



Competing interests: None declared.

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The evolving paradigm of health technology assessment: reflections for the millennium

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Thirty years ago an American congressman said, "Technical information needed by policy makers is frequently not available, or not in the right form. ... Technology assessment is a form of policy research. ... It identifies policy issues, assesses the impact of alternative courses of action, and presents findings."¹ Those words launched an explosion of activity in the field of technology assessment as decision-makers found assessment results increasingly important in managing the rapid technological change that has become the hallmark of the 20th century.²⁻⁴

In the specific area of health technology assessment, this exuberance shows little sign of abating. In Canada, bodies such as the Canadian Coordinating Office for Health Technology Assessment, Quebec's Conseil d'évaluation des technologies de la santé and British Columbia's Office for Health Technology Assessment are examples of this growth. These groups and others contribute to decision-making, not only at the health care system level, but also at the level of patient care by promoting the development of clinical practice guidelines and other methods for improving care. Thus, for decision-makers at all levels in rapidly changing health care systems, reflecting on the future of health technology assessment is critical in an environment that is increasingly dominated by cost-effectiveness, evidence-based medicine and changing ideas of accountability.

What is health technology assessment?

Technology assessment has been applied to many different health care technologies by a variety of organizations using many methods. Its expansion reflects a rising concern about the growth of health care systems. In many jurisdictions, including Canada, health care systems are being sub-

stantially restructured as a result of aging populations, rapidly developing new and often expensive medical technologies and increasing costs. In addition, some restructuring efforts are aimed at making delivery systems more responsive to patient needs.

Health technology assessment is not simply more research. Four key features, which are critical to its ongoing impact, distinguish it from research. The first is its policy orientation. Distinct from health-related research, health technology assessment seeks to produce and communicate information reflecting not the whims or interests of an individual scientist but the contribution of scientific inquiry to policy-making.

The second feature is interdisciplinary content and process. The character and strength of health technology assessment comes from integrating the efforts of multiple disciplines.

Third, health technology assessment accomplishes this integration by synthesizing information, examining databases and, at times, generating primary data. Choices among these methods are driven by the relevance of the results to improved decision-making.

Fourth, those engaged in health technology assessment recognize the importance of disseminating and communicating information. Research findings are often reported in publications where they may be read almost solely by like-minded people. In contrast, health technology assessment organizations must actively move assessment results into the decision-making process, often tailoring dissemination means and strategies to different target audiences.

In short, health technology assessment is a bridge between the world of research and the world of decision-making, particularly policy-making.⁵ Effectively bridging



these 2 worlds means changing the structures that surround different health care system components, such as hospital care, ambulatory services, community-based care and drug payment plans. Restructuring these components can promote innovation by facilitating new creative partnerships, freed from administrative and financing mazes that limit the delivery of cost-effective care in the most appropriate settings. Thus, at its most effective, health technology assessment not only connects the world of the scientific and technical with that of policy-making, but it also helps reduce obstacles to improving both decision-making and health.

While linking these 2 often disparate realms, health technology assessment also highlights the crucial importance of maintaining a certain distance between them — policy-making must be informed but not limited by the scientific tendency to reductionism, and scientific inquiry and synthesis of its results must proceed without interference from but informed by the needs of the policy-making process. Effective health technology assessment requires some form of mutual agreement about the role of technical information.

The practice of health technology assessment

Health technology assessment is carried out by a variety of organizations in Canada, both government based and university based. Professional organizations and corporate consulting firms have also contributed to its growth. Rather than arguing the superiority of one type of organization over another, it is more fruitful to judge the extent to which an organization is able to put the 4 defining features of health technology assessment into practice. Thus, scientific integrity, links to multiple stakeholders, and timely, accurate dissemination of assessment results become the important features of the organization rather than its particular structure.

Because health technology assessment is interdisciplinary, it relies on various types of evidence. In addition, its contribution to improved decision-making depends on its ability to develop a variety of interfaces for gathering and interpreting that evidence, including links with investigators, government, health care organizations and other payers, patients, industry and the media. Although it is tempting to limit evidence to the scientific (or even a subset such as randomized trials), effective assessment requires recognizing and gathering 3 conceptually distinct types of evidence: the scientific, the contextual and the historical.

