MANAGED CARE: TECHNOLOGY ASSESSMENT AND TECHNOLOGY CONTROL

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Introduction

The control of health care costs continues to be the primary goal of managed care. Double digit inflation in the health care sector continues to be problematic; although society as a whole has not declared what fraction of economic productivity is properly applied to health care. No student of the subject can help but be impressed by the circumstantial evidence that suggests that society is beginning to rail at the fraction of domestic productivity that health care currently consumes.

No control of health care utilization will be effective without assuring that the quality of care is at least maintained. As a result, managed care has to focus on the control of health care cost through mechanisms that attempt to:

(1) discourage the delivery of health care services which are ineffective or very unlikely to be effective in a particular case and
(2) assure that those health care services that are effective are delivered at minimum cost.

This implies that there are at least two critical parameters that must be known relative to each health care service: namely, the effectiveness of that service and its cost. The determination of these and other parameters of health care services, also known as health care "technologies," is the science of "technology assessment."

Technology Assessment

The Institute of Medicine (IOM), in what has become the basic treatise on the subject, has defined technology assessment as "...any process of examining and reporting properties of a medical technology used in health care, such as safety, efficacy, feasibility, and indications for use, cost, and cost-effectiveness..."1 Medical technology comprises those "techniques, drugs, devices, and procedures used by health-care professionals in delivering medical care to individuals, and the systems within which such care is delivered." (Definition originally proposed by Congressional Office of Health Technology Assessment - OHTA.)1

There is an important implication to this definition that will help us begin to understand the relationship between technology assessment and technology control. Technology assessment is a process. To the extent that this is so, the product of technology assessment is information about the properties of a medical technology...

To understand the relationship between technology assessment and technology control, therefore, it is necessary to understand how technology assessment produces information and how that information can be used to effect control.

The Process of Technology Assessment

It is far beyond the scope of this paper to present an exhaustive review of the techniques employed by those who do technology assessment. (The interested reader is referred to one of many texts in the field, the most accessible of which is that completed by the IOM, previously mentioned.)1 What I hope to do here is provide a brief overview of those techniques and to permit some understanding of the utility of the information that is produced to effect technology control.

Very broadly, one may consider technology assessment to be one of two types: that based on the collection of primary data (technology assessment that employs a process of information "generation"), and that based on the analysis of secondary data (technology assessment that employs a process of information "synthesis"). The prototypical process for information generation is the randomized, controlled clinical trial, a typically costly, multi-site, multi-year, carefully planned process for collecting data relative to a specific technology and creating information about its effectiveness and sometimes about its cost.

In contrast, there are a variety of techniques which take advantage of data that are already available. Some of these are formal and mathematically rigorous, for example, those which employ a technique called "meta-analysis." Others, such as the literature reviews and syntheses typically performed by the OHTA, are systematic and scientifically rigorous, but are somewhat more subjective in their approach to comparing different primary analyses. Still other "information synthesis" methods depend upon the synthesis of pre-processed information: that is, upon the implicit

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synthesis of expert knowledge, using polling of experts, such as the American Medical Associations' Diagnostic and Therapeutic Technology Assessment (DATA) process, or formal or informal expert consensus-building techniques.

It is relevant to make the distinction between information-generation processes and information-synthesis processes, because the utility of the information that proceeds from the two types of technology assessments varies. The information that proceeds from primary data collection and analysis is widely regarded to be more credible, the "gold standard." Where the quality of information is a critical determinant of the usefulness of that information at effecting control, no process other than a randomized controlled clinical trial (RCT) may be sufficient to establish that control. On the other hand, the RCT typically proceeds over several years, provides information which is very specific, and describes the characteristics of a medical technology applied in a setting other than the real world. Where there is a need for current information or where there are many questions that relate to the effective use of a technology, such as the appropriate indications for positron-emission tomography, or where there is reason to be concerned that the use of a technology in community practice may differ significantly from the use in a research setting, there is legitimate concern that an RCT may not be a very powerful tool to support information-based control systems.

