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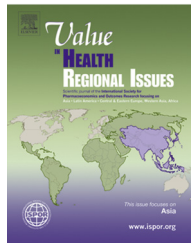

Value of Information in Asia: Concepts, Current Use, and Future Directions

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ABSTRACT

Health technology assessment is a form of health policy research that provides policymakers with information relevant to decisions about policy alternatives. Findings from cost-effectiveness analysis (CEA) are one of the important aspects of health technology assessment. Nevertheless, the more advanced method of value of information (VOI), which is recommended by the International Society for Pharmacoeconomics and Outcomes Research and Society for Medical Decision Making Modeling Good Research Practices Task Force, has rarely been applied in CEA studies in Asia. The lack of VOI in Asian CEA studies may be due to limited understanding of VOI methods and what VOI can and cannot help policy decision makers accomplish. This concept article offers audiences a practical primer in understanding the calculation, presentation, and policy implications of VOI. In addition, it provides a rapid survey of health technology assessment guidelines and literature related to VOI in Asia and discusses the future directions of VOI use in Asia and its potential barriers. This article will enable health economists, outcomes researchers, and policymakers in Asia to better understand the importance of VOI analysis and its implications, leading to the appropriate use of VOI in Asia.

Keywords: Asia, cost-effectiveness analysis, value of information.

Introduction

Health technology assessment (HTA) is a form of policy research that examines short- and long-term consequences of the application of health care technology [1]. The primary goal of HTA is to provide policymakers with information relevant to decisions about policy alternatives. Throughout the industrial world in North America and Europe, HTA has been conducted at the national or multisystem level for several decades. It was, however, formally introduced in Asia during the late 1990s [2]. The early initiative of HTA in Asia was the formation of a special interest group on developing countries at the annual meeting of the International Society of Technology Assessment in Health Care in 1996. The special interest group, in turn, developed the Asian HTA network, which aims to pool available resources and maximize the resources of as many countries as possible. At present, several countries in Asia, such as Malaysia, Singapore, China, South Korea, Taiwan, and Thailand, have formal HTA programs or organizations [2].

Findings from cost-effectiveness analysis (CEA) are one of the important aspects of HTA that inform policy decision making. Several CEA studies [3–9] have been conducted in Asia to inform policy decision making. Most of the CEA studies include standardized methods recommended by the International Society for Pharmacoeconomics and Outcomes Research and Medical Decision Making Modeling Good Practices Task Force [10], such as a base-case analysis and one-way and probabilistic sensitivity analyses. Although most studies were conducted using standardized methods, a challenge for implementing HTA in Asia is to help decision makers to set up an evidence-based appraisal system. It is an urgent need for improving the quality of HTA use in Asia.

In addition to the standardized methods such as base-case analysis and sensitivity analyses, the more advanced method of

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value of information (VOI) is recommended by the International Society for Pharmacoeconomics and Outcomes Research and Medical Decision Making Modeling Good Practices Task Force to prioritize further research. Nevertheless, VOI has rarely been applied in CEA studies in Asia. Briefly, VOI is a systematic decision-analytic approach aiming to inform optimal research design and prioritization. It is also used to inform decision makers in terms of assessing whether we should require additional information to inform decision making [11,12]. A systematic review [12] reveals that several studies reported VOI within CEAs for North American and European HTA. VOI is also recommended by the Patient-Centered Outcomes Research Institute to use as a decision-supportive tool for research topic prioritization [13]. VOI analysis can provide priority of research questions that have the greatest potential to improve population health [13]. There are, however, several methodological challenges in VOI application such as the high computational demands, complexities with nonlinear models, how to include structural uncertainty, and how to weave VOI into informing policy decision making. Even though VOI has been introduced and used in North America and Europe for many years, only a few published Asian CEA studies [14–16] disseminated VOI in an effort to inform policy decision making. The lack of VOI in Asian CEA studies may be due to limited understanding or uptake of CEA methods, which is a prerequisite of VOI. There are, however, several guidelines that provide important information on good research practices for conducting CEA [10,17–22]. Another possible reason of the lack of VOI in Asian CEA studies is understanding of VOI methods and what VOI can and cannot help policy decision makers accomplish. Given the efforts to solidify and standardize Asian HTA, we believe that now is a good opportunity for decision makers to gain a better understanding of VOI and to advocate for its application alongside conducting CEAs. Therefore, this article introduces the theory and concepts of VOI and provides a survey of HTA guidelines and literature related to VOI in Asia. Moreover, we propose future directions of VOI in Asia. This article will help in making VOI more accessible for readers and decision makers with limited experience or education of this topic. It illustrates a practical way to gain understanding of VOI and, in particular, expected value of perfect information (EVPI) through step-by-step calculations.

