The Paradigm Shift from Patient to Health Consumer: 25 Years of Value Assessment in Health

Eline M. van den Broek-Altenburg, Adam J. Atherly

Submitted to: Journal of Medical Internet Research
on: May 14, 2024

Disclaimer: © The authors. All rights reserved. This is a privileged document currently under peer-review/community review. Authors have provided JMIR Publications with an exclusive license to publish this preprint on it's website for review purposes only. While the final peer-reviewed paper may be licensed under a CC BY license on publication, at this stage authors and publisher expressively prohibit redistribution of this draft paper other than for review purposes.

Table of Contents

Preprint
JMIR Publications

The Paradigm Shift from Patient to Health Consumer: 25 Years of Value Assessment in Health

Eline M. van den Broek-Altenburg[1] PhD, MS, MA; Adam J. Atherly[2] PhD

[1]University of Vermont Burlington US
[2]Virginia Commonwealth University Richmond US

Corresponding Author:
Eline M. van den Broek-Altenburg PhD, MS, MA
University of Vermont
111 Colchester Avenue
Burlington
US

Abstract

While economic analyses and health technology assessment have come a long way in their multi-faceted assessment of the clinical, economic, ethical, legal, and societal perspectives that may be impacted by a new technologies and procedures, these approaches do not reflect underlying patient preferences that may be important in the assessment of “value” in the current value-based healthcare revolution. Also, the arbitrary nature of the threshold in these studies limit a value-based approach to measuring dollars in terms if an increase in the QALY gained. The major challenges that come with the transformation to a value-based healthcare system lead to questions such as: “how are economic analyses, often the basis for policy and reimbursement decisions, going to switch from a societal to an individual perspective?”; and “how do we assess (economic) value, then, taking into account individual preference heterogeneity as well as varying heuristics and decision rules?”

These challenges, both related to including the individual perspective in cost effectiveness analysis, have been widely debated. The societal perspective measures cost-effectiveness of treatment in terms of costs and Quality-Adjusted-Life-Years (QALY), where QALYs assume a health state that is more desirable is more valuable and, therefore, value is equated with preference or desirability. This approach has major empirical and conceptual shortcomings such as inconsistencies among values obtained from the standard-gamble, time-trade-off, and visual-analog-scale elicitation formats and more importantly, the linearity assumptions that violate the assumption of diminishing marginal utility.

This paper reviews 25 years of value assessment approaches in health. It first describes the foundation of value assessment in other fields, then in the second part discusses the application of these methods in health economics. In the third part, it explains why value assessment works differently in health and a one-to-one copy from other fields in not always appropriate. It will be challenging to take into account the complexities of individual preferences and behaviors, especially if they are not met at the societal level. The paper does conclude with suggestions and opportunities to further improve value assessment methods in health in the years to come.

(JMIR Preprints 14/05/2024:60443)
DOI: https://doi.org/10.2196/preprints.60443

Preprint Settings

1) Would you like to publish your submitted manuscript as preprint?
✓ **Please make my preprint PDF available to anyone at any time (recommended).**
Please make my preprint PDF available only to logged-in users; I understand that my title and abstract will remain visible to all users.
Only make the preprint title and abstract visible.
No, I do not wish to publish my submitted manuscript as a preprint.
2) If accepted for publication in a JMIR journal, would you like the PDF to be visible to the public?
✓ **Yes, please make my accepted manuscript PDF available to anyone at any time (Recommended).**
Yes, but please make my accepted manuscript PDF available only to logged-in users; I understand that the title and abstract will remain v

Preprint JMIR Publications

Yes, but only make the title and abstract visible (see Important note, above). I understand that if I later pay to participate in <a href="http

Preprint
JMIR Publications

Original Manuscript

Preprint
JMIR Publications

The Paradigm Shift from Patient to Health Consumer:

25 Years of Value Assessment in Health

Preprint JMIR Publications

ABSTRACT

While economic analyses and health technology assessment have come a long way in their multi-faceted assessment of the clinical, economic, ethical, legal, and societal perspectives that may be impacted by a new technologies and procedures, these approaches do not reflect underlying patient preferences that may be important in the assessment of “value” in the current value-based healthcare revolution. Also, the arbitrary nature of the threshold in these studies limit a value-based approach to measuring dollars in terms if an increase in the QALY gained. The major challenges that come with the transformation to a value-based healthcare system lead to questions such as: “how are economic analyses, often the basis for policy and reimbursement decisions, going to switch from a societal to an individual perspective?”; and “how do we assess (economic) value, then, taking into account individual preference heterogeneity as well as varying heuristics and decision rules?”

These challenges, both related to including the individual perspective in cost effectiveness analysis, have been widely debated. The societal perspective measures cost-effectiveness of treatment in terms of costs and Quality-Adjusted-Life-Years (QALY), where QALYs assume a health state that is more desirable is more valuable and, therefore, value is equated with preference or desirability. This approach has major empirical and conceptual shortcomings such as inconsistencies among values obtained from the standard-gamble, time-trade-off, and visual-analog-scale elicitation formats and more importantly, the linearity assumptions that violate the assumption of diminishing marginal utility.

