CLINICAL NEUROPSYCHOLOGY AND COST OUTCOME RESEARCH
A beginning

Psychology Press
New York and Hove
CLINICAL NEUROPSYCHOLOGY AND COST OUTCOME RESEARCH: A Beginning

Edited by
George P. Prigatano
Neil H. Pliskin

Psychology Press
Taylor & Francis Group
LONDON AND NEW YORK
Dedication

This book is dedicated to practicing clinical neuropsychologists, who are increasingly asked to justify the usefulness of their clinical work and to provide documentation regarding the cost effectiveness of their services and the impact those services have on health-care economics.
## CONTENTS

*Preface*  
*Contributors*

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Health-Care Economics and Clinical Neuropsychology</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>George P. Prigatano</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The Clinical Neuropsychological Examination: Scope, Cost, and Health-Care Value</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>George P. Prigatano, Lanie Y. Zigler, and Leslie D. Rosenstein</td>
<td></td>
</tr>
</tbody>
</table>

**PART I. TRAUMATIC BRAIN INJURY**

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Neuropsychological Assessment After Traumatic Brain Injury in Adults</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Mark Sherer and Thomas A. Novack</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Neuropsychological Assessment and Management of Patients with Persistent Postconcussional Disorders</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>Ronald M. Ruff and Paul M. Richards</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Providing Psychological Services to Families of Brain-Injured Adults and Children in the Present Health-Care Environment</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>Patricia S. Camplair, Robert W. Butler, and Muriel D. Lezak</td>
<td></td>
</tr>
</tbody>
</table>
PART II. CEREBRAL VASCULAR DISORDERS

Chapter 6  Neuropsychological Assessment of Patients with Cerebrovascular Accidents  111
Neil H. Pliskin and Lisa A. Sworowski

Chapter 7  Neuropsychological Assessment of Patients Who Have Undergone Surgical Repair of Anterior Communicating Artery Aneurysms  133
John DeLuca and Maria T. Schultheis

PART III. NEOPLASMS

Chapter 8  Neuropsychological Assessment and Treatment of Patients with Malignant Brain Tumors  159
Christina A. Meyers and Scott B. Cantor

PART IV. DEMENTIA

Chapter 9  The Clinical Utility of Neuropsychological Evaluation of Patients with Known or Suspected Dementia  177
Kathleen A. Welsh-Bohmer, Deborah Kolta Attix, and Douglas J. Mason

Chapter 10  Neuropsychological Consultation and Training of Family Members of Patients with Dementia  201
Deborah Kolta Attix, Douglas J. Mason, and Kathleen A. Welsh-Bohmer

PART V. EPILEPSY

Chapter 11  Neuropsychological Evaluation of Patients with Epilepsy  223
Carl B. Dodrill

Chapter 12  Nonepileptic Seizures and Their Costs: The Role of Neuropsychology  235
Roy Martin, Brian Bell, Bruce Hermann, and Stephen Mennemeyer
PART VI. LEARNING DISABILITIES

Chapter 13  The Use of Neuropsychological Assessment in Clarifying the Educational Needs of Children with Learning Disabilities  261
Lorie A. Humphrey and Paul Satz

PART VII. REHABILITATION, PSYCHOTHERAPY, AND PATIENT MANAGEMENT

Chapter 14  The Clinical Utility and Cost-Effectiveness of Comprehensive (Holistic) Brain Injury Day-Treatment Programs  293
Leonard Diller and Yehuda Ben-Yishay

Chapter 15  Psychotherapy After Brain Injury: Costs and Benefits  313
Mary Pepping and George P. Prigatano

Chapter 16  Does Cognitive Rehabilitation Work? Clinical and Economic Considerations and Outcomes  329
Barbara A. Wilson and Jonathan Evans

Chapter 17  Neuropsychological Assessment of Sport-Related Mild Traumatic Brain Injury  351
Ruben J. Echemendia, Mark Lovell, and Jeffrey Barth

PART VIII. SPECIAL TOPICS

Chapter 18  Neuropsychological Assessment of Physicians Whose Competency to Practice Medicine Is Being Questioned  373
Laetitia L. Thompson

Chapter 19  Clinical Neuropsychology in the Forensic Arena  393
Robert L. Heilbronner and Neil H. Pliskin
There are three keys to the survivability and success of clinical neuropsychology as a profession in today's health-care environment. First, clinical neuropsychologists must continue to strive at integrating important insights from the neurosciences into their practice. Expanding the scientific basis of clinical neuropsychology is crucial for its contributions to the health-care system. Second, practicing clinical neuropsychologists must be constantly alert to factors that may improve services for the patients they serve. This includes being vigilant regarding how patients and families experience the services they receive and their degree of satisfaction with those services. A third, but frequently neglected area, focuses on the need of clinical neuropsychologists to demonstrate to health-care economists, government officials, and third-party payers the value of their services. As this book addresses, value has both subjective and objective markers. At times, value can be measured directly in terms of dollars saved, but most frequently it is measured by a health outcome that is not easily assessed by attaching a monetary figure. Nevertheless, clinical neuropsychologists must become acquainted with the broad area of cost outcome research in order to conduct studies that address this third dimension.

