



**CENTER FOR  
VALUE BASED  
MEDICINE®**

**Pharmaceutical  
Value Index®  
Descriptor**

090508PHNO

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Phone: 215-353-6249

Box 335  
Flourtown, PA 19031  
[www.valuebasedmedicine.com](http://www.valuebasedmedicine.com)

Fax: 215-233-3222

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# Executive Summary

- The *Pharmaceutical Value Index*<sup>®</sup> is a ground-breaking instrument which measures the: 1) *comparative effectiveness* and 2) *cost-effectiveness* of a drug or medical device.
- The *Pharmaceutical Value Index*<sup>®</sup> is applicable for a drug or device which is: 1) under consideration for development, 2) under development in clinical trials, or 3) already in the marketplace.
- The *Pharmaceutical Value Index*<sup>®</sup> provides a cost framework to maximize return on investment (ROI) for a drug or device while maintaining cost-effectiveness.
- The *Pharmaceutical Value Index*<sup>®</sup> is directed by physicians with the clinical & business expertise to appreciate: 1) market need, 2) market pricing, 3) market penetration and 4) net present value (NPV) issues.
- The *Pharmaceutical Value Index*<sup>®</sup> considers the costs saved by the use of a drug or device, including those related to: 1) expensive operations and hospitalizations, 2) disability payments and 3) loss of salary.
- The *Pharmaceutical Value Index*<sup>®</sup> gives manufacturers a more effective tool to promote their drug or device to their most sophisticated markets—regulatory agencies, payers and physicians who prescribe their products.
- The *Pharmaceutical Value Index*<sup>®</sup> quantifies the quality-of-life gain from a drug or device using the *Quality-of-Life Utility Database*<sup>SM</sup>, a unique information system consisting of over 45,000 patient utilities.
- The *Pharmaceutical Value Index*<sup>®</sup> combines the best, evidence-based, clinical trial data with patient quality-of-life preferences to give the most *accurate measure* of the patient benefit conferred by a drug or device.

**Comments on the value-based medicine methodology utilized  
in the *Pharmaceutical Value Index*<sup>®</sup>**

Thomas Scully, JD, Former Administrator, Centers for Medicare and Medicaid Services

***“Drs. Brown visited with me at CMS in 2002. I liked their work then, and I like it now.”***

***“No matter the system of healthcare delivery, value-based medicine provides an extraordinary return on investment. In essence, it gives us an information system that identifies healthcare interventions of the highest quality for the most reasonable cost. By doing so, value-based medicine allows healthcare dollars to be directed to services that return the greatest value.”***

From the Foreword of Brown MM, Brown GC & Sharma S. *Evidence-Based to Value-Based Medicine*, Chicago, AMA Press, 2005.

.....

Mark McClellan, MD, PhD, Former Administrator, Centers for Medicare and Medicaid Services

***“I will do anything I can to make this go”***

Referent to a value-based medicine, cost-utility healthcare information system for clinical practice during a meeting with principals of the Center for Value-Based Medicine<sup>®</sup>, 1-05.

.....

Carmen Puliafito, MD, MBA: Dean, USC School of Medicine

***“The authors are to be congratulated for their path-breaking work.”***

During a formal discussion of a Center for Value-Based Medicine paper<sup>®</sup>, AAO, 2000.

.....

Amit K. Ghosh, MD, on behalf of the American College of Physicians

***“Value-based medicine fills a void in applying evidence-based medicine to patients.”***

*ACP Journal Club*, 2006, in Discussion of *Evidence-Based to Value-Based Medicine*, Chicago, AMA Press, 2005.

.....

RxPG

***“Medical research and practice is currently evolving from evidence-based medicine to an even higher quality of patient care: value-based medicine.”***

Review of *Evidence-Based to Value-Based Medicine*, which received the highest \*\*\*\*\* rating by RxPG, the Internet’s largest community website for medical students and physicians.

**Current or former clients of Center for Value-Based Medicine<sup>®</sup> services include:**

Allergan, Inc.

Emmes Corporation

Eye Research Institute

Genaera Pharmaceuticals

Genentech, Inc.

Lippincott, Wilkins and Williams

Merck, Inc.

National Eye Institute, National Institutes of Health

National Institute on Aging, National Institutes of Health

NeoVista, Inc.

Novartis

Oraya Therapeutics

Pennsylvania Department of Public Assistance

Pfizer

US Cochrane Center, Cochrane Collaboration

List incomplete.