This paper reviews 25 years of value assessment approaches in health. It first describes the foundation of value assessment in other fields, then in the second part discusses the application of these methods in health economics. In the third part, it explains why value assessment works differently in health and a one-to-one copy from other fields in not always appropriate. It will be challenging to take into account the complexities of individual preferences and behaviors, especially if they are not met at the societal level. The paper does conclude with suggestions and opportunities to further improve value assessment methods in

health in the years to come.

Preprint
JMIR Publications

Introduction

The concept of value assessment has been used for decades in marketing, management, and other fields to develop strategies to assess potential and realized customer value. Successful application of these strategies in health has required an understanding of what value assessment entails, including quantifying the impact of a provider's offering to patients' and payers' costs as well as health gains. But the adoption of value assessment in health has been slow, gradual, and multifaceted. One major explanation for this is that it required a paradigm shift "from patient to health consumer" to accept that some marketing concepts regarding customers are applicable to patients.

This paradigm shift is currently happening which can be observed in the way Health Technology Assessment (HTA) methods are changing and in the ever-changing health policy landscape. This paper reviews 25 years of value assessment approaches in health. It first describes the foundation of value assessment in other fields, then in the second part discusses the application of these methods in health economics. In the third part, it explains why value assessment works differently in health and a one-to-one copy from other fields in not always appropriate. The paper concludes with suggestions and opportunities to further improve value assessment methods in health in the years to come.

Value Assessment in Marketing and its Economic Foundations

In marketing, value assessment has been a key factor when seeking ways to differentiate from competitors and gain a competitive advantage [1-2]. As a result, firms have increasingly adopted customer value-based selling [3], customer value-based pricing [4], and customer value management [5]. However, successful adoption of these strategies requires an understanding of consumer preferences, which quantifies the impact of a supplier's offering to customers' costs and returns [6]. Over the past few decades, several methods have been developed to perform value assessment and elicit preferences from consumers.

Preprint JMIR Publications

Value assessment represents a change in perspective for many firms. Historically, firms often adopted the “production” mentality, whereby value was perceived based solely on the quality of the product produced rather than the value provided to consumers. This was famously illustrated by Henry Ford, when he responded to criticism that his cars came in a single color by saying “consumers can have any color they want, as long as it’s black”. This mentality shifted over time in most industries to a different approach that considered more carefully what consumers value and how to produce products that maximize consumer value.

Most value assessment is based on the assumption that consumers maximize utility. In fact, the utility maximization paradigm forms the basis of many economic, psychological, cognitive and behavioral models. Value assessment is done by estimating a utility function which represents consumers’ preferences which are assumed to be complete and transitive. This means consumers can compare any two goods or services and their preferences are internally consistent [7]. Consumers can then rank order the goods or services under consideration according to their personal “value function”.

When making a decision under certainty, the value function reflects the decision-maker’s preferences on a particular outcome. Outcomes are defined by the assignment of values to a set of attribute variables which are either discrete or continuous and together make up for the space of all possible outcomes. However, outcomes are often not defined under certainty but in terms of probabilities and a utility function is needed to assess the value of a decision. Expected Utility Theory (EUT) (proposed by von Neumann and Morgenstern in 1944) described a more complex utility function representing the decision maker’s attitudes regarding risk and the value of the outcomes by inducing a preference ordering on the probability distributions over the entire outcome space [8]. Decades later, Kahneman and Tversky contrasted the EUT concepts of risky and riskless choices with Prospect Theory (PT) [9]. While EUT assumed that risk attitudes derived exclusively from the way in which people value rewards as reflected in the curvature of the utility function, PT posited that one’s

Preprint JMIR Publications

risk attitude would also vary with their subjectively weighted outcome probabilities.

To collected preferences and derive the utility function, there are many ways to ask consumers to rank order options. In marketing research, some of the more established methods include contingent valuation [10], contingent ranking [11] and behavior [12], paired comparisons [13,14], discrete choice experiments [15], (full-profile) conjoint analysis [16], adaptive conjoint analysis (ACA) [17, 18] and ACA's self-explicated prior [19]. In all these methods, consumers are asked to implicitly or explicitly rank order options and make choices based on the ordering. There are many different ways this is done. For example, in the ACA self-explicated model, consumers are asked to rank order levels of an attribute of a choice, which is either assumed to be homogeneous across respondents or derived individually [19]. They then rate the importance of the difference between the best and the worst levels of an attribute on a 4-point scale which are then multiplied by the preference orders and rescaled so that the difference between the highest and lowest partworths of an attribute is equal to the attribute's importance [20].

In the self-explicated model, the choice set is truncated to four importance scores across and the assumption of equal successive intervals within attributes is embedded in the model. This is in contrast to actual choices, where the choice set may have many attributes, such as price, color, quality, reliability, reputation, size, calories, packaging and so on and also where some choice could be quite similar and others quite different such as the choice between two kinds of sliced bread, a bagel and a pita. In the case of paired comparisons, such as full profile ACA, it is assumed that consumers sum the weighted additive differences between alternatives on each attribute [21]. In most preference elicitation methods, the values assigned to the attributes are discrete.