This book began with the intent of summarizing for clinical neuropsychologists and for those outside the field what, in fact, are the clinical utilities of various neuropsychological services. Second, we hoped to describe for clinical neuropsychologists concepts and methodologies that could be used when studying the economic and health-care benefits of their services. We realize this can be a daunting task, as most of us have only marginal training in economics, typically at the undergraduate level. We, therefore, consider this book a "beginning," not even an introduction to this rather complicated but important area of research.

Our hope is that clinical neuropsychologists, and particularly the membership of the National Academy of Neuropsychology (NAN), will benefit from reading this volume in numerous ways. We hope it will stimulate research projects that will aid neuropsychologists in demonstrating the utility of their work and the economic impact in our health-care environment. We also hope it will provide a resource neuropsychologists can turn to when explaining to others exactly what their work is about and how they are attempting to go about measuring its impact in our health-care environment. Finally, we hope it will consolidate useful clinical information for practicing clinical neuropsychologists.
When we began this project, we were fully aware that there were few empirical studies that dealt directly with such questions as the cost-effectiveness of the neuropsychological examination or neuropsychologically oriented rehabilitation. Nevertheless, we knew we had to begin somewhere. Initially, some potential publishers of this book declined to support the project for fear there was not enough empirical evidence to devote a book to this topic. We hope the readership will find those publishers wrong in their judgment. There is, in fact, a great deal of information available that indirectly bears on this important topic. It is true there are very few studies that directly measure the cost–outcome of our work, but the existing database provides a springboard for beginning research in this area. It is the intent of this book to provide such a beginning for clinical neuropsychologists.

As editors of this project, we wish to thank the 1998 and 1999 board of directors of NAN, who supported the idea of this book and authorized funds to help make it a reality. We also thank the Barrow Neurological Institute at St. Joseph’s Hospital and Medical Center; Robert F. Spetzler, M.D., its director; Shelley A. Kick, Ph.D.; Eve DeShazer; and Judy Wilson for their economic, editorial, and secretarial help on this project. Special thanks also to Jerry Sweet, Ph.D., for his exceptionally helpful review of an earlier version of this manuscript.

The NAN membership will also note that this book carries with it an opportunity to obtain continuing educational credits (see the Appendix). We are hopeful that the book will provide valuable information and that clinical neuropsychologists can obtain continuing education credits in a cost-efficient manner.

Finally, we would like to express our special thanks to Alison Mudditt, of Psychology Press, for her support and belief in this project. Our organization should not forget the dedication of Psychology Press to this venture, as it indeed carries with it some risk, but we hope considerable benefit.

George P. Prigatano
Neil H. Pliskin
Phoenix, Arizona
CONTRIBUTORS

Editors/Authors

George P. Prigatano, Ph.D.
Barrow Neurological Institute
St. Joseph's Hospital and Medical Center
Phoenix, AZ

Neil H. Pliskin, Ph.D.
University of Illinois College of Medicine
Chicago, IL

Authors

Deborah Koltai Attix, Ph.D.
Duke University Medical Center
Durham, NC

Jeffrey Barth, Ph.D.
University of Virginia School of Medicine
Charlottesville, VA

Brian Bell, Ph.D.
University of Wisconsin
Madison, WI

Yehuda Ben-Yishay, Ph.D.
Rusk Institute
New York University Medical Center
New York, NY
Robert W. Butler, Ph.D.
Oregon Health Services Center
Portland, OR

Patricia S. Camplair, Ph.D.
Oregon Health Sciences University
Portland, OR

Scott B. Cantor, Ph.D.
University of Texas MD Anderson Cancer Center
Houston, TX

C. Munro Cullum, Ph.D.
University of Texas Southwestern Medical Center at Dallas
Dallas, TX

John DeLuca, Ph.D.
Kessler Medical Rehabilitation Research and Education Corporation
West Orange, NJ

Leonard Diller, Ph.D.
Rusk Institute
New York University Medical Center
New York, NY

Carl B. Dodrill, Ph.D.
University of Washington School of Medicine
Seattle, WA

Ruben J. Echemendia, Ph.D.
Pennsylvania State University
University Park, PA

Jonathan Evans, Ph.D.
Oliver Zangwill Centre for Neuropsychological Rehabilitation
Ely, UK

William D. Gouvier, Ph.D.
Louisiana State University
Baton Rouge, LA
Paul Lees-Haley, Ph.D.
Lees Haley Psychological Corporation
Woodland Hills, CA

Jill Hayes Hammer, Ph.D.
Louisiana State University School of Medicine
New Orleans, LA

