The HAART side of resource allocation

Pedram Sendi, Amiram Gafni

The advent of highly active antiretroviral therapy (HAART) including the use of protease inhibitors has led to a substantial decline in morbidity and mortality experienced by HIV-infected individuals.[1] More recently, non-nucleoside reverse transcriptase inhibitors have become available that have further expanded the armamentarium of antiretroviral drugs for the treatment of HIV infection.[2]

In this issue (page 106), Hartmut Krentz and colleagues report the results of their comprehensive evaluation of the health care costs associated with treating HIV-infected patients in southern Alberta.[3] The study is comprehensive in the sense that all HIV-infected patients in southern Alberta were included and all types of health care costs were recorded and analyzed for the period 1995–2001. The findings of the study indicate that health care expenditures per patient per month have increased substantially since the advent of HAART, which is mainly due to an increase in the number and type of antiretroviral compounds included in the drug regimen.[3] This explains the increase in mean cost per patient per month for antiretroviral drugs during the study period, which was partially offset by savings associated with nonantiretroviral drugs, outpatient care, inpatient care and home care.[3] These savings, however, do not completely compensate for the increased cost of antiretroviral drugs. It is interesting to note that, in a similar study, Bozzette and colleagues found that total health care costs had decreased since the introduction of HAART.[4] However, that study was conducted in the United States. It should be remembered that patient characteristics, epidemiology, patterns of medical practice, prices of medical services and cost estimation procedures usually differ between countries, and this often leads to varied findings.[5]

Evaluating health care costs since the introduction of HAART only represents one part of the equation. The net gain in health outcomes, namely, length and quality of life, is what has been "bought" by introducing HAART.[1] The question that the decision-maker faces is whether HAART represents an efficient use of available resources. The cost-effectiveness of HAART has been addressed in previous studies.[6,7] In a Swiss study and in a US study, HAART has been shown to increase health care costs, which is in line with the findings of Krentz and colleagues.[3,6,7] When the analysis was limited to health care costs, the incremental cost-effectiveness ratios ranged from Swiss Fr 33 000 to Swiss Fr 45 000 per life-year gained in the Swiss study and

US$13 000–US$23 000 per quality-adjusted life-year gained in the US study.[6,7] However, in the Swiss study, in addition to health care costs, changes in productivity costs were considered from the societal perspective.[6] As a consequence of their improved health status resulting from HAART, patients may be able to return to work or work until later in their life.[8] When these productivity gains were included in the analysis of the Swiss study, HAART was found to be a cost-saving strategy.[6] HAART has the potential to be one of those few treatments that lead to improvements in health outcomes as well as savings in costs, thus it is a dominant strategy.

The study by Krentz and colleagues teaches us that in Alberta more health care resources will be needed to provide appropriate medical care to all HIV-infected patients. This is because of an increase in average direct costs per patient per month and an increase in the size of the infected population.[3] In light of that, consideration must be given to where these additional resources will come from. If we assume that the provincial health care budget may not be exceeded, then by definition some other health care program will need to be cancelled or reduced in order to free up resources for the HAART program.[9,10] These programs should be chosen so that the health outcomes forgone by deleting these other programs will be smaller than the health outcomes gained by introducing the HAART program. This policy would improve the health of the population without calling for additional resources. However, it may prove difficult to downsize or cancel programs that have already been implemented. In these situations, the health care budget needs to be increased. The source for the additional funds could be, for example, taxation or the budget of other ministries. The opportunity cost of health care resources is then experienced in areas other than health.

When a government decides to increase the health care budget, it has explicitly, or more likely implicitly, applied the decision rule described above. That is, the value of the health benefits resulting from an increase in the health care budget is judged to be greater than the value of what could have been achieved with the same resources elsewhere (e.g., in education or road building). However, there might be other new health care programs competing for the same additional health care budget. HAART would then need to be compared with these other programs both in terms of resource requirements and health outcomes. It

is common to rank programs according to the cost-effectiveness ratio and implement them, starting with the most cost-effective program, until the budget is exhausted.[11] This approach assumes complete divisibility of programs and constant returns to scale (i.e., where increasing input causes output to increase by the same proportion). These assumptions are unlikely to be met in real world situations.[10,12,13] For example, decision-makers have been shown to be reluctant to offer better treatment to some patients, while other patients, with identical medical conditions, would receive the "old" less effective and less costly treatment.[14] That is, programs are often treated as completely indivisible because of ethical reasons. The assumption about constant returns to scale requires that adding, for example, 10% more nurses on the ward will increase the "output" produced by 10%. However, empirical studies illustrate that this is not the case.[15] Under these circumstances (i.e., lack of complete divisibility and constant returns to scale), the approach of ranking programs according to the cost-effectiveness ratio does not work and other methods need to be employed.[13]