# Pharmaceutical Value Index<sup>®</sup>

## A. Pharmacoeconomic Background

In 1980, the annual prescription drug expenditure in the U.S. was \$12 billion.<sup>1</sup> For 2007, the annual drug expenditure is estimated by actuaries at the Centers for Medicare and Medicaid Services (CMS) to exceed \$292 billion.<sup>1</sup> In inflation-adjusted dollars, the cost of prescription drugs per capita in 2007 has increased to approximately 3-4 times what it was in 1980.<sup>2</sup>

Critics emphasize rising pharmaceutical costs, but typically ignore the extraordinary costs of drug development. More importantly, they fail to take into account the fact that drugs greatly improve length-of-life and/or quality-of-life, while saving substantial costs by making more invasive and expensive interventions unnecessary. They furthermore neglect to recognize that drugs increase worker productivity and decrease the burden of disease-related disability, thus contributing to an increased Gross Domestic Product (GDP) and overall improved economy.<sup>3</sup> The Pharmaceutical Value Index<sup>®</sup> addresses and integrates each of these issues.

While not yet policy in the United States, countries such as Canada, Great Britain, the Baltic States, Australia and others require an economic analysis, in addition to sound evidence-based data, before a new drug is added to a formulary or a medical device put into clinical practice. Recent federal legislation on the “comparative effectiveness” of healthcare interventions makes it likely that economic analyses in the U.S. will also soon be required.

Economic requirements in the U.S. notwithstanding, Pharmaceutical Value Index<sup>®</sup> analyses of select drugs and devices can provide handsome returns on investment for manufacturers and distributors. These analyses, performed in user-friendly fashion by physicians experienced in medical economic modeling, demonstrate the marked benefit of drugs and devices in ways generally not undertaken in FDA or insurer submissions. They give pharmaceutical and device manufacturers a powerful marketing tool to let stakeholders know the value their products deliver and the costs they save.

***Pharmaceutical Value Index*<sup>®</sup> analyses can provide a handsome return on investment (ROI) by estimating the pricing structure a drug or device can sustain and still remain cost-effective.**

The *Pharmaceutical Value Index*<sup>®</sup> provides a standardized information system created by clinician researchers to allow drug and device manufacturers to: 1) quantify the patient-perceived value conferred by their drug or device in user-friendly format, 2) strategically utilize the data to secure the most advantageous pricing, and 3) employ this tactical information in the field in marketing their product(s) to all stakeholders in healthcare, including physicians, other providers, patients, policymakers regulatory agencies, employers and insurers.

## ***B. Value-Based Medicine*<sup>SM</sup>**

Evidence-based medicine is the practice of medicine based upon the highest level of scientific evidence available.<sup>4,5</sup> Regrettably, evidence-based medicine generally focuses on one outcome and often ignores the quality-of-life parameters associated with an intervention.

*Value-Based Medicine*<sup>SM</sup> is the practice of medicine based upon the *value* (improvement in length-of-life and/or quality-of-life) conferred by healthcare interventions.<sup>3,6</sup> The term *value* does not imply cost, but rather the total *benefit* conferred by an intervention. Value-Based Medicine<sup>SM</sup> incorporates *utilities* which objectively measure the quality-of-life associated with any health state and the improvement in quality-of-life conferred by a drug, device or other intervention.

Value-Based Medicine<sup>SM</sup> incorporates the best evidence-based medicine data (Level 1<sup>4,5</sup> data derived from randomized clinical trials) with quality-of-life utilities obtained from patients to provide a more accurate representation of

the overall worth of a drug or device to a patient than possible with evidence-based data alone.<sup>3</sup> By integrating quality-of-life improvement with evidence-based outcomes such as increased life expectancy, the patient *value* conferred by a drug may improve considerably compared to that demonstrable by evidence-based data alone. And when providers understand which interventions convey the greatest value, they can deliver the highest quality care.

***Value-Based Medicine<sup>SM</sup> allows higher quality medical care than possible with evidence-based medicine data alone.***

## **C. Utility Analysis**

### **--A Measure of Quality-of-Life--**

The improvement in length-of-life conferred by a healthcare intervention can generally be acquired from the evidence-based literature, but the improvement in quality-of-life is more difficult to measure. The quality-of-life associated with a health state can, however, be objectively measured using *utility analysis*.

The variant of utility analysis incorporated in the *Pharmaceutical Value Index*<sup>®</sup> is the established time tradeoff method.<sup>6-16</sup> The utilities themselves are derived from patients who have lived in a health state of interest, since patients are best able to appreciate to what degree the diseases they live with on a daily basis diminish their quality-of-life.<sup>3</sup>

Patient utilities often differ substantially from those of experts, the community and other surrogate respondents.<sup>11,12</sup> The patient utilities used in the *Pharmaceutical Value Index*<sup>®</sup> are reproducible and validated across adult age strata, level of education, ethnicity, geographical borders, gender

and income levels.<sup>10-16</sup> In essence, this means they are unaffected by each of these variables.