Bruce Hermann, Ph.D.
University of Wisconsin
Madison, WI

Robert Heilbronner, Ph.D.
Independent Practice
Chicago, IL

Lorie A. Humphrey, Ph.D.
University of California at Los Angeles
Los Angeles, CA

T. Michael Kashner, Ph.D., JD, MPH
University of Texas Southwestern Medical Center at Dallas
Dallas, TX

Mark Lovell, Ph.D.
University of Pittsburgh Medical Center
Pittsburgh, PA

Muriel D. Lezak, Ph.D.
University of Oregon Health Science Center
Portland, OR

Roy Martin, Ph.D.
University of Alabama
Birmingham, AL

Douglas J. Mason, Ph.D.
Duke University Medical Center
Durham, NC
Stephen Mennemeyer, Ph.D.
University of Alabama
Birmingham, AL

Christina A. Meyers, Ph.D.
University of Texas MD Anderson Cancer Center
Houston, TX

Richard I. Naugle, Ph.D.
Cleveland Clinic Foundation
Cleveland, OH

Thomas A. Novack, Ph.D.
University of Alabama
Birmingham, AL

Mary Pepping, Ph.D.
University of Washington School of Medicine
Seattle, WA

Paul M. Richards, Ph.D.
Private Practice
Boulder, CO

Leslie D. Rosenstein, Ph.D.
Independent Practice
Austin, TX

Ronald M. Ruff, Ph.D.
University of California
San Francisco, CA

Paul Satz, Ph.D.
University of California at Los Angeles School of Medicine
Los Angeles, CA

Maria T. Schultheis, Ph.D.
New Jersey Medical School
Newark, NJ
Mark Sherer, Ph.D.
Methodist Rehabilitation Center
Jackson, MS

Lisa A. Sworowski, Ph.D.
University of Chicago Pritzker School of Medicine
Chicago, IL

Laetitia L. Thompson, Ph.D.
University of Colorado School of Medicine
Denver, CO

Kathleen A. Welsh-Bohmer, Ph.D.
Duke University Medical Center
Durham, NC

Barbara A. Wilson, Ph.D.
Medical Research Council
Cambridge, UK

Lanie Y. Zigler, Ph.D.
Private Practice
Phoenix, AZ
Health-Care Economics
and Clinical Neuropsychology

Introduction

America's ideals and its economy are interrelated. The pursuit of life, liberty, and happiness implies the enjoyment of good health. Numerous studies have documented the obvious point that impaired health is readily associated with unhappiness (see Csikszentmihalyi, 1999). But what is the cost of "good health," and who is to pay for it? Kaplan (1999) noted that for the last 30 years economists have expressed concern about the rising costs associated with health care in America. He noted that almost 15% of the U.S. gross domestic product (GDP) is spent on health care, "while no other country in the world spends more than 10%" (p. 160). Moreover, economists question whether the rising health-care costs are actually associated with better health status (Gold, Siegel, Russell, & Weinstein, 1996).

Certain statistics raise the suspicion that the increased cost of medical care is, at least in part, related to poor business practices. For example, Stein and Foss (1995) compared the annual rate of change in "output, prices, and employment" between health-care delivery services and all private industry in the United States between 1977 and 1992. During that time the domestic output of all private industries grew at a rate of 2.6%, compared to 2.4% in the health industry. Yet prices for health industry services and products increased more than 8%, whereas "all domestic private industries grew at a 5% rate" (p. 236). Employment-compensation costs also increased dramatically compared to the private sector. Were Americans paying more but getting less compared to other services they were receiving?

Part of the problem in answering this question is that the health-care service arena had insufficient data to counter attacks on its business practices and to demonstrate that the health-care services provided to Americans were needed and valued by the public. The rapid changes in reimbursement schedules, difficulties encountered in re-
ceiving “good” hospital care, and restrictions on seeing doctors that patients knew and trusted have resulted in America’s dissatisfaction with changes imposed by policy makers interested in lowering the costs of health care but not in understanding what health-care consumers actually experience as a result of those changes.

Although the percentage of “other professional services” (including psychological services) accounted for 10% to 12% of health expenditures in 1993 (Stein & Foss, 1995), psychologists are being asked to justify their services and their associated fees. This book is the first major effort by clinical neuropsychologists to state the utility of their clinical services and to provide consolidated information regarding studying cost outcomes. Like many areas within the health-care delivery system, few systematic data are available on this important topic. Consequently, this text attempts to help clinical neuropsychologists learn how to demonstrate the economic value of their work. The book was conceptualized as a first major effort to help clinical neuropsychologists meet the challenges imposed by contemporary health-care economic policies and procedures.

Economics and Health Care

Economics is “the science that deals with the production, distribution, and consumption of wealth” (Webster’s, 1983, p. 574). It attempts to apply statistics, mathematical models, research designs, and, to the degree possible, controlled observations to understand how money is used and saved; how expenditures flow from certain principles of supply and demand; and how various business practices influence the distribution of wealth.

In their discussion of the American economy, Stein and Foss (1995) noted that the GDP for the United States has grown dramatically since the late 1890s. Consumer spending has fueled much of the growth. They compared the distribution of consumption expenditures during 1963 and 1993, noting that the proportion spent on food decreased dramatically during this period. Apparently, this is a well-recognized economic principle. The more wealthy a nation is, the less it spends proportionately on food. During the same time, however, a greater proportion of the GDP was spent on medical care and transportation. Regarding the increase in medical expenditures, they commented as follows: “The rising share of medical care reflects higher incomes, more new but costly medical procedures and drugs, an aging population, and the increasing prevalence of medical insurance that weakens patients’ incentives to economize on medical care” (Stein & Foss, 1995, p. 22). The notion that the mere presence of health insurance may result in overutilization of a given health-care service is referred to as the “problem of demand response” (see Frank & McGuire, 1999).

