educational Trust, 1973.
5. Kaplan RM, Bush JW, Berry CC. Health status: types of validity and the Index of Well-being. *Health Serv Res* 1976;11:478-507.
6. Kawachi I, Bethwaite P, Bethwaite J. The use of quality-adjusted life years (QALYs) in the economic appraisal of health care. *N Z Med J* 1990;103:46-8.
7. Mendeloff JM, Kaplan RM. Are large differences in "lifesaving" costs justified? A psychometric study of the relative value placed on preventing deaths. *Risk Anal* 1989;9:349-63.
8. Mehrez A, Gafni A. Quality-adjusted life years, utility theory, and healthy-years equivalents. *Med Decis Making* 1989;9:142-9.
9. Rawles J. Castigating QALYs. *J Med Ethics* 1989;15:143-7.
10. Mooney G. QALYs: are they enough? A health economist's perspective. *J Med Ethics* 1989;15:148-52.

•••