There are a number of practical challenges with these approaches. Issues with reference point [22,23], scale [24], differences in attribute processing and heuristics [25,26], learning and fatigue effects [27], attention [28] and other challenges have caused considerable methodological discussion and new

Preprint JMIR Publications

modelling approaches in marketing, transportation and environmental economics over the past decades as researchers work to model consumer decision making. In health, many of these methods have been adopted to define value for individual patients, often following the same patterns of discussion and methodological improvements as other fields. The next paragraph describes some of the initial attempts to copy preference elicitation methods from these other fields and why some of the “fixes” in those fields will not work in health.

Value Assessment in Health - Health Technology Assessment

In health, the first mention of value assessment was in the context of what is now known as Health Technology Assessment (HTA). HTA is used to ensure that healthcare decisions take account of relevant evidence about the costs and benefits of a treatment in a systematic way [29]. HTA focuses on decision-making at the societal level and seeks to answer how to best assess the various aspects of value and allow these to be factored into societal-level choices regarding rates and reimbursements in health. This was most widely used by counties that centralized healthcare decision making in the context of a national healthcare system, such as the United Kingdom.

Since new health technologies have made an impact in clinical and economic outcomes, research methodologies to evaluate the efficiency of these new technologies were necessary. Cost-effectiveness analysis (CEA) is one way of doing this which assesses the value or benefit of new health care technologies or interventions and compares the costs to a reference or threshold. In the U.S., the first and second panels on CEA included economists, ethicists, psychometricians, and clinicians who were asked to make reference case recommendations. The 1996 consensus report, titled “Cost Effectiveness in Health and Medicine”, was the first to describe the uses and conduct of cost-effectiveness analyses (CEA) as decision-making aids in the health and medical fields [30].

But more than 20 years before the panels in the U.S., HTA was being more

Preprint JMIR Publications

actively developed in Europe in the 1970s with both formal and informal initiatives in different countries [31]. So-called consensus conferences played an important role in the early development of HTA and had the explicit goal of using the best available evidence in making policy, administrative, and clinical decision in health care. By generating a broader interest in scientific evidence among policy makers, clinicians, and the general public, the conferences created a wider understanding of the need for comprehensive assessment in health care [31]. The concept of consensus conferences was launched by the U.S. National Institutes of Health in the 1970s, and quickly adopted in several countries in Europe for HTA [31]. While U.S. policies have from there on prevented the use of CEA for reimbursement decisions, such as with the Affordable Care Act in 2010 which banned Medicare from using CEA metrics, formal agencies were established in many individual European countries for health technology assessment, starting with the first in Sweden in 1987 followed by many others in the 1990s.

Even though most of the HTA agencies in Europe are advisory bodies and have no regulatory functions, in 1991 the European health ministers together identified HTA as a “key tool to improve the management of scarce healthcare resources”. Indeed, the combination of scarcity in health and single payer systems in many European countries led to the adoption of CEA. Victor Fuchs in his book Who Shall Live (1974) provided a clear explanations and memorable examples of the need for choices about health at the societal level, writing: *“It is increasingly recognized around the world that no country can provide all its citizens with all the health care that would be good for them. Resources need to be allocated [by the government]. And the challenge for every society is to distribute those resources as fairly as possible and to do as much good as possible.”* [32]

In Australia, too, HTA of nonpharmaceutical technologies developed in the 1970s and in 1990 for pharmaceuticals. It was established by the Commonwealth Parliament in the light of increasing costs of medical investigations and patient care [33]. Since almost 70 percent of total health expenditures in Australia are

Preprint JMIR Publications

funded by government programs, including Medicare and the Pharmaceutical Benefits Scheme, evaluation was undertaken to consider the effects of developments in technology on medical benefits and public hospital costs, with some emphasis on diagnostic methods [33]. Economic evaluation is undertaken by or on behalf of manufacturing industry, and the evidence on clinical effectiveness, safety and cost effectiveness presented is then considered by the Pharmaceutical Benefits Advisory Committee (PBAC).

QALY

HTA commonly uses evaluation methods to assess whether the costs per Quality-Adjusted Life Years (QALY) gained from a treatment, pharmaceuticals or intervention are within the conventional range of acceptability. The QALY is a standard measure of disease burden which includes both the quality and quantity of a human life and is used in economic and health policy evaluation to assess the value of medical interventions [34]. One QALY equals one year of perfect health. This differs from a year of life gained, which does not take the quality of life into account. Most HTA-oriented countries base their reimbursement model on a threshold number per QALY saved. Cost-effectiveness thresholds (CETs) vary widely by country and are typically used to assess whether an intervention is worthwhile from a country-specific standpoint and should reflect health opportunity cost [36]. In Australia, for example, the PBAC is believed to apply a threshold range of $45,000 to $60,000 per QALY [35], £20,000-40,000 per QALY in the U.K. and in many European countries this is between € 50,000-100,000 per QALY saved. CETs used by some decision makers—such as the World Health Organization suggested CETs of 1 to 3 times the gross domestic product (GDP) per capita—do not.

