

# Why Examining the Desirability of Health Technology Matters

L'importance d'examiner dans quelle mesure les technologies de la santé sont souhaitables



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## Abstract

Although technology is ubiquitous in healthcare, its impact on people's perceptions and lives is poorly understood. Fresh insights are required to meet current and future technology-related policy challenges. Keeping a population healthy requires considering not only technologies that are used in clinical settings (diagnostic, therapeutic, palliative), but also those used in the community (home care, self-care, technical aids) and those that affect health more broadly (health promotion technologies, occupational health technologies). At the policy making level, understanding the desirability of health technology may prove to be more important than simply appraising its affordability.

## Résumé

Bien que la technologie soit très répandue dans le domaine de la santé, on saisit mal son incidence sur les points de vue et la vie des gens. Une meilleure compréhension s'impose si l'on veut relever les défis actuels et futurs en ce qui a trait aux politiques liés à la technologie. Maintenir une population en santé exige non seulement des technologies qui sont utilisées dans des cadres cliniques (diagnostiques, thérapeutiques, palliatifs), mais également des technologies utilisées dans la communauté (soins à domicile, soins auto-administrés, aides techniques) et celles qui touchent la santé dans son ensemble (technologies visant la promotion de la santé, technologies en milieu de travail). Sur le plan de l'élaboration des politiques, comprendre dans quelle mesure les technologies de la santé sont souhaitables pourrait s'avérer plus important que simplement évaluer leur caractère abordable.

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**T**HIS PAPER ARGUES THAT THE REASONS TECHNOLOGY MATTERS IN healthcare, and its impact on people's perceptions and lives, are poorly understood. Fresh insights are required to meet technology-related policy challenges. So far, applied health research has portrayed health technology as both a tremendous opportunity to improve the lives of patients and a major threat to the financial sustainability of public healthcare systems (Lehoux 2006). As a result, research has focused mainly on the measurement of cost and effectiveness – helping decision-makers ponder technology's affordability given the prevailing budget constraints – and has provided very little insight into the question of its desirability, e.g., the reasons for its being socially valuable or not.

## Beyond “High-Tech” Medicine

For many observers, health technology is bliss – something that must be strategically embraced, not irrationally resisted:

Technology has streamlined the administration of the hospital and the doctor's office, enabling more efficient and cost-effective processing and storage of patient medical and billing records. Telemedicine has advanced to the point where remote specialist consultation can take place through videoconferencing and the immediate transmission of X-ray and other images. Technology has brought noninvasive diagnostic and surgical tools to the physician's practice. And breakthroughs in medicine through computer-assisted research have

reduced the half-life of medical knowledge to five or fewer years ... . (Ellis 2000: xiii–xiv)

From such an overly optimistic perspective, technology evokes modernity; whatever is newest is supposed to be better. Furthermore, health innovation is usually equated with “high-tech” medicine, while social innovations (i.e., employment or housing policies) and public health interventions are left aside. This understanding is rooted in recent history. In the 1980s, “health technology” referred to all instruments, devices, drugs and procedures that were used in the delivery and organization of healthcare services (US Congress 1985: 3). This definition included technologies that were pivotal in supporting hospital work (e.g., information systems, surgical rooms, sterilization systems). Since then, technological developments have significantly reconfigured the centrality of the hospital in modern medicine by enabling new healthcare delivery models wherein the responsibility of patients and their relatives significantly increases (e.g., home and ambulatory care). This profound technology-driven change has not been fully acknowledged.

Table 1 provides examples of various technologies that are currently used in and around healthcare systems. Some of these technologies are not tools used by clinicians; rather, they are used in the workplace or community and affect health by preventing disease, injury or exposure to deleterious products or practices. In addition, several “mundane” technologies (e.g., blood glucose monitors, syringes) contribute profoundly to the effectiveness of healthcare (Lehoux et al. 2004). The emergence of Severe Acute Respiratory Syndrome (SARS) in Toronto, Canada, vividly illustrates how effective detection and control of contagious cases relies on the appropriate use of simple tools such as ear thermometers, hand washing and facial masks – and fails when such tools are inconsistently applied in practice (Poland et al. 2005).