In addition to a greater proportion of the GDP being spent on medical care, an equally large portion is now spent on transportation. Americans are more mobile and use their health-care system perhaps to a greater degree than in the past. Although efforts have been made to reduce the cost of air travel and health-care services, the public seems unhappy with the imposed changes. The news is frequently filled with discussions of the problem of crowded airplanes, delays, the failure to provide meals on long flights, and the failure of the airline industry to consider consumer complaints seriously. Yet the airline industry continued to flourish until the attack on America on September 11, 2001.

Likewise, concerns about health-care costs have resulted in briefer hospitalization
stays, less nursing coverage, less and restricted access to physicians, and long delays in getting authorization to see physicians for services. Americans have become more vocal and contentious about their dissatisfaction with health maintenance organizations (HMOs). Lawsuits filed and won against HMOs seem to be on the increase. The liability suits often include emotional distress as well as failure to provide adequate physical care. In fact, a journal has appeared that provides attorneys with information dealing solely with lawsuits filed against managed care organizations (i.e., *Mealey's Managed Care Liability Report*).

Considerable inequity also is inherent in our present system. A case in point follows: The medical director of an HMO denied clinical neuropsychological evaluations for young adult traumatically brain-injured (TBI) patients covered under their organizational care. However, when that medical director suffered a mild head injury, he arranged for his corporation to authorize a clinical neuropsychological examination by a clinical neuropsychologist who was out of the network. These arrangements reflected his perception that a clinical neuropsychologist would provide the most expert evaluation of his cognitive difficulties.

Despite the absence of statistics justifying the service for a large number of enrollees under their insurance policy, the medical director’s “subjective” or personal perception revealed that, in fact, he considered the service important enough to get it for himself. This “subjective” side of health-care expenditures should also be monitored and not forgotten when the utility of our services, their costs, and the perceived and actual benefits of such services are studied. A growing literature has emerged around the topic of the impact managed care has had on the utilization of psychological testing in general and neuropsychological testing in particular. The reader is referred to several recent publications focusing on this topic including Groth-Marnat (1999); Kubiszyn, Finn, Kay, Dies, Meyer, Eyde, Moreland, and Eisman (2000); Maruish (2001); Norcross, Karg, and Prochaska (1997); Piotrowski (1999); Piotrowski, Belter, and Keller (1998); Stout (1997); Stout and Cook (1999); and Sweet, Moberg, and Suchy (2000).

**Productivity and Standard of Living**

Many practicing clinical psychologists and clinical neuropsychologists report that they must work several more hours each week than they once did to maintain their present income. As managed care policies have resulted in less financial reimbursement for health-care services in the United States, physicians report the same phenomenon. Managed care often is a misnomer for managed costs. How the quality and quantity of health-care services are related to their cost is the true question. Answering this question requires not only accounting and statistical skills but innovative ways of measuring the direct and indirect benefits (and costs) of neuropsychological services.

In the broad economic picture, of which health-care costs are only a portion, some basic economic ideas need to be considered. In a free enterprise economic system, three basic points are often made. First, “production is important because it determines income, and income determines consumption” (Junior Achievement, 1996, p. 82). Second, standard of living is measured in part by “the amount of goods and services available to citizens” (Junior Achievement, 1996, p. 82). Third, the average citizen’s “piece” of the GDP is an index of the funds available within a country to purchase goods and services to increase or maintain the standard of living.
In the present health-care environment, clinical neuropsychologists must be very productive to generate an adequate income to keep themselves and their profession alive and healthy. These services must provide a higher standard of living for the people whom they serve without substantially increasing that proportion of the GDP devoted to health-care costs in this country. Squarely stated, these are the hard facts confronting our profession.

In the early 1990s, the apparent perception of many business and government leaders was that the U.S. economy needed to reduce health care costs to remain competitive in various international markets. Thus, managed care began to influence health care delivery services in the early and mid-1990s.

Our institution (St. Joseph's Hospital and Medical Center) was greatly affected by reimbursement patterns superimposed by managed care. By mid-1995, the Department of Clinical Neuropsychology within Barrow Neurological Institute (BNI), St. Joseph's Hospital and Medical Center, faced a major dilemma. Its billed services covered the overall cost of the department, but the percentage of revenue actually collected seriously jeopardized the survivability of the department. An accountant-oriented administrator simply asked the question: Could the revenues collected justify the maintenance of the Department of Clinical Neuropsychology? When the answer appeared to be no, that administrator took steps to eliminate all salaried positions for clinical neuropsychologists in that department.

