Three Sets of Case Studies Suggest Logic and Consistency Challenges with Value Frameworks

Joshua T. Cohen, PhD*, Jordan E. Anderson, BA, Peter J. Neumann, ScD

Center for the Evaluation of Value and Risk in Health, Tufts Medical Center, Boston, MA, USA

A B S T R A C T

Objective: To assess the logic and consistency of three prominent value frameworks. **Methods:** We reviewed the value frameworks from three organizations: the Memorial Sloan Kettering Cancer Center (DrugAbacus), the American Society of Clinical Oncologists, and the Institute for Clinical and Economic Review. For each framework, we developed case studies to explore the degree to which the frameworks have face validity in the sense that they are consistent with four important principles: value should be proportional to a therapy's benefit; components of value should matter to framework users (patients and payers); attribute weights should reflect user preferences; and value estimates used to inform therapy prices should reflect per-person benefit. **Results:** All three frameworks can aid decision making by elucidating factors not explicitly addressed by conventional evaluation techniques (in particular, cost-effectiveness analyses).

Our case studies identified four challenges: 1) value is not always proportional to benefit; 2) value reflects factors that may not be relevant to framework users (patients or payers); 3) attribute weights do not necessarily reflect user preferences or relate to value in ways that are transparent; and 4) value does not reflect per-person benefit. **Conclusions:** Although the value frameworks we reviewed capture value in a way that is important to various audiences, they are not always logical or consistent. Because these frameworks may have a growing influence on therapy access, it is imperative that analytic challenges be further explored.

Keywords: cost-effectiveness analysis, healthcare costs, oncology treatments, value frameworks.

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Introduction

Any algorithm used to evaluate the value of medical therapies has limitations. A single number or set of numbers cannot capture all information pertaining to the myriad benefits, risks, and costs of a wide range of treatments.

Nevertheless, algorithms used in "value frameworks," such as those being developed and promulgated by a range of professional societies and other organizations in the United States, can be designed to better reflect outcomes of interest to stakeholders, and to account for the preferences of the patients and other agents such as payers. This study uses concrete examples—case studies—to explore the extent to which three well-known value frameworks achieve these goals.

These and other frameworks are a response to the important needs of payers, clinicians, and patients to systematically evaluate and in some cases compare therapies. The frameworks seek to expand upon traditional evaluation methodologies (e.g., cost per quality-adjusted life-year [QALY] ratios) by more explicitly accounting for the preferences of framework "users," and by reporting results in a user-friendly manner. Also, it bears emphasizing that developing value frameworks is challenging. It is easier to criticize frameworks than to construct them. Nonetheless, it is important to explore whether notable frameworks have face

validity, that is, do they align with an externally logical and credible characterization of value? To address this question, we constructed a series of case studies.

Methods

Value Frameworks

We focused on three value frameworks: DrugAbacus (from the Memorial Sloan Kettering Cancer Center), the American Society of Clinical Oncologists (ASCO) framework, and the Institute for Clinical and Economic Review (ICER) framework.

DrugAbacus [1] aims to "determine appropriate prices for cancer drugs based on what experts tend to list as possible components of a drug's value." It derives an "appropriate" price for a drug on the basis of its incremental survival benefit and the value of each added survival year, as designated by the user (Fig. 1). The algorithm underlying DrugAbacus (as of August 2016) then scales this price by a series of factors, each of which reflects a characteristic, as specified by the framework's authors (e.g., the drug's toxicity, novelty, and cost of development) and a "preference weight" selected by the user. Each factor's preference weight represents that factor's maximum impact on price. For example,

* Address correspondence to: Joshua T. Cohen, Center for the Evaluation of Value and Risk in Health, Tufts Medical Center, 35 Kneeland Street, Boston, MA 02111.

E-mail: jcohen@tuftsmedicalcenter.org.

