

Health Technology Assessment: Lessons Learned from Around the World—An Overview

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An Overview of this *Value in Health* Special Issue

Few recent issues in drug development and health systems management have generated more commentary, and more controversy, than health technology assessment (HTA). The keen interest in HTA stems from the high stakes involved. For regardless of differences in definition and application, it is clear that HTA brings together public and private interests in a process in which there are potentially winners and losers, and the perception of outcome is highly contingent on each party's point of view. Critics charge that HTA has been used simply to restrict access to new health-care technology, whereas advocates underscore use of HTA to promote efficient resource allocation and to advance population-based health.

Any contemporary body of work on HTA needs to reconcile, by definition, the relationship between HTA [a form of policy research that examines short- and long-term consequences of the application of a health-care technology] and evidence-based medicine (EBM) [clinical evidence analysis for individual decision-making practice guideline, and policy decision-making]. Underlying these concepts is the demand for information on the comparative effectiveness (CE) of health-care interventions when used in actual practice. With this *Value in Health* Special Issue, we seek to inform this ongoing debate on the nature and role of HTA by bringing together leading academicians and practitioners from around the world to offer their perspectives on HTA in their country and to identify lessons learned. In Article 2, "Health Technology Assessment and Evidence Based Medicine: What Are We Talking About?" the relationship between HTA and EBM are presented as well as an overview of HTA as a process. In Articles 3 to 7 ("Nasty or Nice? A Perspective on the Use of Health Technology Assessment in the United Kingdom"; "Health Technology Assessment in Canada: 20 Years Strong?"; "Health Technology Assessment: A Perspective from Germany"; "Health Technology Assessment: Reflections from the Antipodes"; and "Health Technology Assessment in Health-Care Decisions in the United States"), we asked contributors from the United Kingdom, Canada, Germany, Australia, and the United States to describe the health-care organizations involved in HTA, their processes, and the use of HTA in health-care decisions of their respective countries, and to assess their

HTA processes across a range of important attributes: transparency of information and process, independence of, and participation in the assessment and appraisal, use of QALY thresholds, methods to deal with uncertainty, and the role of "real-world" data. We further asked contributors to elicit how HTA function in practice care across a range of equity, efficiency and access dimensions, effects on patient and provider choice and access, effects on health-care budgets and health outcomes, and the role of politics in the process. Some contributors addressed all of these attributes and practical considerations, whereas others only addressed attributes and practical considerations deemed relevant in their country. Article 8—"Lessons for Health Technology Assessment: It Is Not Only about the Evidence"—emphasizes the similarity of country-specific HTA systems and processes and presents future direction.

Although the country-specific HTA health organizations and processes presented in this Special Issue may vary, we see emerging from these articles a set of common issues about the role of HTA in society, its effects on public health and access to care, its effects on innovation, and on the integrity and viability of publicly financed health care in general. We see HTA at the focal point of an ongoing struggle across a range of countries attempting to come to terms with expanding expenditures for health care, the availability of remarkable new innovations in health-care technology, and constrained budgets. Although this Special Issue will not resolve these concerns, it is hoped that by articulating, comparing, and contrasting HTA systems and processes, it enriches the discourse and helps build the common ground needed to seek meaningful solutions; and that the lessons learned can inform the development of HTA in societies confronting the challenges of supporting economic growth and providing basic health care.

The last article in this Special Issue, "Editorial: Pursing Efficiency: A Dead End for HTA?" is provided by a guest editor. Guest editors are selected by the *Value in Health* editor-in-chief to critique this Special Issue to ensure that a broad range of views are expressed.

We hope that you will find this *Value in Health* Special Issue on HTA both informative and engaging as we grapple with the HTA challenges ahead.

Health Technology Assessment, Evidence-Based Medicine, and Comparative Effectiveness

Notable progress has been made recently in understanding the similarities and differences between and within HTA and EBM processes. Health technology assessment is a form of policy research that examines short- and long-term consequences of the

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application of a health-care technology. Properties assessed include evidence of safety, efficacy, patient-reported outcomes, real-world effectiveness, cost and cost-effectiveness as well as social, legal, ethical, and political impacts [1]. As we shall see, HTA is not a monolithic construct. A primary distinguishing element among systems is the focus on the production of evidence-based reports (e.g., by the Swedish Council on Technology Assessment in Health Care *Sweden's Statens beredning för medicinsk utvärdering* [SBU]) and production of guidance decisions linked to the use or reimbursement of health technologies (e.g., National Institute for Clinical Excellence (NICE) in the UK and Pharmaceutical Benefits Advisory Committee (PBAC) in Australia). Clearly economic concerns play a significant role at one end of the spectrum of HTA activities, but less so at the other.