The department, however, had been in existence for almost 10 years and had been productive from research, clinical, and teaching perspectives. Its services had been appreciated by the patients, families, and physicians who had requested those services. The director of the BNI (a physician) convinced hospital administrators that the Department of Clinical Neuropsychology should be maintained because the services these psychologists provided were important for the continuum of quality care for neurological patients. With this level of support, the department survived the economic crisis of the mid-1990s precipitated by managed care and its associated reduction in reimbursement. The department is now economically solvent in terms of productivity, and percentages of collections are improving. Barriers to collecting fees for services that were once approved by insurance companies have been identified progressively and handled in a businesslike manner. Consequently, salaried psychology positions have remained. Clinical neuropsychologists continue to provide services to patients and families and are encouraged to engage in research and educational activities.

From my perspective, the message of this story is that the "bean counter" mentality of given administrators can greatly damage a department of clinical neuropsychology. However, if that department has demonstrated its true utility from both scientific and clinical perspectives, then visionaries will support its maintenance during difficult times. In the long run, clinical neuropsychologists will be able to maintain their positions if they can demonstrate the value of their services unequivocally. This value often is a subjective perception on the part of the individuals receiving services, but it can have certain "objective" markers. It results from psychologists taking seriously the need to care for patients, to study the efficacy of their work, and to publish both positive and negative findings associated with their clinical and research efforts (Prigatano, 1999; 2000). With this approach, clinical neuropsychologists can and will survive the crisis imposed by the "managed care-managed cost" movement in the health-service industry in America.

In the present health-care environment, clinical neuropsychologists must continue
to articulate the value and usefulness of their clinical services. They must measure that value from the consumer’s perspective as well as from that of the physicians who refer those patients. They must further demonstrate that in some instances clinical neuropsychological services reduce other related health-care costs (thus reducing the percentage of the GDP devoted to health care).

These tasks require clinical neuropsychologists to become acquainted with a new vocabulary; new journals; new sources of information; and new research questions, methodologies, and measurements.

□ A New Vocabulary for Clinical Neuropsychologists

Hargreaves, Shumway, Hu, and Cuffel (1998) have written a useful text that describes methods for assessing cost-outcomes in the field of mental health. The terminology they described is important for clinical neuropsychologists. From an economic perspective, they described four models for studying cost-outcomes associated with mental health care. Although clinical neuropsychology partially relates to mental health services, it also partially relates to general health services. Thus, their methodology and terminology have to be understood in terms of our own specialty.

Perhaps the first form of study that is driven from economic theory could be described as the study of cost-efficiency. In this case, the major goal is to minimize the cost of a given outcome. In business, many examples reflect this type of study. For example, suppose you are a builder and you want to construct a series of homes for $125,000 or less in a metropolitan area. Those homes would then be sold for $250,000. The question is how to keep the cost at $125,000 or less. An analyses of the cost of labor, materials, land, and so on would be necessary to determine how to produce a home for that amount of money. The economics are straightforward. The skill is in defining where costs can be cut to achieve a certain financial goal.

Applied to health care, the question can be reframed as follows. If the goal is to spend no more than $50,000 a year to rehabilitate a brain-dysfunctional patient to the point that he or she can return to work, what is the most cost-efficient manner of achieving this goal? Should money be spent for a day-treatment program, outpatient therapies, or a job coach? To answer this question, one must clearly understand the services one is buying and also the nature of the patient’s needs to determine whether a certain form of therapy is appropriate for the patient. In this case, the choice of therapy may initially appear cost-efficient, but it may not necessarily prove to be cost-efficient in the long run. Demonstrating cost-efficiency is important for clinical neuropsychologists.

As Hargreaves et al. (1998) noted, “cost efficiency studies are usually not practical (in health care) because there is rarely sufficient evidence to demonstrate that treatment alternatives have equal treatment outcomes” (pp. 40–41). The advent of the case manager model attempted to apply a cost-efficiency mentality to the management of brain-dysfunctional patients. In this instance, however, it should be noted that the outcome is determined by many “patient variables” as well as by many “therapist variables.” Consequently, cost-efficiency studies of the health care of patients who are typically seen by neuropsychologists are quite difficult to accomplish. However, there may be instances when this type of study is possible.

A second form of economic analysis has been referred to as cost–benefit studies. In
this approach, cost and outcome are expressed in economic terms. For example, in nonhealth-care economics, one could study the cost of building a database for a retail merchandise company and calculate the dollars one would expect to save using a computer system rather than a manual monitoring system. One could show that activities such as inventory monitoring and producing payroll will result in substantially fewer errors and less cost to the employers if they purchase such a database system with appropriate computer software and hardware. Simple rules of accounting demonstrate the cost–benefit of such an approach, and many accounting firms flourish because of it.

Can this type of approach also be applied to health care? Hargreaves et al. (1998) noted that outcomes in the health-care area can seldom be examined only in terms of dollars because the services involve health, and health represents both physical and psychological well-being. Therefore, it can be extremely difficult to use a purely financial measure to evaluate outcomes. Consequently, strict cost–benefit studies can be especially difficult in the health-care arena.