DrugAbacus price = Added survival * Value of each year * Adjustment factors

DrugAbacus Assumption | User-specified value | Depends on user preference and DrugAbacus assumption

Adjustment factor	User preferences	Preference scale	DrugAbacus assumption
Toxicity Discount	User-specified max discount	30% — 0%	*DrugAbacus toxicity assumption:* Based on prevalence of Grade 3 and 4 toxicity effects and on the probability that patient discontinues treatment because of toxicity.
Novelty	User-specified max premium	3× — 1× (no premium)	*DrugAbacus novelty assumption:* • Next-in-class: No premium • Drug with known target but novel delivery: 50% of premium • Drug with novel mechanism of action: Full premium
Cost of Development	User-specified max premium for high development costs	3× — 1× (no premium)	*DrugAbacus development cost assumption*: Based on number of subjects in drug's FDA approval trials: • "Development cost is low": No premium • "Development cost is high": Full premium
Rarity	User-specified max premium for drugs treating "rare" conditions	3× — 1× (no premium)	*DrugAbacus rarity assumption:* Based on incidence of treated disease: • "Treated disease is not rare": No premium • "Treated disease is very rare": Full premium
Population Health Burden	User-specified max premium for drugs treating "high burden conditions"	3× — 1× (no premium)	*DrugAbacus population burden assumption:* Based on life years lost in population to the treated disease: • Treated disease is low burden: No premium • Treated disease is high burden: Full premium
Unmet Need	User-specified premium for drugs treating conditions not addressed by other drugs	3× — 1× (no premium)	*DrugAbacus unmet need assumption*: Based on how many treatments are recommended for drug's target condition by the National Comprehensive Care Network. • Minimal unmet need (many alternatives): No premium • High unmet need (few alternatives): Full premium
Prognosis	User-specified premium for drugs treating severe conditions	3× — 1× (no premium)	*DrugAbacus prognosis assumptions*: Based on median survival in the absence of therapy (from FDA label): • Low severity (long median survival in the absence of therapy): No premium • High severity (strong median survival in the absence of therapy): Full premium

Fig. 1 – DrugAbacus framework. FDA, Food and Drug Administration.

a "novelty" preference weight of 2.5 means that DrugAbacus inflates the price of the most novel drugs (drugs with a novel mechanism of action) by a factor of 2.5. DrugAbacus does not scale the price of drugs with minimal or no novelty (i.e., next-in-class drug prices are multiplied by 1.0); drugs with intermediate novelty (known target but novel delivery) are scaled by an intermediate value—in this case, the average of 1.0 and 2.5, or a factor of 1.75.

The ASCO framework has a stated goal of aiding patient and clinician shared decision making. Its June 2016 revised framework [2,3] characterizes drug value in terms of points awarded on the basis of a drug's clinical benefits, toxicity, and "bonus" considerations (see Fig. 2). How it awards points depends on the type of data available. Clinical benefit points reflect overall survival (OS) if that information is available, progression-free survival (PFS) as a second choice, and response rate otherwise. Toxicity points correspond to the new drug's potential harms, taking into account the number of distinct toxic symptoms, their severity, and prevalence. Finally, the bonus category adds points for increased long-term ("tail of the curve") survival, improved cancer-related symptoms, improved quality of life, and extended time between treatments.

The ICER framework [4] envisions payers as a key audience. It assesses value using a two-part approach. First, the ICER identifies a "care value" benchmark representing the highest price consistent with a cost-effectiveness ratio less than (more favorable than) a cost-per-QALY threshold of either $100,000 or $150,000 per QALY. Which threshold it uses (the smaller, more stringent value or the higher, less stringent value) depends on a qualitative assessment of contextual factors, such as the supporting comparative effectiveness evidence, the drug's other benefits and disadvantages (e.g., adherence levels), and other considerations (e.g., ethical, legal, or other issues). Second, the ICER identifies a "health system value" benchmark consistent with "sustainable" health care budget growth. In practice, the ICER identifies the highest drug price consistent with aggregate annual population spending of no more than $904 million. (The ICER explains that the $904 million spending limit per new drug is consistent with the annual drug spending growth of no more than 1% higher than a historical annual gross domestic product growth rate of 2.75%, and that this rate corresponds to societal willingness to pay for Medicare spending growth, as expressed in the Accountable Care Act [5].)