In contrast, secondary or information-synthesis methods may proceed relatively quickly, may consider a broad range of questions, and may be able to consider what is known about the characteristics of technologies as they are commonly used as well as under ideal conditions. However, such methods suffer from the predictable problem: secondary analysis is only as good as the knowledge base from which it proceeds. Where information is not available or where available information is low quality, information-synthesis methods are relatively weak. Unfortunately, the user of information that derives from such analysis may not always be able to judge the quality of the inputs. This is particularly problematic where synthesis employs expert consensus methodologies, because the product of this process may be sensitive to the composition of the expert group. How does the "extent of use" of a given technology change over time, and are there opportunities to control that? Changes in the "extent of use" map out a "life-cycle," which really is a description of how technology diffuses over time. Although the diffusion of technology is a complex subject, it is easy to recognize five distinct stages in the life-cycle, or "extent of use cycle," of a medical technology. Each of these is a point where control can potentially be exerted:

Development: Even before a technology is born, there is an "embryonic" phase during which research and development proceed; this developmental period begins with the earliest discussions of feasibility and need, and ends with the introduction of a marketable product. During this period of development, the subject technology is virtually invisible to the world; its use is limited to scientific trials of efficacy and effectiveness toward the end of this stage of the life-cycle. At this stage of its life, the technology has virtually no financial or clinical impact on managed care populations.

Introduction: With the completion of the research and development phase, a technology is introduced into medical practice. This introduction may require federal approval, e.g., FDA approval of a new drug or device; or it may simply signal that a technology has reached the stage of investigation where a firm is prepared to begin marketing it. During the introductory period of the technology life-cycle, a technology appears for the first time in non-investigative clinical practice; a critical milestone has been reached, but the use of the technology at this point is still quantitatively unimportant to managed care populations.

Expansion (or increasing use): Following the first commercial use of a new technology, its use typically increases. This is the period of expansion; it is the time when a new technology is moving to fill the demand which has existed for it, and during which new opportunities for use are explored and exploited. Typically, it is during this period that the technology reaches its full clinical and financial impact, and it is during this period that managed care firms begin to respond programatically, if they have not responded during earlier stages of the life-cycle.

Maturity (or constant use): At some point, most technologies reach a fairly steady state, where indications for use are relatively stable and patterns of use relatively constant. This period of stability may be relatively long lived if there is little stimulus to develop alternative technologies, or it may be relatively brief.
The impact of the use of technology is most felt during this period of life; at this point, control over the technology may be most difficult to achieve.

Senescence (or declining use): Eventually, a technology begins to disappear, although a few technologies disappear completely. As new technologies are developed, those which are extant are replaced or are used for fewer and fewer indications. Rarely, new information may be developed that challenges prevailing notions of the safety or efficacy of a technology. In this case (as, for example, in the case of the morning sickness drug thalidomide or the surgical procedure known as the Garren gastric bubble), a technology may disappear completely. More often, there is a measurable decline in the use of a technology, which reaches a steady state level of use which may persist for a very long time.

Information-Dependent Technology Control

The "life cycle" above suggests a way to organize our thinking about the control of technology, and particularly, to consider how and where the information products of technology assessment may be used to control, or enable the control of, the use of medical technology.

Control during "development": Because the research and development of new technology is mostly outside the managed care industry, there is only opportunity for indirect control during this stage of a technology's life. In fact, that opportunity for control does exist (see below); its potential has, for the most part, yet to be realized.

Technology assessment almost certainly plays a major role in the control of technology development. An understanding of core parameters, such as cost, efficacy, and cost-effectiveness of a novel technology is critical to those who plan to develop it; technology assessment is a tool, therefore, that helps to shape the research and development agenda in those industries that supply new technology. Technology assessment produces information that helps suppliers recognize market opportunities. Put another way, the information that is provided through technology assessment serves a critical function: to accelerate or retard the development of specific new technologies. The control that this implies is profound, but largely beyond the direct reach of the managed care firm. It is myopic, however, to view this control as completely beyond the reach of managed care firms. One of the factors that must go into the equation when a supplier is considering the advisability of developing a specific type of technology for a specific market application, is the probability and extent of reimbursement from third-party payors. To the extent that payors are able to offer signals to potential suppliers of new technology that affect those suppliers' expectations regarding future reimbursement, payors are almost certainly able to affect decisions regarding the new technology agenda. For the most part, these signals have been vague, or must be inferred from that which is known about past behaviors of third-party payors.

It is unclear that this must be so. For example, where technology assessment in the payor industry identifies a significant opportunity for a new product which would increase the efficiency of health care, there is at least the theoretical prospect that the payor industry could send a strong signal to potential suppliers of new technology that would encourage its development. At present, there is little evidence that such potential control has been realized; at a minimum, it would require a very high level of technical sophistication in the payor industry and a desire to exert control through a process which may not, in fact, be cost-effective.