A third type of economic analysis, which has gathered considerable promise in health care, is that of cost-effectiveness. Hargreaves et al. (1998) pointed out that "cost-effectiveness analysis, unlike cost benefit analysis, is used when both outcomes and costs are expected to differ. In cost-effective analysis, however, outcomes, or effectiveness, are measured in units that seem more natural than dollars" (p. 41). A perfect example of this statement, as applied to health care, is measurement of the cost-effectiveness of psychotherapy.

Miller and Magruder (1999) edited a text entitled Cost-Effectiveness of Psychotherapy: A Guide for Practitioners, Researchers, and Policymakers. In that text, Howard, Lueger, Martinovich, and Lutz (1999) made some important distinctions relevant to the practice of clinical neuropsychology. In our traditional, Western empirical approach to science, randomized controlled studies are the gold standard for determining if a treatment has an effect. We can refer to such studies as efficacy studies. Another type of question centers around the effectiveness of a given treatment when delivered by clinicians in the field, not necessarily by researchers conducting a controlled scientific investigation. Studies in health-care economics involve cost-effectiveness rather than efficacy. These studies focus on whether a given intervention provided by a typical clinician results in some measurable benefit to the patient or person who is being served.

Different models can be used when conducting such cost-effectiveness studies. In an informative example, Howard et al. (1999) reanalyzed Hans Eysenck's data, which previously criticized the value or the efficacy of psychotherapy. They noted the following:

For example, a reanalysis of Eysenck's data (McNeilly & Howard, 1991) has qualified Eysenck's (1952) conclusion that spontaneous remission is as effective as psychotherapy. Indeed, it is, if a 2-year end point analysis is made of the Eysenck's data. As Figure 4.2 shows, psychotherapy accomplishes in 16 sessions what spontaneous remission does in 2 years. Half of psychotherapy patients are improved with 8 sessions, whereas the comparable rate of improvement under spontaneous remission conditions takes approximately 1 year. (p. 44)

This interesting analysis makes a poignant statement about careful assessment of what could be described as patient "improvement" and how it varies as a function of the number of psychotherapy sessions. It reveals important data that can escape scien-
Health-Care Economics and Clinical Neuropsychology

tific analysis but are extremely relevant when attempting to establish the clinical usefulness of a service in terms of affecting a person's standard of living. Throughout this text, examples are given of how cost-outcome analyses can be applied to problems that clinical neuropsychologists confront.

A fourth model for assessing the economic cost of clinical outcomes has been referred to as cost-utility studies. Hargreaves et al. (1998) noted the following:

Cost utility analysis extends cost-effectiveness analysis by incorporating measures of the relevant importance of the multiple outcome domains. A variety of methods have been developed for quantifying preferences for, or "the utility" of different health outcomes. These methods yield numerical weights that can be combined with the original outcome measures to compute a single comprehensive outcome indicator. (p. 42)

The work of Kaplan (1999) has provided examples of how cost-utility studies can be used in health-care research and has considerable relevance for clinical neuropsychologists. Kaplan described various methods for measuring the quality of life, and one scale—referred to the "quality of well-being scale"—seems to hold considerable promise. It attempts to measure the relative value that persons served apply to different types of symptom reduction or different levels of both physical and psychological health. The methodology for establishing such psychometric instruments is complex. Considerable research is being performed to provide such metrics, which ultimately will have to be incorporated in clinical neuropsychological research.

A summary of the four major economic analyses used in assessing cost outcomes in a health-care environment is given in Table 1.1. Additional theoretical (and real) neuropsychological examples are presented. The four major analyses listed were discussed further by Drummond, O'Brien, Stoddart, and Torrance (1998).

Further Analysis of Cost-Effectiveness in Clinical Neuropsychology

Clinical neuropsychologists must understand the rationale behind cost-effectiveness analysis and how it is used by policy makers. Russell, Siegel, Daniels, Gold, Luce, and Mandelblatt (1996) noted that cost-effectiveness analysis is not a simple, straightforward procedure. The concept behind it is relatively simple; the actual methodology used can be debated (see "Introduction," Gold et al., 1996).

In its simplest form, cost-effectiveness analysis attempts to establish a ratio between the costs of a service divided by its outcome (the cost-effectiveness analysis ratio). How one calculates costs and how one calculates outcome can be narrow or broad. It can reflect the interest of a particular group or society as a whole. For example, the cost of a medical or health service can be measured purely in Medicare dollars spent for the services (reflecting the government's most immediate cost), or it can reflect supplementary insurance expenditures. It also can include costs associated with transportation to obtain the services as well as costs associated with lost income from being out of work to obtain the services. Obviously, the list can be extended.