Hence, a technology is rarely just a stand-alone “high-tech” device that generates measurable costs and benefits; it is one component of larger healthcare and social systems. Without an adequate conceptualization of the social embeddedness of health innovation, most research initiatives trying to understand and assess technology will remain incomplete. Policy questions cannot be answered through cost-effectiveness analyses alone. And, more importantly, the need to consider alternative policy options and pressing ethical questions calls for a different kind of research. Beyond clinical efficacy, what is the value of specific innovations? What impact do they have on clinical practice, population health and social development? Why do clinicians trust and use certain innovations instead of others? Why do patients expect, demand or reject specific interventions? And how does technology really affect the health and well-being of the population?

TABLE 1. Categories of health technology

Category	Examples
<b>Screening tests</b>	Cytological tests, blood tests, pre-natal testing, genetic testing
<b>Diagnostic tests and imaging devices</b>	X-rays, ultrasound, magnetic resonance imaging, computerized tomography
<b>Monitoring systems</b>	Blood glucose monitors, electrocardiograms, foetal monitoring
<b>Implants</b>	Cochlear implants, left ventricular assist devices, pacemakers
<b>Surgery and therapeutic devices</b>	Hip replacement, tonsillectomy, laparoscopic cholecystectomy, radiation therapy
<b>Palliative technologies</b>	Dialysis, ventilators, parenteral nutrition
<b>Drugs</b>	Caplets, patches, injections, inhalers
<b>Health promotion technologies</b>	Vaccines, helmets, condoms, smoking cessation strategies, playgrounds, sports facilities
<b>Occupational health technologies</b>	Protective equipment and clothing, work safety measures, ergonomic furniture and tools, preventive measures for pregnant women
<b>Technical aids</b>	Wheelchairs, hearing aids, prostheses
<b>Information technologies</b>	Telemedicine, electronic patient records, health cards, expert systems

Source: Lehoux 2006.

## Understanding the Desirability of Health Technology through Social Scientific Insights

Figure 1 summarizes key reasons that integrating social sciences perspectives into research on health technology can help generate useful insights. Because understanding rationales (why?) and processes (how?) requires exploring the viewpoints of those involved in particular practices, qualitative research offers a distinctive advantage. (However, like other applied research fields, social scientific research draws on both quantitative and qualitative methods [Kazanjian 2004].)

Social scientific research has established the notion that technology is not simply a neutral tool (Brown and Webster 2004). Rather, it is a normative intervention in the social world, too often taken for granted. Technology deeply modifies how healthcare providers and patients interact and the paths of action they can and should take. For instance, because the belief that information is valuable in itself is such a powerful cultural norm, when screening tests are made available they easily become part of established practice and therefore difficult to oppose (even when an appropriate treatment does not exist). One example of this is the use of electronic foetal monitoring, which can play a significant role in medical liability suits if something goes wrong during a delivery (Johri and Lehoux 2003). Consequently, it is used extensively despite solid

evidence indicating that it is effective only in high-risk pregnancies. Hence, technology tacitly forces certain kinds of clinical practices and frames women's experiences of birth delivery.

FIGURE 1. Reasons for integrating social science perspectives into health technology research

- Technology structures the delivery, use and outcomes of healthcare.
- Non-medical variables influence the effectiveness of health technology (e.g., emotions, knowledge, values, beliefs, cultural practices, social interactions, organizational structures and processes, financial incentives, regulatory frameworks).
- Providers and patients do not use, perceive or value technology in any consistent way; outcomes therefore vary.
- The use of health technology triggers social changes and raises ethical concerns.
- Technology modifies the settings in which healthcare practices take place and influences the appropriateness and effectiveness of health technology.
- Because technology modifies the expectations of patients and the general public with respect to health and healthcare, its regulation requires a broad understanding of the policy arena.

Source: Lehoux 2006.

Another example comes from Greer et al. (2002), who examined how differences between physician–patient interactions in urban and rural locales could explain higher rates of mastectomy (versus lumpectomy) in breast cancer treatment in some parts of the United States. Greer's study is especially insightful because the researchers did not assume a priori that these women's rationality was deficient or that prioritizing health and bodily appearance over other life activities (e.g., taking care of the grandchildren, the farm) should drive their decisions. Its perspective was strongly rooted in an academic tradition – sociology – that observes and conceptualizes social practices. The study's goal was not to find ways of improving physician or patient "compliance," wrongly assuming that the role of social scientific research is to help clinical practice achieve its mission. Rather, Greer aimed to understand why gaps between clinical practice guidelines and actual practices are observed and how they are sustained. Only by maintaining an independent and conceptually committed sociological perspective can this form of research tell us about the extent to which providers' and patients' perceptions and values affect the real-world use and outcomes of health technology.