The study by Krentz and colleagues lays out the resource requirements of the HAART program in southern Alberta, which provides important input for budget allocation decisions in health care.[3] What their study does not tell us is whether the observed substantial increase in costs represents an efficient use of health care resources in southern Alberta or even whether the current mix of services provided to these patients is the most cost-effective one.[3] Moreover, HIV/AIDS treatment is a rapidly changing field. New compounds such as fusion inhibitors or nucleotide reverse transcriptase inhibitors and new technologies such as genotypic or phenotypic antiretroviral resistance testing need to be considered in a future version of the authors' study, because they are likely to affect the cost of treating HIV infection. We think that it is important that future decisions about which services to provide will be based on opportunity cost considerations to ensure that they result in the maximization of the community's health benefits generated from existing resources.[9,10] Failing to do so is likely to result yet again in uncontrolled growth in expenditures without any demonstrated improvement in community health.[16]

Dr. Sendi is with the Institute for Clinical Epidemiology and the Division of Infectious Diseases, Basel University Hospital, Basel, Switzerland. Dr. Gafni is with the Centre for Health Economics and Policy Analysis, Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Ont.

References

1. Palella FJ Jr, Delaney KM, Moorman AC, Loveless MO, Fuhrer J, Satten GA, et al. Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. HIV Outpatient Study Investigators. *N Engl J Med* 1998;338(13):853-60.
2. Staszewski S, Morales-Ramirez J, Tashima KT, Rachlis A, Skiest D, Stanford J, et al. Efavirenz plus zidovudine and lamivudine, efavirenz plus indinavir, and indinavir plus zidovudine and lamivudine in the treatment of HIV-1 infection in adults. Study 006 Team. *N Engl J Med* 1999;341(25):1865-73.
3. Krentz HB, Auld MC, Gill MJ, HIV Economic Study Group. The changing direct costs of medical care for patients with HIV/AIDS, 1995–2001. *CMAJ* 2003;169(2):106-10.
4. Bozzette SA, Joyce G, McCaffrey DF, Leibowitz AA, Morton SC, Berry SH, et al. Expenditures for the care of HIV-infected patients in the era of highly active antiretroviral therapy. *N Engl J Med* 2001;344(11):817-23.
5. Koopmanschap MA, Touw KC, Rutten FF. Analysis of costs and cost-effectiveness in multinational trials. *Health Policy* 2001;58(2):175-86.
6. Sendi PP, Bucher HC, Harr T, Craig BA, Schwietert M, Pfluger D, et al. Cost effectiveness of highly active antiretroviral therapy in HIV-infected patients. Swiss HIV Cohort Study. *AIDS* 1999;13(9):1115-22.
7. Freedberg KA, Losina E, Weinstein MC, Paltiel AD, Cohen CJ, Seage GR, et al. The cost effectiveness of combination antiretroviral therapy for HIV disease. *N Engl J Med* 2001;344(11):824-31.
8. Sendi P, Palmer AJ, Gafni A, Battegay M. Highly active antiretroviral therapy: pharmacoeconomic issues in the management of HIV infection. *Pharmacoeconomics* 2001;19(7):709-13.
9. Gafni A, Birch S. Guidelines for the adoption of new technologies: a prescription for uncontrolled growth in expenditures and how to avoid the problem. *CMAJ* 1993;148(6):913-7.
10. Sendi P, Gafni A, Birch S. Opportunity costs and uncertainty in the economic evaluation of health care interventions. *Health Econ* 2002;11(1):23-31.
11. Karlsson G, Johannesson M. The decision rules of cost-effectiveness analysis. *Pharmacoeconomics* 1996;9(2):113-20.
12. Sendi P, Al MJ. Revisiting the decision rule of cost-effectiveness analysis under certainty and uncertainty. *Soc Sci Med*. In press.
13. Birch S, Gafni A. Cost effectiveness/utility analyses. Do current decision rules lead us to where we want to be? *J Health Econ* 1992;11(3):279-96.
14. Ubel PA, DeKay ML, Baron J, Asch DA. Cost-effectiveness analysis in a setting of budget constraints — is it equitable? *N Engl J Med* 1996;334(18):1174-7.
15. Phelps CE. *Health economics*. New York: Harper Collins; 1992.
16. Gafni A, Birch S. Inclusion of drugs in provincial drug benefit programs: Should "reasonable decisions" lead to uncontrolled growth in expenditures? *CMAJ* 2003;168(7):849-51.

Correspondence to: *Dr. Pedram Sendi, Institute for Clinical Epidemiology, Basel University Hospital, Hebelstrasse 10, 3rd Floor, CH-4031, Basel, Switzerland; fax 41 0 61 265-3109; psendi@swissonline.ch*