EBM is the systematic collection and analysis of clinical evidence to support medical decision-making [2]. David Eddy, a contributor to this Special Issue, has helped us understand the nuances within this EBM framework by distinguishing evidence-based individual decision-making (EBID) from evidence-based clinical guidelines (EBG), the latter intended to apply to groups of patients defined on the basis of clinical criteria, rather than to individual patients as in EBID. EBG provides the systematic review of research that individual health-care providers cannot be expected to undertake, whereas EBID improves providers' ability to apply guidelines to individual cases [3].

Comparative or relative effectiveness (CE), in turn, compares interventions commonly used in actual practice in terms of their medical outcomes, most desirably in real-world clinical settings [4]. CE, HTA, and EBM are related by an integral component of all three—clinical evidence. Despite this coalescence in definitional terms, controversy remains, even among practitioners, particularly around the role of economic evaluation in HTA, EBM, and CE, and we have endeavoured to provide some clarity in this Special Issue in this critical area.

A Concise History of HTA

Although HTA processes may appear to be more advanced in application outside of the United States, it is interesting to note that technology assessment had a beginning in the US public sector. It was during a meeting of the Congressional Committee on Science and Astronautics in 1965 that Chairman Daddario observed the need for policymakers to have information to facilitate the evaluation of the intended and unintended social, economic, and legal impact of modern technology [5,6]. Borne out of this was the Office of Technology Assessment (OTA), an agency that provided to Congress impartial assessments of technologies in medicine, telecommunications, agriculture, materials, transportation, and defense that became the basis of many public policies in the latter part of the 20th century [7]. The OTA model was eventually adapted by Austria, Denmark, the European Community, France, Germany, Great Britain, The Netherlands, and Sweden [8], perhaps a harbinger of the interconnections witnessed among HTAs today. Tellingly, OTA was disbanded in 1995 by withdrawal of congressional funding, perhaps because it failed to navigate the political shoals and was tainted by the perception that it had ventured too far into policymaking [9], the prerogative of the Congress, and the Executive branch of the US government.

Another relatively early model of HTA is SBU, which was established in 1987 in Sweden's Government Office, loosely modelled after the US OTA [10]. In 1992, SBU became an independent, public body with the same remit from the government—to provide unbiased scientific technology assessments of health-care interventions for health-care decision-

makers as well as patients. Sweden's SBU both provides reports to support health-care decisions aimed at efficient allocation of Sweden's health-care resources, and is also active in contributing to the global development of HTA. For example, the SBU was involved in the development of the International Network of Agencies for Health Technology Assessment (INAHTA) and a scientific journal, *International Journal of Technology Assessment in Health Care* [11].

In Australia, the PBAC, a government committee of medical experts who reviews industry submissions and recommends drugs to be subsidized by the Australian Pharmaceutical Benefits Scheme (PBS), could also be viewed as having one of the earlier versions of HTA [12]. Although the PBAC/PBS had been in existence for more than 60 years, it was in 1992 that Australia unveiled its first, formal guidelines for pharmaceutical reimbursement [13].

With the soaring cost of health care in the late 1980's, we saw a resurgence of interest in HTA across the globe. In Canada, it started in the Quebec Province in 1988 with the *Conseil d'évaluation des technologies de la santé* (CETS) and in 2000 was renamed to *Agence d'évaluation des technologies et des modes d'intervention en santé* (AETMIS) with the mandate to evaluate the safety and efficiency of various health-care interventions [14]. At the national level, Canadian Coordinating Office for Health Technology Assessment (CCOHTA) was formed in 1989 to conduct effectiveness reviews for medical devices and shortly thereafter added pharmaceuticals [15]. In 1994, CCOHTA published Canada's first set of national guidelines for the economic evaluation of pharmaceuticals that grew out of a 1993 Canadian Collaborative Workshop on Pharmacoeconomics attended by international experts and representatives of Canada's provincial, territorial, and federal health-care systems [15]. Over the years the scope of this body has been transformed. To reflect the larger mandate of promoting effective utilization of technology at the federal, provincial, and territorial level, CCOHTA was rebranded in 2006 as the Canadian Agency for Drugs and Technologies in Health (CADTH) [15]. As part of the health care reform in 2003, a Common Drug Review (CDR) process was implemented by CCOHTA to increase the consistency and quality of the drug review process across the provinces. The national Canadian Expert Drug Advisory Committee (CEDAC) was established as part of the CDR to provide independent reviews of the manufacturer submissions and to make recommendations to provincial health-care systems for formulary listing. Canada's national buying power coupled with the use of HTA has enabled it to negotiate more aggressive pricing than its neighbor, the United States.