Outcome can likewise be measured in many ways. Outcome measures can reflect medical outcomes such as the reduction of neural tube defects in a given population over time, the increase in life expectancy after cancer treatment, or the avoidance of predictable dementia after placement of a shunt for low-pressure hydrocephalus. It
<table>
<thead>
<tr>
<th>Type of Cost Analysis</th>
<th>Design Outcome Desired</th>
<th>Possible Clinical Examples</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency (or minimization)</td>
<td>Costs of a service to produce an expected outcome</td>
<td>Identification of cognitive deficits indicative of early dementia</td>
<td>Neuropsych assessment: Option 1: (2 hrs., $300) Option 2: (4 hrs., $600) Option 3: (two separate testing sessions, 4 hrs. each; $1,200)</td>
</tr>
<tr>
<td>Benefit</td>
<td>Cost of service in dollars compared to costs saved in dollars by providing the service</td>
<td>Reduce health-care costs following severe TBI</td>
<td>Holistic neuropsychological rehabilitation of TBI patients conducted in Denmark, 162,000 DKK/yr.</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>Cost of two or more treatments to produce similar clinical outcomes</td>
<td>Reduce irritability and enhance social integration after TBI</td>
<td>Service #1: 1-yr. psychotherapy, $7,000 Service #2: antidepressant medications alone for 1-yr., $2,000</td>
</tr>
<tr>
<td>Utility</td>
<td>Cost and outcome of different services to impact some healthcare problems</td>
<td>Improve quality of life of TBI patients. Reduce depression in family members of TBI patients. Return TBI patients to gainful employment</td>
<td>1-yr. holistic neuro-psychologically oriented rehabilitation, $60,000 U.S.* versus cost of just paying disability benefits over 3 yrs.</td>
</tr>
</tbody>
</table>

TBI = traumatic brain injury. * = estimated cost. †Most patients would be identified by Option 2; therefore, it provides the most cost-efficient outcome given the probability of success. ††Over 3.5 yrs this rehabilitation program demonstrated cost benefits. ‡This outcome measure could be measured in various subcomponents such as job satisfaction, reduction of psychiatric disability, dollars the patient paid in taxes, and reduction of disability benefits by workmen’s compensation insurance.
also can reflect quality of life variables such as a decrease in depression and the enhancement of memory function. It can further include broader psychosocial variables such as the number of days the individual has been able to maintain work after rehabilitation (or surgery). And it can measure any reduction in disability payments following a certain form of medical or health intervention. Each investigator must struggle with which variables will be placed in the denominator and which will be placed in the numerator of this ratio. How each variable will be measured and weighted in the final analysis requires considerable skill and sophistication. Clearly, this can be a daunting task; nevertheless, some approach is needed to answer various policy maker’s questions regarding what clinical neuropsychologists do and how it affects health outcomes and associated costs.

It should be kept in mind that in true cost-effectiveness analysis one is always comparing the cost-outcome of a certain form of care with the cost outcome of another form of care. That is, in strict cost-effective analysis one is comparing different types of outcomes with different associated costs. To understand how cost-effectiveness analysis is used in decision making, it is also important to keep in mind that at least two other issues are relevant to policy makers beyond this analysis. Policy makers ask questions such as these: How serious is the health problem that is being addressed (e.g., the management of a tension headache versus surgical resection to cure epilepsy)? How effective is a given intervention in reducing the problem (Russell et al., 1996, p. 7)?

These serious questions often have been answered by physicians and the public at large. However, political forces influence expenditures because vested interest groups can emphasize the importance of a certain health problem for a section of the American public (for example, the human immunodeficiency virus problem). The effectiveness of treatment is supposed to be determined by scientific investigations, which has driven the so-called evidence-based medicine movement into health-care practice. Here is where clinical neuropsychologists must become articulate when they perform studies. Besides carrying out methodologically sound studies of cost-effectiveness, they must articulate (and demonstrate) the seriousness of the problem they are evaluating as well as the effectiveness of an intervention that would modify or reduce the problem. To do so, clinical neuropsychologists must see the “big picture” of their work and be innovative about evaluating which variables should be in the denominator and which in the numerator of their cost-effectiveness analysis ratio. To do such research, however, clinical neuropsychologists must expose themselves to new journals and books outside the field of clinical neuropsychology, and develop new ways of thinking about how to measure the impact of their clinical and scientific work in health economic terms.

New Journals for Clinical Neuropsychologists

The data collected relevant to cost outcome studies in health care can be found in a large array of journals. In the fields of neurology, psychiatry, clinical psychology, and clinical neuropsychology, a number of studies are being published relevant to cost-outcomes research in such journals as the Archives of General Psychiatry, American Journal of Psychiatry, Acta Psychiatrica (Scandinavia), The New England Journal of Medicine, Neurology, Annals of Internal Medicine, Epilepsy, Journal of the American Geriatric Society, Dementia and Geriatric Cognitive Disorders, Journal of Geriatric Psychiatry, British Journal

However, numerous papers in other journals that we seldom read ultimately bear on our work as well. These are the journals commonly read by health economists and policy makers. A perusal of the references listed in Hargreaves et al. (1998), Miller and Magruder (1999), and Gold et al. (1996) suggests that the following journals should become more common reading for neuropsychologists interested in cost–outcome studies: American Journal of Managed Care; Health Economics; Health Policy; International Journal of Technology Assessment in Health Care; Human Resources; Journal of Health Politics, Policy and Law; Controlled Clinical Trials, Milbank Quarterly; Medical Decision-Making; Quality of Life Research; Medical Care; Health Services Research; Health Care Demand and Disease Management; and Health Affairs. Other important journals in this area include Health Care Finance Review, Journal of Health Care Finance, and Behavioral Health Care Tomorrow.