The quality adjustments in QALYs are based on various measurement methods and instruments. One key early debate was whether “health” could be measured as a single index value or whether health should be represented by a series of values representing different aspects of health, such as physical, mental and emotional health. The early measures developed for the Rand Health Insurance Experiment, for example, included 36 questions that could be

Preprint JMIR Publications

summed up to eight different domains of health [37]. A related issue was whether measures of health needed to be condition specific and calibrated to a particular health issue or whether a “generic” measure could measure health across a multitude of conditions.

In the late 80s, an inter-disciplinary five-country group developed the EuroQol instrument, a five-dimensional three-level generic measure subsequently termed the ‘EQ-5D’ [38]. It was designed to measure and value health status in terms of 5 dimensions: Mobility, Self-Care, Usual Activities, Pain/Discomfort, and Anxiety/Depression [39]. The valuation method expanded usage across clinical programs, disease and condition areas, population surveys, patient-reported outcomes, and value sets. The EQ-5D has been widely tested and used in both general population and patient samples and has been translated into over 130 different language versions. The EQ-5D has become the standard measure for health and provides a standardized generic measure with a single index value representing health. Indeed, the success of the EQ-5D led the MOS from the Rand Health Insurance Experiment to be similarly consolidated into an index measure, first as the SF-12 then as the SF-6. Yet the different variants of the MOS have never achieved the widespread acceptance of the EQ-5D.

The EQ-5D was designed to measure decrements in health across conditions, and populations. In theory, the EQ-5D measures “health” in a standardized way that can be compared across conditions, populations and time. Yet there are limitations to the EQ-5D. Notably, substantial use of the instrument has shown that it can suffer from ceiling effects, particularly when used in general population surveys, but also in some patient population settings.

Value Assessment in Health in the United States

U.S. policymakers have consistently chosen not to use the costs per QALY framework for reimbursement decisions. In recent years, the U.S. did see steady growth in the number of organizations conducting value assessments. National organizations such as the Institute for Clinical and Economic Review (ICER) [40], the Innovation and Value Initiative (IVI), and the National Comprehensive Cancer

Preprint JMIR Publications

Network (NCCN) have introduced value assessment frameworks and tools to guide health care decision-makers in evaluating the relative benefits and costs of health care interventions, primarily pharmaceuticals. According to recent analysis, the field of value assessment in the U.S. is dynamic and evolving [41], and the use of value assessment is gaining traction with health care decision-makers and policymakers. Overall, 79 percent of surveyed health care payers reported that ICER recommendations influenced their decision-making in 2022, compared with only 49 percent in 2016 [42,43].

There have been sporadic attempts to incorporate HTA into public health coverage decisions in the United States. The most well-known is the attempt by the state of Oregon to use HTA principals to determine Medicaid coverage decisions. The state rejected standardized CEA and instead used a combination of expert opinion and public panels to create rank ordered priorities. The Oregon attempt to use CEA failed. The attempt failed because of a combination of factors. One was a lack of public acceptance of the priorities; one of the most visible elements was a child, Adam Howard, who died after he was denied a bone marrow transplant because of the combination of a low probability of success and high cost. A second factor was the Americans with Disability Act (ADA), which both the Bush and Clinton administrations argued was violated by the use of HTA.

Preprint JMIR Publications

Although CEA has not been well accepted in the United States, there are newer approaches that seek to incorporate HTA into decision making in the United States. CEA has been supplemented with approaches to assess value, including multi-criteria decision analysis (MCDA), generalized risk-adjusted cost-effectiveness (GRACE) and the Value Flower. MCDA is a decision-making method that systematically weighs various value elements that may fall outside traditional value assessments, such as a treatment’s scientific novelty, a patient’s disease severity, or how a treatment may affect a caregiver’s productivity [44]. MCDA models allow users to choose their willingness-to-pay thresholds and customize their value determination results using modifiable inputs for measures related to a treatment’s benefits and cost.

This is the beginning of a new era where measurement methods no longer solely insist on linear, additive utility. This can be seen in GRACE analysis, which is a somewhat different approach to CEA that aligns economic assessments of treatments with patient preferences and experience of care [45]. In GRACE analysis, differential cost-effectiveness thresholds (relative to traditional CEA) are applied based on disease severity (e.g., higher thresholds for more severe diseases) and other patient circumstances to better recognize the value of treatments that promote equity and significantly improve patient QoL [45]. This links value assessment more tightly to economic theory, recognizing that the utility value of a health improvement varies depending on the underlying level of health. This was one of the key problems with the use of HTA in Oregon – treatments with acceptable QALY values but low utility values like routine dental care were prioritized over conditions with lower QALY values but (potentially) higher utility values such as bone marrow transplants.

Apart from addressing potential non-linearity of utility functions, there have been several initiatives to expand the set of “value measures”. An ISPOR special task force created a “value flower” that identified elements of value that are and are not typically included in standard CEA methodology and a recommendation to expand cost effectiveness measures with these value elements to better capture what is important to individuals but unmeasured in standard QALYs [46]. In general, newer approaches to CEA now seek to include measures of productivity, real option value, insurance value, reduction of uncertainty, scientific spillover, severity of disease, adherence improving factors, equity and the value of hope. The issue with all of these novel approaches, however, remains that the ultimate goal is to draw conclusions about *societal* costs and benefits rather than a blueprint for *individualized* health care delivery based on patient preferences and perceptions.

