Patient Oriented Outcome Analysis

by W. Li, MD, FACS, FACC

Introduction

Our proposal rests on analyzing clinical outcomes in terms of disability-free patient survival, and at the same time meet the requirements of funding limitations.

There is a widespread effort today in funding and delivering medical services to the U.S. population. This effort is largely a result of the increasing proportion of the national budget being spent on medical-related matters. Much public emphasis is placed on cost-effective care, and sources of funding. The unique dependence on employer funded private insurance rests in the American model, which is not present in other industrialized nations. This emphasis on costs dominates this debate, and the objective analysis of patient outcomes is secondary. This essay aims to balance this debate by stressing patient outcomes.

Goals of Medical Care

We believe that the goal of all medical care is to optimize disability-free patient survival. This concept forms the basis for our approach. To achieve this end, we propose that clinical outcomes be analyzed employing actuarial methods.[1]

Disability-free patient survival is consistent with the time-honored principle of relieving patient pain and suffering. Medical care is focused on reversing the effects of disease processes and detecting disease before irreparable changes occur. Patients experience disease processes in a biological continuum, extending over time. Some entities such as degenerative illnesses may extend over many years, whereas others such as infectious illnesses or malignant neoplasms may run their course in a matter of days or months.

Methods

Disability-free survival is readily calculated employing actuarial methods. Such methodology is not new or novel. For instance, they are in evidence in any medical article dealing with cancer survival. Here the total period of time under consideration is divided into discrete intervals, and the proportion of surviving patients is calculated at the end of each time interval.

Application of this calculation in medical analysis can offer insight not only into the natural history of a disease process, but the effect of medical intervention: both on survival and disability. [2] By superimposing survival data from competing treatments, one can readily compare overall impact of therapy choices.

We propose that cost data can also be incorporated into this analysis. In this way, one gains an objective result of the impact of cost on patient survival. This concept forms the crux of our proposal.

Example of the Model

To illustrate, let us use the HMO model of a healthcare delivery system and coronary heart disease (CAD) as a clinical example to illustrate the concept of "patient-oriented

1 Estimation of Survivorship in Chronic Disease: the "Actuarial" Method, Lila Elveback, American Statistical Association Journal 53: 420–440 (1958)

2 The Analysis and Presentation of Surgical Results by Actuarial Methods, R. P. Anderson, L. I. Bonchek, et al, Journal of Surgical Research 16: 224-230 (1974)

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outcome analysis". An HMO has one practical advantage: all the care is delivered within one business entity, whether it be in-patient or out-patient. This includes acute and chronic patient care, as well as pharmaceuticals and paramedical areas such as rehabilitation services. The real cost of care is well-documented, and readily available since the HMO serves both as an insurance entity and a medical-care delivery entity.

In the area of coronary heart disease, there are many competing and complementary treatment modalities depending on any one individual patients' needs. These range from life-style changes, to pharmacological treatment plans, to invasive catheter plans such as PTCA and stents, to open-heart surgery. During the course of a single patient's lifetime, he may receive any one or many of these treatments, and sometimes repeatedly.

One starts by collecting all the patients with the disease entity: coronary heart disease. These are then stratified into simple clinical groups such as age, sex and NYHA functional class. Disability ranges from none (NYHA Class I) to mild (NYHA Class II) to severe (NYHA Class IV). The goal for the institution is to achieve the highest proportion of live NYHA Class I patients. Each modality of treatment (drugs vs PTCA-stent vs surgery) generates its own survival curve. Any single patient that "crosses over" to another treatment modality is not lost to analysis, but is analyzed with the new treatment population cohort. Separate survival curves are generated within each modality of treatment for each NYHA class. Furthermore, within a large population the patient population may be further stratified by age, and also by associated diseases such as diabetes, hypertension, sex, etc.

Any patient with CAD also undergoes routine testing such as EKG, stress exercise treadmill tests with and without scans, cardiac catheterization, echocardiography as well as outpatient visits through his lifetime: all generating costs to the HMO. By including the total costs at each time interval, one gets a clear picture of what the cumulative costs exist over time, for any one cohort of patients.