By reading journals focused on health-care economics and policies, we will become more familiar with studies that affect the delivery of our services and familiarize ourselves with how to address questions commonly asked by health economists.

New Sources of Information: Two Examples

To highlight how reading health-care economic journals opens new vistas for clinical neuropsychologists, a recent study is described. Rizzo et al. (1998) studied the costs of falls in the Medicare population. As people age, falls become quite common. In their data analysis, Rizzo et al. (1998) noted:

the probability of incurring hospital costs increased monotonically with fall severity and that subjects that incurred one or more injurious falls were more than three times as likely to receive hospital care as were nonfallers and were more than 16 times as likely to receive nursing home care.” (p. 1179)

Their estimate for just hospital costs for one injurious fall was almost $14,000. For an individual who had one noninjurious fall, the cost was less than $7,000. What differentiated an injurious from a noninjurious fall? Their data analysis clearly showed that the presence of mental impairment, as measured by a mental status examination, was related to whether individuals suffered injurious falls. The implication is that special management of elderly patients with cognitive impairments might result in fewer injurious falls which, in turn, would result in a substantial economic savings. Neuropsychologists must be aware of such data and design studies to demonstrate that both brief assessment and appropriate behavioral management in terms of cognitive assessment result in a substantial economic savings for Medicare patients—and therefore for the government.

Nowack (1997) also presented provocative data for clinical neuropsychologists interested in cost-effectiveness issues. Nowack discussed the costs associated with misdiagnosis of epilepsy. Substantial expenditures are associated with individuals with nonepileptic seizures who are diagnosed as having epilepsy. Nowack estimated that the cost of such misdiagnosis was somewhere between $650 million and $4 billion. Whether these figures are accurate is difficult to determine. They are, however, stag-
nerg. They suggest that if clinical neuropsychologists can help differentiate patients who have nonepileptic seizurelike events from those with true epilepsy, they may well save the health-care system millions of dollars. The chapter by Martin, Bell, Hermann, and Mennemeyer in this text partially addresses this important question.

By being aware of such studies, neuropsychologists can construct scientifically sound studies that demonstrate the potential financial impact of effective clinical neuropsychological work. The remainder of this book describes clinically useful aspects of our services and clarifies which existing data are relevant to the cost-effectiveness of our work. Equally important, each chapter suggests research ideas that may be helpful in conducting cost outcome research pertinent to the practice of neuropsychology.

Plan of Text

The following chapters discuss a select but representative sample of the types of services provided by clinical neuropsychologists to the various patient populations they serve. Each chapter has the following goals:

- Review relevant research concerning the state of knowledge related to a given problem area.
- Describe the utility of the neuropsychological services provided for different patient populations.
- Summarize studies that have been done or could be done to address how neuropsychological services can be studied within the context of cost outcomes research.

References

Csikszentmihalyi, M. (1999). If we are so rich, why aren't we happy? American Psychologist, 54(10), 821–827.


ture of the anterior communicating artery (ACoA): The ACoA aneurysm syndrome. BNI Quarterly, 9, 9.


Castle, S., Wilkins, S., Heck, E., Tanzy, K., & Fahey, J. (1995). Depression in caregivers of demented patients is associated with altered immunity: Impaired proliferative capacity, increased CD8+, and a decline in lymphocytes with surface signal transduction molecules (CD38+) and a cytotoxicity marker (CD56' CD8'). *Clinical & Experimental Immunology, 101*, 487–493.


Wells, K., Stewart, A., Hays, R., Burnam, M., Rogers, W., Daniels, M., Berry, S., Greenfield, S., & Ware, J. (1989). The functioning and well-being of depressed patients: Results from the Medical Outcomes Study. Journal of the American Medical Association, 262, 914-919.


Wells, K., Stewart, A., Hays, R., Burnam, M., Rogers, W., Daniels, M., Berry, S., Greenfield, S., & Ware, J. (1989). The functioning and well-being of depressed patients: Results from the Medical Outcomes Study. Journal of the American Medical Association, 262, 914-919.


Epilepsy Foundation. (1999). Epilepsy: A report to the nation. Epilepsy USA, as quoted on the Epilepsy Foundation Website.


Hadler, N. M. (1996). If you have to prove you are ill, you can't get well: The object lesson of fibromyalgia. *Spine, 21*, 2397–2400.


Gianutsos, R., & Matheson, P. (1987). The rehabilitation of visual perceptual disorders attribut-
able to brain injury. In M. Meier, A. Benton, & I. Diller (Eds.), Neuropsychological rehabilitation (pp. 303–241). London: Churchill Livingstone.


Ragge v. MCA/Universal Studios, 165 F. R. D. 605(C.D. Cal. 1995)


Social Security Act Amendments, Section 1122, PL 92-603; and the National Health Planning and Resources Development Act (Health Systems Agencies) of 1974, PL 93-641.