A common conceptual shortcoming in applied health research is to consider that ethical and social issues arise *after* a given innovation has been put to use, as if such issues could be divorced from the design process (Faulkner et al. 2003). Values are conceptualized as if they were located in society (or end users), not in the technologies themselves. However, technologies encapsulate values, and their design shapes user behaviour, thereby introducing new norms into practices (Oudshoorn and Pinch 2003). Compromises between the views of designers, CEOs, shareholders and clinicians are negotiated and generally rely on claims made on behalf of patients and soci-

ety, often without direct input from patient or community groups. Such negotiation means that innovations, when introduced into the clinical market, may not be aligned at all with what patients and communities value or are willing to endorse (as the case of cochlear implantation has vividly demonstrated).

There are many other, similar examples that underscore the relevance of turning to the social sciences to better understand technology's role in health and society (Brown and Webster 2004). Still, one fundamental reason to turn to the social sciences is for conceptually reframing what technology is and does, and what its desirability means for various groups. A technology can be considered desirable by certain groups (engineers) and not others (patients). And it can be considered *justifiably* desirable or not. Unreflective "desires" should not be confused with desirability. Desirability is an inter-subjective notion that requires a technology's purpose and impact to be examined, debated and established by applying several disciplinary and lay perspectives (Lehoux 2006).

Researchers thus need to make explicit, reflect on and confront the normative assumptions that underlie the "face value" desirability of various categories of technology (see Table 2). These assumptions remain tacit most of the time because, among others things, technology is considered (by most) a product of clinical and social progress.

Nevertheless, these assumptions drive the development, dissemination and use of health technology, which then plays a pivotal role in the transformation of our existence (Ihde 1990). The desirability ascribed to clinical interventions often evolves over time, rendering the social and technological unfolding almost invisible. For instance, pre-natal screening could not have emerged as a socially accepted clinical practice if the clinical, social and legal movements towards the recognition of abortion had not been achieved beforehand. These social and technical changes, plus the seemingly unrelated in vitro fertilization techniques, were all essential for today's stem cell research to grow.

It is thus necessary to examine critically the views and values of members of the public and patients. Jepson and colleagues (2007: 9), who examined experiences of screening programs for colorectal, breast and cervical cancers, argue: "Current strategy tends to concentrate on providing information on the benefits and limitations of screening. However, the findings from this qualitative research suggest that people want contextual information to make sense of the screening tests." This includes information on the severity of the disease and the broader context of self-management, such as risk factors and symptoms. For these authors, the term "informed consent" is problematic because the information provided seems to have little effect on choice, but greater effects on anxiety and satisfaction.

Hence, technology from a social scientific perspective actively mediates life and death, health and risk, knowledge and uncertainty, autonomy and mobility. Because we

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are human, it generates wonder and sorrow, creates hope and anxiety (Callahan 1990) and generates power and authority (Blume 1992). Trying to ignore such influential socio-political dimensions will always prove deceptive.

TABLE 2. Assumptions underlying the desirability of health technologies

Health technologies	Where their desirability lies	
	What they do	What these actions imply
<b>Screening tests</b>	Provide information that requires a confirming procedure or test (diagnostic)	Information is valuable in itself and/or it leads to a diagnosis in a timely manner
<b>Diagnostic tests and imaging devices</b>	Provide information about the presence/absence of disease	Information is valuable in itself and/or it leads to an appropriate and timely action vis-à-vis disease
<b>Monitoring systems</b>	Provide information about various vital bodily functions, psychosocial well-being and compliance with treatments	Interpretation of the data is reliable and leads to its being acted upon in an appropriate manner; continuous surveillance does not alter identity and behaviour
<b>Implants</b>	Restore (temporarily) bodily functions (e.g., cardiac function, hearing)	Long-term risks, decreased quality of life and identity alteration are acceptable to the patient
<b>Surgery and therapeutic devices</b>	Stop or delay the pathological process and reduce symptoms	Risks, invasiveness and consequences are acceptable to the patient
<b>Palliative technologies</b>	Substitute (temporarily) natural bodily functions (e.g., breathing, nutrition, cardiac function)	Sustaining life when quality is compromised is valuable
<b>Drugs</b>	Stop or delay the pathological process; reduce symptoms	Side effects and decreased quality of life are acceptable to the patient
<b>Health promotion technologies</b>	Promote/discourage lifestyles and behaviour; protect from or reduce harm associated with risky practices (e.g., drugs, sexuality, sports)	Alteration of practices, identity and peer recognition are acceptable/meaningful to the individual/group
<b>Occupational health technologies</b>	Protect workers' health; promote/discourage work-related behaviour affecting health	Overall quality of work conditions and alteration of practices, identity and peer recognition are acceptable/meaningful to the individual/group
<b>Technical aids</b>	Facilitate autonomy, mobility and social integration	Aids are user-friendly and help overcome the social barriers associated with the disability
<b>Information technologies</b>	Record, archive, transmit and provide access to administrative and clinical information	Access to and use of information respect confidentiality and bring efficiency and quality to healthcare