Value Assessment in Health - Policy Efforts

Patient Centeredness

In the policy arena, a series of important changes have been made regarding

Preprint JMIR Publications

the patient’s position in the decision-making process. For decades, there have been attempts to improve “patient centeredness” in healthcare, which is defined as: “providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions” [47]. Although the focus on patient centered care has increased, the rationale, measurement, and implementation of strategies to improve patient centered care or to use patient experiences for quality improvement purposes have been widely debated [48, 49]. In practice, patients are not directly and proactively involved as much in the process of quality improvement. Even if efforts to design care through the patient’s eyes [50] is supported, the question remains to what extent this can be done at the individual patient level. One example of this would be Health Plan Employer Data and Information Set (HEDIS) which has been used to compare and report quality across health plans from a patient perspective. Despite HEDIS measures generally reflecting cost-effectiveness practices, in a number of cases these do not appear to be cost effective for certain subgroups [52]. Results from health preferences research are usually not communicated at the individual level, and there is a lot of debate around the external validity of such studies [52-54].

Shared Decision-Making

The same is true for the concept of shared decision-making: a process by which patients and providers consider outcome probabilities and patient preferences and reach a health care decision based on mutual agreement [55]. This is best used in situations where there is medical uncertainty or different treatment options. Theoretically, provider and patient discuss the different options and reach a conclusion together about the optimal strategy. In the U.S., for example, policy initiatives to improve achieve shared decision making were embedded in both the Affordable care Act (2010) and the patient-centered medical home, but its success depends on building a good relationship so that information is shared and patients are supported to deliberate and express their preferences and views during the decision-making process. In the United Kingdom, health authorities have engaged clinical champions and patient representatives in national initiatives for shared decision making and embarked on a process of

Preprint JMIR Publications

widely disseminating patient decision aids [56]. In practice, however, providers often find the time required to go over all necessary information and decision aids isn't available. Decision aids ultimately suffer from the same challenge as the concept of patient centeredness; there is not enough room in the clinical care pathway for approaches that incorporate individual preferences.

Value-Based Care

In many states in the United States, and in countries in Europe, policymakers have decided the traditional, volume-based care delivery system should be replaced with a system in which physicians are being rewarded for providing "value" to patients. In theory, valued and engaged consumers are at the center of the health care experience and are supported by a coordinated care team. In practice, value is often currently defined in terms of care coordination, health outcomes and providing clinically appropriate care for each patient's situation. Value-based payments are still being defined. Paying for value without an integrated delivery system has challenges. In states having implemented value-based care, such as Vermont, physician groups have the option to forgo participation and even if they do choose to participate, they can dictate key terms of their participation [57].

Challenges to Value Assessment in Health

Patient value is a key component in all areas of health care delivery, and understanding how health providers create, communicate and deliver value to patients is a key factor when seeking ways to improve care according to the Triple Aim of improving the individual experience of care; improving the health of populations; and reducing the per capita costs of care for populations [58].

The practice of HTA uses a societal perspective to measure cost-effectiveness of treatment in terms of costs and Quality-Adjusted-Life-Years (QALY), where QALYs assume a health state that is more desirable is more valuable and, therefore, value is equated with preference or desirability. This approach has major empirical and conceptual shortcomings such as inconsistencies among values obtained from the standard-gamble, time-trade-off, and visual-analog-scale

Preprint JMIR Publications

elicitation formats and more importantly, the linearity assumptions that violate the key economic assumption of diminishing marginal utility. While HTA has come a long way in its “multi-faceted assessment of the clinical, economic, ethical, legal, and societal perspectives that may be impacted by a new technology, procedure, drug, or process” [59], these approaches may not sufficiently reflect individual patient -or health consumer- preferences that may be important in the assessment of “value” in the current value-based healthcare revolution.

The key difference in measuring value is that the outcome in other fields is an economic and tangible measure, such as purchasing a car, whereas in health it is the production of health. One way to better predict behavior and choice in health, therefore, is to include the health production function. Our recent work on medication non-adherence, for example, has shown that there is an enormous discrepancy between patient preferences and their beliefs and expectations [60]. In a pilot study utilizing a double-bound contingent-belief (DBCB) questionnaire, patients could express how efficacy and side effects were affected by controlled levels of non-adherence, allowing for the estimation of sensitivity in health outcomes and costs. The derived health production function suggested that patients may strategically manage adherence to minimize side effects, without compromising efficacy. Patients’ inclination to manage medication intake was closely linked to the relative importance they assign to treatment efficacy and side effects. We formalized the definition of health production functions by positing that patients craft a mental model of health production under scenarios that are not covered by interactions with their physicians or by the clinical evidence available to them. This function relates the benefits of health behaviors to the costs associated with achieving such benefits. Value, then, is now not only defined by preferences for health outcomes alone but by patient’s expectations of health outcomes. The “mental model” described in this paper is now being tested in different studies.