In 1999, when the UK introduced the National Institute for Clinical Excellence (NICE), which subsequently became the National Institute for Health and Clinical Excellence, to provide guidance on new technologies and treatment of diseases, it significantly contributed to the globalization of HTA. NICE's clear remit to establish a transparent review process to determine how well the treatment work clinically in relation to how much it will cost the National Health Service (NHS)—does it represent value for money—continue to garner much interest across the globe. The appraisals are conducted by an independent Technology Appraisal Committee with membership from key stakeholders: NHS, patient advocacy groups, academia, and the medical technology industries [16]. Although NICE recommendations are not statutory mandates, NHS is obligated to implement the recommendations thus conferring significant weight to NICE reviews. The impact of NICE's recommendations are also far reaching because the reviews are publicly available. A positive or negative decision by NICE can have market implications beyond the UK. For example, "hit" statistics from the NICE website indicate

wide usage by North American health-care decision-makers (Andrew Dillon, personal communication, Molndal, Sweden, November 2005).

Despite the disappearance of the OTA, the United States has also experimented with HTA since the 1990s. With the decentralized US public and private health-care systems, a handful of EBM or HTA-like bodies support formulary decision-making. Health-care plans can commission or purchase HTAs conducted by third party entities such as the Blue Cross Blue Shield Association Technology Evaluation Center (TEC) and the Emergency Care Research Institute (ECRI) [17,18]. The State of Oregon's Drug Effectiveness Review Project (DERP) is probably the most well recognized body in the United States applying principles of EBM to formulary decision-making in the public sector. DERP has gained much national attention for limiting its reviews to a restricted range of evidence typically randomized clinical trials and applying its conclusions in a policy environment more suited to HTA. DERP is currently sponsored by many US State Medicaid programs and Canada's CADTH. In addition to efforts by DERP, BCBS TEC, and ECRI in the United States, a formulary dossier submission format endorsed by the Academy of Managed Care Pharmacy has been adopted in whole or in part by many managed care plans. This has allowed health plans to proactively request information and to also standardize the analysis and presentation of that clinical and economic information across the medical technology companies to facilitate the formulary evaluation process [19].

One of the newest HTA models was introduced by Germany during its 2004 health-care reform, focused on an independent body named the Institute for Quality and Efficiency in Health Care (*Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen* [IQWiG]) [20]. IQWiG, similar to NICE, conducts studies of pharmaceuticals, surgical procedures, clinical practice guidelines, and disease management programs. These evaluations are usually commissioned by Germany's Federal Joint Commission, *Gemeinsamer Bundesausschuss* (G-BA), or the Federal Ministry of Health. Most products are automatically reimbursed once approved with a reference price system that placed limits on the level of reimbursement for off-patent drugs and patented drugs considered to be "me-too" products. Unless a medicine can demonstrate clear innovation or therapeutic superiority over existing therapies, reference pricing is applied by the G-BA. Currently, Germany is undergoing another health-care reform effort with one of its goals being "to further increase efficiency in the prescription of drugs, especially of the very expensive ones" [21].

The Challenge of HTA International Comparisons

Differences in culture, history, politics, health-care financing, and the underlying rationale for undertaking HTA in general, all have had important effects on the makeup and function of HTA in each country. To this point, a recent review conducted by the UK's Office of Health Economics revealed few systematic within-country patterns in HTA configuration and behaviour across any of six dimensions measured [22]. The refrain, *if you have seen one HTA system, you have seen them all*, simply doesn't apply. Rather, in undertaking this comparison we were repeatedly admonished that *if you have seen one HTA system, you have seen one HTA system*. Such heterogeneity among HTA systems could confound an unstructured approach to eliciting common "lessons learned." Many contributors to this Special Issue found this charge quite difficult to complete in any truly comprehensive way because of the paucity of studies on the actual outcomes of

HTA. Thus, if this Special Issue makes any lasting contribution, it is hoped that its call for more research on the societal effects of HTA is heeded.