Source: Lehoux 2006.

## Why the Focus on Affordability Is Misleading

Because technology is often seen as the main cost driver (Cohen and Hanft 2004), applied health research, and more specifically Health Technology Assessment (HTA), has sought to better inform policy making by examining costs and benefits. The main assumption is that the budget for healthcare is a closed envelope (Banta and Luce 1993). Rational choices therefore must be made in order to sort out “good” innovations from “bad” ones, and in order to select only those that yield high value for money in terms of clinical effectiveness.

While this view is valid, it nonetheless frames the “problem of health technology” in a way that is misleading. The problem is reduced to questions of affordability and payment: Can healthcare systems absorb the costs of innovations? And who will pay for them?

The presumption that decision-makers – armed with HTA findings – can sort out affordability vis-à-vis budget constraints in a straightforward manner is contentious. Cost-effectiveness experts themselves do not believe that such information can provide a value-neutral ground for decision-making. A recent study by Gold and colleagues (2007: 70) shows that lay participants who were asked to act as “social decision-makers” and rank 14 condition–treatment pairs for coverage can be “clearly influenced by cost-effectiveness information.” However, these authors report that the effect was not uniform and that “many behaviorally mediated illnesses were given less priority than would be expected on the basis of cost-effectiveness alone.” This result suggests that perceptions and values may be more powerful in shaping one’s judgments than data about costs and effectiveness. If this is the case, then it would be advisable that the values underlying technology-related decisions be made explicit and publicly accountable.

In fact, the affordability argument will always remain a slippery slope for Canadian decision-makers, especially in a context where pressures are growing for a greater role of the private sector in healthcare. Denying access to technology on the basis of a collective economic rationality will be resisted time and again because the few individuals who have the ability to pay will be powerful and convincing (Giacomini et al. 2003; Johri and Lehoux 2003). Thus, the ultimate question remains political: Who can afford innovations?

In our view the growth of medical technology is accelerating and will continue to accelerate rapidly in the early part of the new millennium. Consumers will demand it and want the benefits. All of this will drive up health care spending, and consumers will be faced with the need to pay for access to the technology. We do not believe that any system of rationing access to demonstrably beneficial technology will be acceptable in the United States. (Coddington et al. 2000: 183)

Because there may be no limit to what wealthy societies (let alone individuals) are ready to invest in health, being able to define and justify what makes certain health technologies socially more desirable than others may prove to be more important than solely appraising their affordability.

## Ways Forward

The approach this paper suggests requires both deliberative processes and new forms of empirical research in order to inform policy. A new policy-oriented research agenda can be developed by tapping the significant body of knowledge already produced by social scientists about the social dimensions of innovation and about ways to deal with policy issues. As suggested by Table 1, keeping a population healthy requires considering not only technologies that are used in clinical settings, but also those used in the community and those that affect health more broadly (in the workplace, for instance).

Because healthcare comprises competing and conflicting objectives, not all of which are worth pursuing, a more informed reflection on what people want from technologies is needed. Technology-related evaluation and decisions require making explicit the normative assumptions that stakeholders (patients, relatives, clinicians, managers, taxpayers, industry, regulatory bodies, researchers) hold about specific kinds of technological and social innovations and to put to test these assumptions.

Taking this perspective, Table 2 offers a series of assumptions that both researchers and policy makers can revisit when trying to ascertain whether innovations are justifiably valuable or not. Although technology appears ubiquitous in healthcare, a sharper understanding of its real-world use is required, one that is sensitive to, but also challenges, the perceptions and values of clinicians, patients and social groups. In what ways is a given innovation to be considered individually or socially desirable? Are those reasons publicly justifiable? Such questions can be tackled only by clinicians and health researchers who take seriously the social scientific perspective and the stakeholders' views.

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