Apart from tangibility, a second key difference is that production and consumption of a medical service take place simultaneously. This inseparability

Preprint JMIR Publications

and the inconsistency in health that is being produced, gives much more room to interpretation, experiences, perceptions and emotions when making a decision. In some cases, patients may be informed regarding clinical efficacy but they may care more about another attribute of service or treatment that is entirely unrelated to clinical outcomes, but not irrelevant to the patient. For example, a physician advises a patient to wait with treatment because patient is at risk for side effects at that point in time. The physician is attempting to provide high quality care and act in the patient's best interest, while maintaining a reputation for delivering high-value care. This particular patient may choose immediate treatment because the gains outweigh the potential side effects and the patient does not care about physician's reputation. This creates a conflict between QALY type HTA assessment and individual assessments of "value".

In a situation like this, who defines what "value-based" care means? If policymakers truly want to promote patient-centered care and shared decision making, the question is what the desired outcome is in this situation. Reimbursement decisions are currently based on an equation that defines value in terms of health states. We know that this approach tells only one part of a story – what is preferable from a societal approach. If we accept the notion that patients are all different and have different preferences, it must be acknowledged that "value" in healthcare needs to be redefined to incorporate patient preference heterogeneity.

Preprint JMIR Publications

Outlook into the Future: Health Consumers and Value Assessment

Value assessment in health has come a long way in the past 25 years. Currently, health economic models focus on the benefits and costs of treatment options and help define reimbursement and delivery systems. But this top-down approach needs to make room for "value-based" care which takes into account value to individual patients. Value-based care ties the amount health care providers earn for their services to the value they deliver for their patients, such as the quality, equity, and cost of care. Through financial incentives and other methods, value-based care programs aim to hold providers more accountable for improving patient outcome. But in practice, so far, the focus is primarily on cost containment.

In this system, there is little attention for variations in individual patient preferences or factors that affect those preferences. Essentially, value-based health still focuses on cost containment strategies for the average patient, not individual value to individual patients. The one-size-fits-all approach to value disproportionally makes some patients worse off. In addition, delivery systems have differential effects on patient populations which further enhances health inequities. Theoretically, it also increases spending, because patients are expected to all require a treatment for a weighted average cost. In practice, some will require higher cost treatment options while others will value lower cost options. Care delivery that takes into account all aspects of human decision making will help pave the way for more accurate cost benefit analysis and improved access and affordability.

One lesson learned from 25 years of value assessment in health is that there is no average patient, yet many HTA assessments are still based on averages. This is why value assessment from a societal perspective may lead to equitable allocation of resources without necessarily leading to optimal utilization of resources. If individual patient behavior and preferences are not taken into account in value assessment methods, resources will be wasted because of a mismatch between what the consumer values and what society prioritizes.

It will be challenging to take into account the complexities of individual preferences and behaviors, especially if they are not met at the societal level. There has been an increase in the adoption of ideas from behavioral economics and mathematical psychology to better understand human decision making in health. There are ways to add information about the cognitive and brain processes that may help value assessment in health to perform more precise predictions of human decision-making and choice.

One pieces that is also missing in these models is a better understanding of the

Preprint JMIR Publications

role of emotion in the decision-making process. One of the opportunities lies with neuroscience models. For example, the large-scale sharing of task-based functional neuroimaging data has the potential to allow novel insights into behavioral mapping for the use of health economic evaluation. Advances in scanner technology, image acquisition protocols, experimental design, and analysis methods have promised to push forward fMRI to the true study of functional brain organization. Recent developments in fMRI techniques allow researchers to identify which regions of the human brain are involved in different types of decisions and that activity in those regions would definitively reveal people’s thoughts and emotions. By using functional neuroimaging and connecting to psychometric and behavioral data, health economists can make more accurate predictions of human behavior and decision-making similar to econometric “fusion” models using both revealed and stated preferences to predict uptake.

But the final challenge for future value assessment will be to incorporate heterogeneity of preferences into decision models. Currently, heterogeneity is largely considered in terms of health equity and the impact of approval of denials of treatment on disadvantaged populations. But the more challenging aspect will be trying to reconcile heterogeneous patient preferences with decision tools based on “average” patients. Centralized decision makers using average metrics like “Incremental Cost Effectiveness Ratios” are reliant on the strong assumption of linearity of preferences – which is unlikely to hold in heterogeneous / diverse societies. This means that centralized planners using decision rules based on measures like the average cost per QALY gained will misallocate resources and fail to use healthcare dollars to maximize the well-being of society.