In any attempt to make international comparisons, one is challenged by the relevance of each case study to any other. Other cross-national comparisons have foundered on the rocks of generalizability. Nevertheless, we hope you see, as we do, the important challenges and opportunities inherent in HTA systems globally. As societies grapple with the role of HTA in health care it is likely that we will see some convergence in methods, or at least further collaboration. It is our hope that any convergence in HTA systems is accomplished on the basis of sound program evaluation, with consideration of societal outcomes, and accommodation and reconciliation as possible of all relevant points of view and involving all relevant stakeholders.

The Impact of HTA Systems on Societal Health Outcomes

For a process of such critical importance to all stakeholders—governments, patients, providers, payers, and medical technology firms alike—one would expect a large and growing body of research on its structure, its process, and especially, its outcomes. However, a review of the existing literature on HTA reveals a startling lack of depth, particularly on the impact HTA has had on health-care budgets, efficiency, and on societal health outcomes. Indeed one commentary noted that whereas the previous 10 years have been well-spent on building the HTA/EBM infrastructure and evidence base, the next 10 should focus on the outcomes [23].

The vast majority of the research on HTA has focused on the configuration of respective systems, and on the process, such as identifying the determinants of a positive HTA review. The focus on structure and process over national and societal outcomes is not surprising given the relative ease of evaluating structure and process, and the challenges of assessing outcomes in ecological studies. Beyond the methodological difficulties, though, one may detect a lower priority level accorded outcomes among governments wholly absorbed with building HTA infrastructure, and simultaneously trying to avoid the political pitfalls related to the perception that HTA is simply the rationing of health care disguised as rigorous policy analysis. In addition to the paucity of research on outcomes, even among the existing studies, the vast majority are focused on NICE, which is not surprising given that NICE is among the most highly transparent and visible HTA organizations. Clearly, research on the broader array of HTA systems is needed. In contrast, there has been a considerable amount of research on the impact of EBM, especially evidenced-based clinical guidelines [24,25], though Homans et al. found that the research into the economic impact of clinical practice guidelines was of poor quality [26].

Given the limitations noted, what can the literature tell us about the impact of HTA? In terms of structure, although there is wide variation among systems, a recent model holds that structural patterns among systems are discernable, with primary differences deriving from the policy implementation level (e.g., policy objectives of the system, legal status, and its relationships with stakeholders) and the individual technology decision level (e.g., assessment processes, how decisions are made, and how they are implemented) [27]. Differences along these axes likely have important implications for scope of the HTA approach, inclusiveness of the process, implementation of recommendations, resistance to political influences and outcomes [28].

The impact of HTA on setting health-care priorities has also been studied [28–31]. Although HTA has influenced priority-

setting in health care in some systems, observers seem to agree that the impact on priority setting has been modest at best [31]. The difficulty HTA has faced in incorporating political and social value perspectives is cited as one key barrier. Similarly, HTA's traditional focus on the health service level versus the public health level is yet another barrier. Although HTA can inform health-care priority setting, in practice HTAs have, broadly speaking, failed to deliver in this area, perhaps because of the limits imposed by their level of policy implementation noted earlier.

The remaining area of inquiry in the existing literature is on aspects of the assessment and appraisal process itself, again with a distinct focus on the NICE experience [32–34]. A quantitative analysis of the determinants of NICE decisions revealed some interesting but hardly surprising patterns. For example, NICE dossiers containing more supportive clinical trials and lower, more favorable cost-effectiveness ratios were more likely to receive a positive review [31]. Similarly, a review of 86 NICE guidances found that nearly two-thirds of NICE's negative appraisals were associated with lack of evidence and high cost-effectiveness ratios [33]. Studies examining cost-effectiveness thresholds have generally supported the £30 000 cost/QALY cutoff for NICE acceptability, with some variation for products in high-need areas [31,33].