Scientific evidence is the type most familiar to the academic community and perhaps to practitioners — the raw material of health technology assessment, noteworthy for its focus on health states or interventions as objects of inquiry and methods to minimize uncertainty. Further development of the interface between science and health technology assessment could increase continuity between research and assessment and facilitate collaboration between research funding agencies and technology assess-

ment bodies. The torrent of high-quality scientific evidence and meta-evidence in the form of systematic reviews shows no sign of abating, but if it is to contribute to policy-making, the technology assessor must situate it within the context of a decision.

Contextual evidence refers to the many factors that shape the making of policy — who makes decisions, and how and what factors beyond the scientific influence decisions? This is not evidence that is gathered or used in the same way as the scientific. Rather it describes the decision-making “terrain,” filtering scientific evidence and giving it greater or lesser emphasis depending on the decision-making context. For example, implementing incentives for meeting targets related to preventive care guidelines, as proposed in some Canadian provinces, would change the “terrain” of practitioner decision-making, theoretically creating new demands from practitioners for guidelines that would enable them to deliver optimal care to their patients and, thus, be rewarded under the incentive arrangements. In addition to paying for these services, governments have an important role in regulating the introduction and use of technology. Even in health care systems with substantial private-sector financing or delivery of services, both government and nongovernment payers speak increasingly with a single voice about the desire for better information on how to manage health care services most effectively.

Whether in a system of managed-care providers, a publicly funded hospital or a group of office-based practitioners, information technology combined with the climate of evaluation has increased receptiveness to health technology assessment. Each type of organization has a range of methods for influencing decisions, and technology assessors need to understand how they can facilitate or increase the use of health technology assessment information by these bodies. The experience in the United Kingdom, where fundholding general practitioners require relevant information about the merits of the service providers (specialists, hospitals) to which they refer patients, may be relevant to Canadian physicians facing new forms of organization such as regional health authorities and integrated delivery systems.

Practitioners are increasingly exposed to the idea of information management and the importance of ongoing evidence-based, self-directed education, creating a pool of both users of assessments and people capable of contributing to the assessment process.⁶ Within professional organizations, clinical practice guidelines are rapidly emerging in attempts to provide both the highest quality of care to patients and a basis for accountability. The CMA’s work in preparing guidelines for guideline developers is an example of an effort to ensure that guidelines are of high quality and to shape the context of decision-making.⁷

However, historical evidence or patients’ history remains a powerful influence on the uptake and use of practice guidelines or new health care technologies. The practitioner applying a given therapy to an individual patient must recognize that the success of such a therapy, indeed whether it is offered at all, is intimately tied to the illness



narrative of the patient in question.^{8,9} Applying scientific evidence in light of this historical evidence lies at the heart of the dual nature — science and art — of virtually every health care profession. As a practical example, patient preferences regarding pharmacologic or nonpharmacologic treatment of hypertension are likely to have a far more powerful effect on medication compliance than the relative efficacy of the medications the practitioner may consider.

This growing partnership between practitioners and patients is matched by an increasing willingness of industry to participate in assessment. In many jurisdictions, demonstration of a technology's or a therapy's safety and effectiveness must be accompanied by cost-effectiveness data if there is to be any substantial market for these goods. Industry has recognized the importance of such assessments internally, during the product development cycle, for failure to conduct them risks substantial unprofitable investment.

Furthermore, the idea of product development is changing as industry develops systems of comprehensive disease management. Thus, health technology assessment must evaluate a package of care rather than a particular pharmaceutical product or medical device. In addition, both producers of and payers for technologies will be increasingly involved in assessment as they recognize their shared interest in this area earlier rather than later. In addition, the health care sector's potential for broad economic development through industrial innovation in products and methods for service delivery and growth in employment calls for new forms of government-industry collaboration.

Finally, the media communicate both scientific advances and health care reform approaches. The science of health care and the policies surrounding its delivery are increasingly viewed as important news around the world, as scientific results appear simultaneously in top journals and on the front pages of newspapers, and politicians ignore voter concerns about health care at their peril.