Utilities for the same health state have been demonstrated to be similar in the U.S.<sup>17</sup>, Canada<sup>17</sup> and Europe<sup>18</sup>. It appears that utilities are innate to human nature.<sup>3</sup>

***Utility analysis very effectively measures the great improvement that drugs & medical devices confer in quality-of-life.***

**Utility value anchors.** By convention, utilities vary from the anchors of 1.0 (perfect health permanently) to 0.0 (death). The more desirable a health state, the closer its associated utility is to 1.0. Conversely, the poorer the health state, the closer its associated utility is to 0.0. As examples, the utility associated with treated systemic arterial hypertension is 0.98, while that associated with a severe stroke is 0.34. If a severe stroke can be converted to a mild stroke by a drug, the utility improves from 0.34 to 0.84, a gain of 0.50, or a 147% improvement in quality-of-life.

**Decision analysis.** Decision analysis<sup>3</sup> incorporates all benefits and all adverse events associated with the use of a drug or device. The resultant utility associated with drug or device therapy can be compared to the utility outcome associated with no treatment or with another intervention.<sup>3</sup>

***The total value conferred by drugs and devices is a measure of their comparative effectiveness.***

**Total value.** The *total value* gained from an intervention, also known as the *comparative effectiveness*, is calculated by multiplying the (utility gain) x (duration of benefit in years) to yield an outcome measured in quality-

adjusted life-years (QALYs). Thus, a drug or device which converts a severe stroke (utility of 0.34) to a mild stroke (utility of 0.84) for 10 years, confers a total value gain of  $(+0.50 \times 10 =)$  **5.0** QALYs. Length-of-life gains can also be integrated. If that same drug or device also added another year of life, an additional  $(0.84 \times 1 =)$  0.84 QALY is accrued, for a total of **5.84** QALYs.

**Utility database.** A Center for Value-Based Medicine<sup>®</sup> database of over 45,000 patient utilities (*Quality-of-Life Utility Database<sup>SM</sup>*) has been assembled by more than 30 physician researchers at medical specialty offices and hospitals over a 10-year period. Designed specifically for use with pharmacoeconomic analyses, the *Database<sup>SM</sup>* allows the best evidence-based data from pharmaceutical clinical trials<sup>5,17</sup> to be converted to utility form. Although the utilities have been shown to be unaffected by ethnicity, educational level and economic status<sup>10-16</sup>, this reliable and validated database parallels the general population of the United States in ethnic makeup, as well as educational and economic strata.

***The Quality-of-Life Utility Database<sup>SM</sup> is singularly  
unique and permits standardization of the  
Pharmaceutical Value Index<sup>®</sup> across all specialties.***

The database is singularly unique and integral to the *Pharmaceutical Value Index<sup>®</sup>*.<sup>3,17</sup> It allows consistency and reproducibility across all value-based medicine analyses performed at the Center for Value-Based Medicine<sup>®</sup>. If additional utilities are needed, the Center<sup>®</sup> has the capability of sending teams into the field to expeditiously acquire and collate these data.

## D. Cost-Utility Analysis

*Cost-utility analysis*, also referred to by some researchers as cost-effectiveness analysis<sup>3,19-23</sup>, is the healthcare economic instrument that correlates the value of a medical intervention with its incremental costs. Its unit of measure is the \$/QALY (cost expended per quality-adjusted life-year gained). The *Pharmaceutical Value Index*<sup>®</sup> uses this instrument, in conjunction with standardized inputs and outcomes, to assess a drug or device.

The *Pharmaceutical Value Index*<sup>®</sup> consists of the: 1) *comparative effectiveness (value gain)* and 2) *cost-effectiveness* of a drug or device. Comparative effectiveness is measured in both: a) percent improvement in value and b) QALYs gained. The readily understandable *percent improvement in conferred value* of the drug or device can be compared for any intervention across all of medicine.

The *Pharmaceutical Value Index*<sup>®</sup> is unaffected by gender, age, ethnic, educational or socioeconomic strata. It employs health-related quality-of-life values that are population-based and mirror a cross-section of the U.S. populace. As such, the *Index*<sup>®</sup> is applicable across the entire U.S. population.

*Index*<sup>®</sup> values are typically calculated for the *reference case*, or average case, to allow a standardized comparison across all interventions. This helps to eliminate bias against age or any specific cohort.

The costs used in the *Index*<sup>®</sup> are the average Medicare reimbursements to hospitals, ambulatory surgical centers, providers and for durable goods. The Average Wholesale Price (AWP)<sup>24</sup> is utilized for pharmaceutical costs.