Control of "introduction": There are obvious and explicit controls to the diffusion of some technologies at the point of introduction to the marketplace; somewhat less obvious and more implicit controls exist for others. Technology assessment and its information products are critical components of those control systems.

For those medical technologies for which regulatory requirements for demonstrated safety and efficacy exist, such as drugs and devices which are not substantially equivalent to those already on the market, there is tight control of introduction. Relief from that control is obtained when safety and efficacy have been demonstrated through the process of technology assessment. In this case, the control mechanism is outside of the managed care industry, and technology assessment proceeds outside the industry to moderate that control.

For those technologies for which no such regulatory requirement exists, some level of control of the introduction of new technology can be exerted by the managed care/payor industry. Where there is a need for continued investigation in order to establish the efficacy of a new technology, most managed care contracts can exclude the use of that technology from the set of reimbursable services on the grounds that the service remains investigational. The key to such exclusion is, of course, thorough assessment of the extant scientific literature, and documentation that that information necessary to establish the technology as effective is not yet available. These, of course, proceed from technology assessment.
Control of "expansion": Control of the expanded use of new technology has been a major objective of those concerned with managing the utilization of medical services. There are a variety of managed care instruments which offer some control at this point; all incorporate information which comes from some explicit or implicit technology assessment process.

Plan design: First of all, the expanded use of technology can be controlled through explicit inclusion or exclusion at the time of benefit plan design. Of course, the logic of plan design should be informed by the relative costs and benefits of alternative technologies. Rational plan design becomes the means by which the information created by technology assessment effects control.

Reimbursement policy: Some control over the diffusion of technology can be achieved through the interpretation of reimbursement policy. Although contract language varies, all contracts include some language that assures that only those medical services that are accepted as effective are reimbursable. The interpretation of this contract language, that is, the specification of those services that are effective and therefore reimbursable, is an exercise in technology assessment. Corollary to that, new applications of available technology are introduced into medical practice.

Utilization management policy: To the extent that utilization management programs represent an effective control on medical service, they are not more than an instrument to control the expanded, or "inappropriate," use of medical technology. The medical logic that supports these programs is a product of technology assessment; that logic has been "repackaged" to support the utilization management process.

Practice guidelines: Practice guidelines, or protocols, are tools that are used to assist physician decision making with respect to the use of medical technology; they are no more than a control instrument, constructed out of the information that is derived from technology assessment. In fact, they are simply a special case of a more familiar, albeit generally weaker, set of information-dependent controls: namely, educational materials that support provider decision-making. Clearly, all such educational materials depend upon information; the source of that information is, ultimately, some implicit or explicit process of technology assessment.

Control of the "mature" technology: As I have defined this stage of the life-cycle, there is little need for control at this point; this is a period of stability. In fact, this stability usually results from a balance of countervailing forces: those economic forces that tend to drive the expanded use of a technology and those controls that have been put in place. When that balance is reached, there is little change, until new information or, more typically, an alternative technology suggests that a given technology is out of date. At that point, controls in place tend to drive use of that technology down, and the technology becomes "senescent."

Control of the "senescent" technology: The issues that relate to the control of technology at this stage of the life cycle are no different from those discussed above. What distinguishes a "senescent" technology from a "mature" one or an "expanding" one is simply the nature of the information that exists regarding its appropriate use. The same tools are available for "activating" this information, that is, for converting that information into control. And technology assessment plays an equally important role in creating the information needed to permit that control.

Summary

Technology assessment is a process for creating information about important characteristics of a medical service or "technology." That information can be used by managed care firms in different ways at different stages in the life of a technology to attempt to affect control. At the very earliest stages of development, there are limited opportunities to affect control. What opportunities might exist, for example, selective encouragement of the technology development agenda, have not been aggressively pursued and probably cannot be pursued without coordinated action in the industry. Important opportunities for control exist at the point at which new technology is about to be introduced into the marketplace; while these controls are information sensitive, the greatest degree of control can be exerted by regulation and not by managed care interventions. The variety strategies to control the use of available technology all depend on information that is derived from technology assessment. As such, technology assessment processes represent the cornerstone of the industry's technology control function.

References