This analytical scheme answers these questions:

a. Is there a survival advantage to either treatment modality?
b. What is the actual cost of care over 5 years, 10 years for each treatment option?
c. If the patients are stratified by age deciles, or by concurrent disease, how do they impact survival? impact costs?

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d. Is bypass surgery cheaper over a ten year follow-up period?
   1. Are invasive medical treatments cheaper over time?
   2. How do the overall costs compare?

e. Is there a difference in survival and costs between surgical and non-surgical approaches in diabetics and non-diabetics?

f. What is the cost impact of repeat PTCA or repeat surgery, or survival impact?

By adding the concept cost-based disability-free survival, we obtain an idea of the optimal pathway of treatment for any patient cohort. For patients, this approach answers the question: what is the most likely treatment pathway for maximal disability-free survival?

Difficulties with this Model

There are many difficulties that can be foreseen in deploying this type of outcome analysis. They fall into two broad categories: clinical and financial.

The clinical areas that need work stem from the absence of any sort of general clinical databank in the U.S. There are small banks of data in specific areas; notably cancer. Those databanks contain entry clinical profiles and raw survival, and were designed to meet the needs of prospective randomized clinical treatment trials. They are inherently closed end, and have a finite life due to limited funding. Unlike some European counties, there is no National Health Service in the U.S. that collects clinical data. Patients in the U.S. are free to attend multiple doctors and hospitals for care. The records are all local, and are not shared other than to the referring physician or institution. There is a hope that clinical data will become electronic in the near future, but the issues of patient privacy and confidentiality have the potential to make data analysis difficult if not impossible. Finally, issues of data integrity must be addressed.

The cost data required in this proposal is not available at the present time. The overall costs of providing medical services within any one clinic or hospital are known, but individual costs are not tracked and thus can not be assigned to any single patient encounter, only the charges. Charges are not costs. Charges are calculated to meet budgetary requirements of the provider base, whether it is a small office or a large medical center. Charge data is readily available through the private insurance companies for internal use. The goals of the insurance carriers are not the goals of the medical community. Insurance charge data is proprietary and thus is not available nor is it applicable or meaningful for this sort of clinical outcome analysis. Lastly, there is a great reluctance to share any financial data between entities that compete for patients in an open marketplace.

Current Outcome Analysis

At the present, crude mortality figures are available through governmental agencies for isolated broad areas such as infant mortality, AIDS, cancer, or heart disease. Medicare data is also available for broad categories for those enrolled in this federal program. Individual institutions such as medical centers may track overall mortality figures by department, but these lack the specific data required for detailed outcome analysis, and are often kept within the institution.

Each institution monitors internal quality of care through mortality and morbidity monthly conferences, but again these reports are considered proprietary, and only gross results are available to be shared. Furthermore these reports do not contain any useful financial data, as their purpose is to identify and correct suboptimal clinical practices.

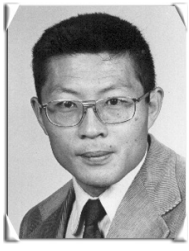
It is estimated that less than 5% of patient care is analyzed employing actuarial methods, as such work has little immediate value in controlling local costs. Such analyses are restricted to specific studies to assess the effectiveness of new or competing treatment modalities.

What Is Required

The concept of 'cumulative complication-free rates'[3] is a good first step. This idea is another expression of 'disability-free survival'. Such work is not currently funded save for specific research projects, and has not been applied on a global basis. Its value to a profit based industry has been ignored. However, if one looks beyond the next quarter's balance sheet, it can have value insofar as achieving the goal of having a public whose overall health is paramount for the public good. ▪

About the Author

Dr. Li is a retired thoracic and cardiac surgeon living on Mercer Island.



3 An Improved Statistical Method for Assessing the Results of Operation, G. L. Grunkemeir, L. E. Lambert, et al, Annals of Thoracic Surgery 20: 289-297 (1975)