**Pharmaceutical Value Index<sup>®</sup> analyses are performed  
by physicians to maximize *translational medicine*  
applications into the clinical arena.**

Most importantly, the *Pharmaceutical Value Index*<sup>®</sup> includes all benefits conferred by a drug or device, all associated adverse events, and all associated costs, including those obviated by use of the intervention. When a drug prevents expensive operations and hospitalizations, disability payments and loss of employment, the costs it saves can be considerable.

### **Cost-Effectiveness Standards**

Standards for cost-utility analysis outcomes are not formally set by any agency in the U.S. at the current time. Nonetheless, most researchers in the U.S. consider interventions costing less than \$50,000/QALY to be very cost-effective, while those costing more than \$100,000/QALY are not considered to be cost-effective.<sup>25-28</sup>

In the United Kingdom, NICE (National Institute for Health and Clinical Excellence) has set standards and advises the National Health Service (NHS) as to which drugs, devices and other interventions are cost-effective and should or should not be used.<sup>29</sup> Interventions costing less than £20,000/QALY (~U.S. \$40,000) are generally accepted as cost-effective, while those costing more than £30,000/QALY (~U.S. \$60,000) are only accepted as cost-effective for increasingly strong reasons.

The World Health Organization (WHO) works with the DALY (disability-adjusted life-year), which is similar to the QALY in measuring quality-of-life gain or loss. WHO has suggested that interventions costing less than 1 x GDP per capita for a DALY (~\$45,000/QALY in the US) are *very cost-effective*, while those costing 1 x GDP per capita to 3 x GDP per capita for a DALY (~\$45,000-\$135,000/QALY) are *cost-effective*, and those costing more than 3 x GDP per capita for a DALY (> \$120,000/QALY) are not cost-effective.<sup>30</sup>

## E. Drug & Device Manufacturer Benefits

Pharmaceutical companies and device manufacturers have long had difficulty demonstrating the considerable value of their products to stakeholders in healthcare, especially as compared to other interventions. The *Pharmaceutical Value Index*<sup>®</sup> allows them to do just this!

The potential benefits of the *Pharmaceutical Value Index*<sup>®</sup> (*Index*<sup>®</sup>) for drug and device manufacturers and/or distributors are listed below:

### ***Overall Advantages for a Drug or Device Company***

1. The *Index*<sup>®</sup> gives drug and device manufacturers an information armamentarium to more effectively demonstrate product value, thereby justifying price and enabling the highest return on investment (ROI).
2. The *Index*<sup>®</sup> allows companies to assess the value of their drug or device versus comparators.
3. The *Index*<sup>®</sup> allows companies to determine the price their drug or device will support in the market and still remain *cost-effective*.
4. Unlike most pharmacoeconomic analyses, *Index*<sup>®</sup> analyses are performed by *clinical physician researchers* adept in healthcare economic modeling and *translational analyses* into the clinical arena.
5. The *Index*<sup>®</sup> uses the distinctive, proprietary *Quality-of-Life Utility Database*<sup>SM</sup>, which has supplied data to decide public policy and set healthcare standards for over 100 million people.

### ***Value Gain, A Marketing Advantage***

1. The *Index*<sup>®</sup> provides a globally unique, objective measure of the patient *value* conferred by a drug or device versus no treatment, or treatment with another intervention.
2. The *Index*<sup>®</sup> shows that the *value* conferred by drugs and devices is often *substantial*, especially compared to other healthcare interventions.

## **E. Manufacturer Benefits (cont.)**

### ***Value Gain, A Marketing Advantage (cont.)***

3. The *value* of a drug or device can typically be very favorably compared to injury reduction interventions and toxin control interventions.
4. This *Index*<sup>®</sup> readily demonstrates drug and device *value* to *all stakeholders* in healthcare, including regulatory agencies, employers, insurers, providers and patients.
5. Rather than conflicting with other quality-of-life instruments, the *Index*<sup>®</sup> is complementary in demonstrating drug benefit.

### ***Cost Savings for Clients, A Second Marketing Advantage***

1. The *Index*<sup>®</sup> incorporates expensive interventions and hospitalizations prevented by the use of a drug or device.
2. The *Index*<sup>®</sup> takes into account public & private disability payments which drugs & devices save.
3. The *Index*<sup>®</sup> integrates the employment and salary gains of patients and unpaid caregivers (thus improving the GDP and tax base) which drugs & devices make possible.
4. These cost savings can be readily demonstrated to all stakeholders in healthcare, especially governmental agencies, insurers and employers.

### ***Highest quality care for the most important people – the patients***

1. The *Index*<sup>®</sup> demonstrates which interventions deliver the greatest value, and thus allow *higher quality care* than possible using evidence-based medicine data alone.

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