Preprint JMIR Publications

References

1. Woodruff RB. Customer value: the next source for competitive advantage. Journal of the academy of marketing science. 1997 Mar;25:139-53.
2. Martelo Landroguez S, Barroso Castro C, Cepeda-Carrión G. Creating dynamic capabilities to increase customer value. Management decision. 2011 Aug 2;49(7):1141-59.
3. Terho H, Haas A, Eggert A, Ulaga W. ‘It's almost like taking the sales out of selling’—Towards a conceptualization of value-based selling in business markets. Industrial Marketing Management. 2012 Jan 1;41(1):174-85.
4. Liozu SM, Hinterhuber A. Pricing orientation, pricing capabilities, and firm performance. Management Decision. 2013 Mar 22;51(3):594-614.
5. Anderson JC, Narus JA, Van Rossum W. Customer value propositions in business markets. Harvard business review. 2006 Mar 1;84(3):90.
6. Payne A, Frow P. A strategic framework for customer relationship management. Journal of marketing. 2005 Oct;69(4):167-76.
7. Board S. Preferences and utility. UCLA, Oct. 2009;6.
8. von Neumann J, Morgenstern O (1944) Theory of games and economic behavior. Princeton Univ Press. http://www.archive.org/details/theoryofgamesand030098mbp
9. Kahneman D, Tversky A. Prospect Theory: an analysis of decision under risk. Econometrica. 1979;47:263–292
10. Venkatachalam L. The contingent valuation method: a review. Environmental impact assessment review. 2004 Jan 1;24(1):89-124.
11. Smith VK, Desvousges WH, Smith VK, Desvousges WH. The contingent ranking method and benefit estimation. Measuring Water Quality Benefits. 1986:145-80.
12. Payne JW. Contingent decision behavior. Psychological bulletin. 1982 Sep;92(2):382.
13. David HA. The method of paired comparisons. London; 1963.
14. Kendall MG, Smith BB. On the method of paired comparisons. Biometrika. 1940 Mar 1;31(3/4):324-45.
15. Louviere JJ, Flynn TN, Carson RT. Discrete choice experiments are not conjoint analysis. Journal of choice modelling. 2010 Jan 1;3(3):57-72.

Preprint JMIR Publications

16. Louviere JJ. Conjoint analysis. Advanced methods of marketing research. 1994 Jul 19:223-59.

17. Green PE, Krieger AM, Agarwal MK. Adaptive conjoint analysis: Some caveats and suggestions. Journal of Marketing Research. 1991 May;28(2):215-22.

18. Johnson RM. Comment on "Adaptive Conjoint Analysis: Some Caveats and Suggestions". Journal of Marketing Research. 1991 May;28(2):223-5.

19. Agarwal MK, Green PE. Adaptive conjoint analysis versus selfexplicated models: Some empirical results. International Journal of Research in Marketing. 1991 Jun 1;8(2):141-6.

20. Huber J, Wittink DR, Fiedler JA, Miller R. The effectiveness of alternative preference elicitation procedures in predicting choice. Journal of Marketing Research. 1993 Feb;30(1):105-14.

21. Tversky A. Intransitivity of preferences. Psychological review. 1969 Jan;76(1):31.

22. Dolan P, Robinson A. The measurement of preferences over the distribution of benefits: the importance of the reference point. European Economic Review. 2001 Oct 1;45(9):1697-709.

23. Munro A, Sugden R. On the theory of reference-dependent preferences. Journal of Economic Behavior & Organization. 2003 Apr 1;50(4):407-28.

24. Hensher DA, Beck MJ, Rose JM. Accounting for preference and scale heterogeneity in establishing whether it matters who is interviewed to reveal household automobile purchase preferences. Environmental and Resource Economics. 2011 May; 49:1-22.

25. Hensher DA. Attribute processing, heuristics and preference construction in choice analysis. In Choice Modelling: The State-of-the-art and The State-of-practice: Proceedings from the Inaugural International Choice Modelling Conference 2010 Jan 15 (pp. 35-69). Emerald Group Publishing Limited.

26. Greene WH, Hensher DA. Ordered choices and heterogeneity in attribute processing. Journal of Transport Economics and Policy (JTEP). 2010 Sep 1;44(3):331-64.

27. Czajkowski M, Giergiczny M, Greene WH. Learning and fatigue effects revisited: Investigating the effects of accounting for unobservable preference

Preprint JMIR Publications

and scale heterogeneity. Land Economics. 2014 May 1;90(2):324-51.

28. Orquin JL, Loose SM. Attention and choice: A review on eye movements in decision making. Acta psychologica. 2013 Sep 1;144(1):190-206.

29. Banta, D. What is health technology assessment? Int J Technol Assess Health Care. 2009;25:(Suppl 1);7–9.

30. Gold MR, editor. Cost-effectiveness in health and medicine. Oxford university press; 1996 Jul 18.

31. Banta D, Kristensen FB, Jonsson E. A history of health technology assessment at the European level. International journal of technology assessment in health care. 2009 Jul;25(S1):68-73.

32. Fuchs VR. Who shall live?: health, economics and social choice: World Scientific; Singapore 2011.

33. Hailey D. The history of health technology assessment in Australia. International journal of technology assessment in health care. 2009 Jul;25(S1):61-7.

34. Weinstein, M.C., G. Torrance, and A. McGuire, QALYs: The Basics. Value in Health, 2009. 12: p. S5-S9.

35. Sax, S. (Chairman). Report of the committee on applications and costs of modern technology in medical practice. Canberra: Australian Government Publishing Service; 1978

36. Woods B, Revill P, Sculpher M, Claxton K. Country-level cost-effectiveness thresholds: initial estimates and the need for further research. Value in Health. 2016 Dec 1;19(8):929-35.