As HTA systems are refined and indeed exported to countries developing HTA system infrastructure, more research on the structure, process, and outcome of HTA systems is warranted.

The Lessons of HTA and EBM: Challenges and Opportunities of the Future

Throughout this Special Issue, the various commentaries and case studies of HTA and EBM from around the world confirm that ample opportunity for continued development and improvement of HTA and EBM exist and that no one model will be universally applicable or even acceptable to all societies. Assessments face a number of challenges, not the least of which is the limitation of existing and emerging methodologies and data sources. Improving the assessment process, improving methods and data, and growing the cadre of researchers and officials able to do and interpret HTA, respectively, will enable societies to expand their ability to conduct and use HTA. However, these scientific advances can succeed in expanding the value of HTA only if the societal or political dimension is also addressed uniquely for each society. To be comprehensive and reflecting the full value of health-care technologies, the HTA process—regardless of the country or health-care system—should combine assessments of clinical effectiveness, societal values, budget impact and economic efficiency, as well as ethical judgments pertinent to the relevant population. The scientific methods and the data to accomplish the initial aspects of these assessments, as well as the process overall that uses these methods and data, have to be transparent, credible, and consistently applied.

Investments are needed to increase the availability of appropriate data to support the assessments on an ongoing basis. Further, these data must be accessible to multiple stakeholders to ensure transparency and promote trust among the key stakeholders. As well, the process that brings together the researchers, the methods and the data must be open and transparent, fostering the public trust among stakeholders that is a necessary precondition to acceptance of HTA assessments.

Moving forward it is useful to recall that the field of outcomes research in the United States was promoted in the late 1980s and early 1990s by the Federal Government, which identified a need for disease-specific Patient Outcomes Research Teams (PORTs)

to evaluate the clinical, economic and patient-reported outcomes of diseases and the differential aspects of alternative diagnostic and therapeutic modalities. In fact, the PORTs were a mechanism to accomplish multiple goals that are equally applicable here. First was the need for methods development—e.g., meta-analysis, decision- and cost-effectiveness analysis, real-world data analysis (both retrospectively using claims and other data, as well as prospectively), and patient outcomes and survey research. Second was the need to train more skilled researchers. The lessons of HTA worldwide support these twin needs to continue to improve the scientific methods that comprise HTA. Inasmuch as no single method can accomplish all that is needed, multiple methods need to continue to be brought to bear. This will require societies, and typically both public and private entities, to invest in both the advancement of methods and in the training of more individuals who can and will either conduct HTA, or consider it in their health-care policymaking or health-care delivery decisions. Just as we recall that the OTA was disbanded by the US Congress because it ran afoul of key constituencies, so the predecessor of the Agency for Healthcare Research and Quality—the Agency for Health-care Policy and Research, which administered the PORTs—was almost similarly hobbled politically because its findings were opposed by influential sectors of the medical provider community.

HTA is not merely the application of good scientific evaluation methods—it *must* be that to be viable or successful. However, to be successfully implemented, the HTA process must consider the social or ethical context. That is, HTA must be applied with open and transparent consideration of the common good—as understood by the public and industry alike. As has been shown by NICE, CADTH, and others, HTA assessments must be done in a transparent manner with respect to: 1) the choice of technologies or services assessed; 2) the conduct of the assessments; and 3) the application of the assessment results to decisions related to access and reimbursement.

Moreover, any investment in the scientific progress of HTA must be accompanied by investment in engaging the public directly. The social and ethical discussions must be accorded special attention. Transparency of the process is critical. Focused engagement of and active participation by all stakeholders is even more critical. The involvement of health-care professionals, patient advocacy groups, medical technology firms, and other influential bodies will be challenging and at certain times contentious. However without positive social interaction along with the advancement of science, HTA will not be as effective as proponents claim in improving the effectiveness and efficiency of health care. Recall that although OTA was an important early developer and proponent of HTA, and was scientifically astute, it was eventually abolished in part because it and its Congressional supporters were not sufficiently responsive politically. In summation, to succeed, HTA will require investments of time, personnel and financial resources, and attention to scientific, social and political issues. However, for HTA to succeed optimally, its acceptance by multiple key stakeholders will be necessary. This will require engagement of health-care professionals, patient advocacy groups, and medical technology firms, facilitated by an HTA process that is recognized as open, transparent and consistent.

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