Media attention also highlights the increasingly complex choices facing health care decision-makers and their patients, involving uncertainty about future events and, often, the need to establish priorities. Communicating complex information effectively is challenging, as emphasized during Oregon's consultation process to define a list of services insured by the state.¹⁰

Effective assessment must then draw on the 3 types of evidence to produce an interdisciplinary result that will influence decision-making. Rather than threaten scientific integrity, admitting various types of evidence earlier in the assessment should strengthen the credibility of the scientific evidence, as more opportunities for effective communication of that evidence to decision-makers will arise from broader stakeholder participation. Furthermore, the changing nature of practitioner decision-making — toward alliances with patients, in place of paternalism, and through increasingly complex delivery systems for health care services — suggests that historical and contextual evidence will grow in importance even as the volume of scientific evidence explodes.

The limits and frontiers of health technology assessment

Despite a robust and growing demand for health technology assessment, the health care reform and restructuring process holds several constraints. In general, health care reform proceeds through 3 stages. The first is marked by conceptual development and preparation, often unlinked to explicit reform strategies. At this stage, health technology assessment may be relevant in describing the existing system and providing a framework for reconfiguring it. However, the second or acute stage, which is felt far more by providers, practitioners and often patients, is marked by a rapid pace of change that may outstrip health technology assessment's capabilities, particularly when elected governments are driving the changes. This acute stage is followed by a third stage of consolidation of whatever new systems are in place. New systems create information needs, and these needs can be met by health technology assessment.

Thus, technology assessment organizations would do well to monitor this cyclic process, because the biggest gains are to be made before and after implementation, whereas the acute reform stage is less a repudiation of health technology assessment than a period of decision-making beyond the realm of the technical or scientific.

Just as the growth of health technology assessment has stemmed from interest in evaluation and accountability, assessment organizations and processes require evaluation. Specific indicators of the impact of health technology assessment, such as the diffusion pattern of a given technology in hospitals or a changing clinical practice pattern, are logical outcome measures.¹¹⁻¹³ Measuring growth in the "culture of evaluation" among organizations and groups with which technology assessment interfaces is one approach to determining the overall impact of health technology assessment in decision-making. In addition, assessment organizations are ideally suited to a process of continuous quality improvement — an approach not only in keeping with the spirit of evaluation that sustains health technology assessment but also likely to facilitate the responsiveness and adaptability of assessment organizations as health care systems and those who make decisions change.

On the eve of the 21st century, health technology assessment appears to have a bright future. However, this opportunity may be missed if an excessively scientific focus leads to technocratic irrelevance. Indeed, the assessments of the future will increasingly be expected to consider the social and ethical dimensions of technology use. These dimensions are illustrated by the case of cochlear implants in North America and Europe, where assessment required consideration of the impact of the implants in changing the very concept of deafness and its resulting disability.^{14,15} Similarly, despite scientific evidence of benefit from electroconvulsive therapy, substantial resistance rooted in historical misuse of this technology has limited its diffusion and use.¹⁶ Furthermore, the rise of alternative medicine high-



lights the need for more humane health care systems; people seeking care want not only a cure but a personal involvement in the process and systems for delivering care, whether curative or not. As decisions become more complex and difficult, decision-makers will increasingly need to involve stakeholders directly, not only in the evaluation process, but also in the decision-making itself, allowing ownership of these decisions to be more broadly based.

Recent advances in genetics suggest that the uniqueness of individuals can no longer be ignored, even in medical terms. Treating genome information as just another technology to be evaluated would be dangerous, for the genome data lead to profound insights into who we are as humans and resist easy translation into reduced mortality or morbidity — outcomes that we expect of technological advances. As genetics pushes the origins of disease back to conception, particularly in the absence of cost-effective available gene therapy, the importance of providing complete information to patients in bringing them to confront uncertainty inherent to therapeutic choices cannot be understated.

Health technology assessment will have to evolve from an expression of rationalism in the form of establishing normative behaviours (e.g., how practitioners should use a given technology) to a means of providing information that will contribute to elucidating preferences. The next phase in its evolution will require a major shift from simple, linear dissemination to the more complex interactive communication of information with a view to assisting people in making decisions. The success of health technology assessment in achieving this evolution will contribute to rediscovering the profoundly human dimension of health care, and therein lies the ultimate triumph of technology assessment.

We thank Ms. Jennifer Gardner and Ms. Diane Telmosse for their assistance in the preparation of this manuscript.

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Competing interests: None declared.

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