37. Measuring Functioning and Well-Being The Medical Outcomes Study Approach Stewart A and Ware J editors. 1992. Duke University Press

38. Herdman M, Gudex C, Lloyd A, Janssen MF, Kind P, Parkin D, Bonsel G, Badia X. Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). Quality of life research. 2011 Dec;20:1727-36.

39. Devlin NJ, Brooks R. EQ-5D and the EuroQol group: past, present and future. Applied health economics and health policy. 2017 Apr;15:127-37.

40. Wang S, Gum D, Merlin T. Comparing the ICERs in medicine reimbursement submissions to NICE and PBAC—does the presence of an explicit threshold affect the ICER proposed? Value Health. 2018;21:938–943.

Preprint JMIR Publications

41. Ortman, E, Westrich, K, Buelt, L. Driving Progress in U.S. Value Assessment. The PhRMA Foundation, January 2023, available at: https://www.phrmafoundation.org/wp-content/uploads/2023/08/Driving-Progress-in-U.S.-Value-Assessment_PhRMA-Foundation.pdf

42. Xcenda. Managed Care Trends Report. July 2022. Data on file.

43. Choi M, Hydery T, Tan R, Tennant L. Trends in the uptake and impact of the Institute for Clinical and Economic Review value assessment framework in payer coverage decisions from 2016 to 2020. AMCP Virtual Meeting. April 12, 2021. Available at: https://www.xcenda.com/-/media/assets/xcenda/english/content-assets/conference-andposter-presentations/2021/trends-uptake-impact-icer-value-assessment-framework-payercoverage-decisions-2016-2020.pdf

44. pValue. Multi-criteria decision analysis in health care value assessment. Available at: https://www.phrmafoundation.org/wp-content/uploads/2021/04/MCDA-Primer_FINAL-1.pdf

45. Phelps CE, Lakdawalla DN. Generalized Risk Adjusted Cost Effectiveness (GRACE): Ensuring Patient-Centered Outcomes in Healthcare Decision Making. ISPOR’s Value & Outcomes Spotlight. 2021 Sept;7(S2).

46. Neumann PJ, Garrison LP, Willke RJ. The History and Future of the “ISPOR Value Flower”: Addressing Limitations of Conventional Cost-Effectiveness Analysis. Value Health. 2022 Apr;25(4):558-565.

47. Institute of Medicine: Crossing the quality chasm: a new health system for the 21st century. Washington (DC): National Academies Press (US); 2001.

48. Groene O. Patient centredness and quality improvement efforts in hospitals: rationale, measurement, implementation. Int J Qual Health Care. 2011;23(5):531–7.

49. Ocloo J, Matthews R. From tokenism to empowerment: progressing patient and public involvement in healthcare improvement. BMJ Qual Saf. 2016;25(8):626–32.

50. Edgman-Levitan S, Schoenbaum SC. Patient-centered care: achieving higher quality by designing care through the patient's eyes. Isr J Health Policy Res. 2021 Mar 5;10(1):21.

51. Neumann PJ, Levine BS. Do HEDIS measures reflect cost-effective

Preprint JMIR Publications

practices?. American journal of preventive medicine. 2002 Nov 1;23(4):276-89.

52. Lancsar E, Swait J. Reconceptualising the external validity of discrete choice experiments. Pharmacoeconomics. 2014 Oct;32:951-65.

53. Glasgow RE, Bull SS, Gillette C, Klesges LM, Dzewaltowski DA. Behavior change intervention research in healthcare settings: a review of recent reports with emphasis on external validity. American journal of preventive medicine. 2002 Jul 1;23(1):62-9.

54. Quaife M, Terris-Prestholt F, Di Tanna GL, Vickerman P. How well do discrete choice experiments predict health choices? A systematic review and meta-analysis of external validity. The European journal of health economics. 2018 Nov;19:1053-66.

55. Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A, Kinnersley P, Cording E, Tomson D, Dodd C, Rollnick S, Edwards A. Shared decision making: a model for clinical practice. Journal of general internal medicine. 2012 Oct;27:1361-7.

56. A. Coulter, A. Edwards, G. Elwyn, R. Thomson. Implementing shared decision making in the UK. Z Evid Fortbild Qual Gesundhwes, 105 (2011), pp. 300-304

57. Atherly A, van den Broek-Altenburg E, Leffler S, Deschamps C. Despite early success, vermont’s all-payer waiver faces persistent implementation challenges: lessons from the first four years. Health Affairs Forefront. 2021.

58. Whittington JW, Nolan K, Lewis N, Torres T. Pursuing the triple aim: the first 7 years. The Milbank Quarterly. 2015 Jun;93(2):263-300.

59. ICER. ICER Guide to Understanding Health Technology Assessment. 2018; Available from: http://icer-review.org/wp-content/uploads/2018/08/ICER-Guide-to-Understanding-Health-Technology-Assessment-6.19.18.pdf.

60. Muiruri C, van den Broek-Altenburg EM, Bosworth HB, Cené CW, Gonzalez JM. A Quantitative Framework for Medication Non-Adherence: Integrating Patient Treatment Expectations and Preferences. Patient preference and adherence. 2023 Dec 31:3135-45.

Preprint JMIR Publications