Theory and General Concepts of VOI

Health care systems face two policy questions on the adoption of a drug, technology, or intervention: 1) Should an intervention be adopted on the basis of existing evidence in the literature? 2) Is further evidence required to support this decision in the future? (Fig. 1) [23].

An analytic framework must meet the requirements to answer these two questions. The traditional rules of inference (e.g., P value < 0.05, confidence intervals, and credible intervals) fail to address both questions 1 and 2. Simply by rejecting a new technology on the basis of a P value or confidence interval, we are making a decision to treat with standard of care. The decision to treat a population of patients—and the selected treatment(s) among a group of mutually exclusive alternatives—cannot be deferred [24].

Given the objective of a health care system is to maximize health gain subject to a budget constraint, Claxton [24] has argued that a Bayesian decision-theoretic approach addresses both questions 1 and 2. The decision to adopt a technology after its regulatory approval should be based only on the posterior mean net benefit irrespective of whether differences lie outside a Bayesian credible interval (left side of Fig. 1, question 1). The distribution of mean net benefits is relevant only to decide

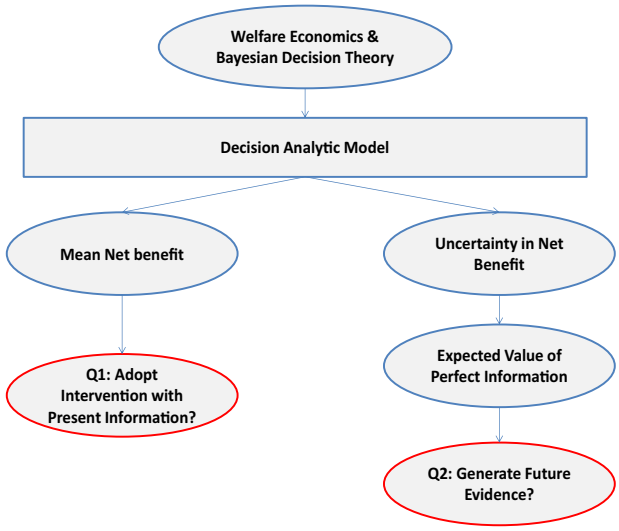

Fig. 1 – Evidence flow chart. Rooted in Bayesian decision theory, VOI can provide an analytic framework that is consistent with the policy-relevant questions faced by health care decision makers. VOI, value of information.

whether more information must be collected (right side of Fig. 1, question 2). As Claxton argued, this approach mirrors the sequential nature of decision making: making an initial decision, deciding to gather evidence, revising decisions after collection of new evidence, and again deciding whether more information is needed.

Application of the Bayesian decision-theoretic approach requires three tasks: 1) development of a decision-analytic model to represent the decision problem and to estimate mean net benefit, 2) a multivariate probabilistic analysis of this decision-analytic model to characterize the decision uncertainty, and 3) estimation of the value of additional information [23].

Once a decision-analytic model is developed, question 1 can be addressed by selecting the treatment alternative with the maximum net benefit as a function of expected cost, expected outcomes (e.g., quality-adjusted life-years [QALYs]), and a threshold (based on willingness-to-pay [WTP] or opportunity costs) (Fig. 2) where

$$\text{Net monetary benefit} = \text{Health outcome} \times \text{Threshold} - \text{Costs}. \quad (1)$$

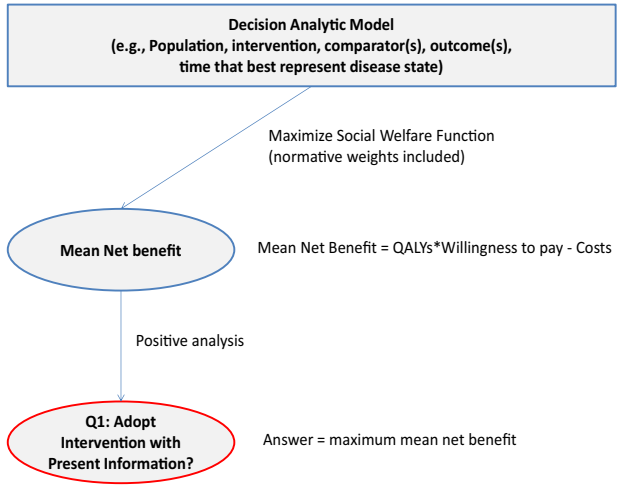

Fig. 2 – Addressing question 1. QALYs, quality-adjusted life-years.