

# DECISION MAKING IN ACQUIRING MEDICAL TECHNOLOGIES IN ISRAELI MEDICAL CENTERS

## *A Preliminary Study*

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### Abstract

**Objectives:** This preliminary study had two objectives: a) charting the considerations relevant to decisions about acquisition of new medical technology at the hospital level; and b) creating a basis for the development of a research tool that will examine the function of the Israeli health system in assessment of new medical technologies.

**Methods:** A comprehensive literature review and in-depth interviews with decision makers at different levels allowed formulation of criteria considered by decision makers when they decide to purchase and use (or disallow the use) of new medical technology. The resulting questionnaire was sent to medical center directors, along with a letter explaining the goals of the study. The questionnaire included 31 possible considerations for decision making concerning the acquisition of new medical technology by medical centers. The interviewees were asked to indicate the relevance of each consideration in the decision-making process.

**Results:** The most relevant criteria for the adoption of new technologies related to the need for a large capital investment, clinical efficacy of the technology as well as its influence on side effects and complication rates, and a formal approval by the Ministry of Health. Most interviewees stated that pressures exerted by the industry, by patients, or by senior physicians in the hospital are less relevant to decision making. Very small and usually not statistically significant differences in the ranking of hospital directors were found according to the hospitals' ownership, size, or location.

**Conclusions:** The present study is a basis for a future study that will map and describe the function of hospital decision makers within the area of new technology assessment and the decision-making process in the adoption of new healthcare technologies.

**Keywords:** Hospitals, Adoption, Diffusion of innovation, Decision making, Healthcare technology

Medical technology is defined as “the drugs, devices and medical and surgical procedures used in medical care, and the organizational and supportive systems within such care is provided” (1). New technologies in the healthcare field may dramatically improve patient outcomes, but they also have been identified as the leading cause of increasing healthcare expenditures (7). Among health services providers, hospitals and medical technologies

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constitute an essential element in every healthcare system, and without the use of medical technology, treatment of the patient in the hospital adds up to supportive care only.

The resources invested in the health system in Israel, similar to the situation in other Western countries, are limited. Inflation in the cost of health care is linked, among others, to adoption and utilization, at times unnecessary, of new medical technologies, while technologies whose cost/benefit ratio is problematic are still introduced. Most health technology assessments are carried out in countries with national healthcare systems (Sweden, Holland, Australia, Canada, United Kingdom), but in many cases, due to lack of budgets, assessment conclusions are published only after the technologies have been adopted and are already widely employed. Moreover, the huge array of new technologies makes it possible to evaluate only a small number of technologies each year. Under such conditions, decision makers in the healthcare system need to develop criteria and use the most up-to-date information available in decision-making processes regarding the adoption of new technologies. Acquisition of new medical technologies and determining how and when they have to be used are important administrative decisions that must be made by decision makers in the healthcare system in general and in medical centers in particular. This preliminary study had two objectives: a) charting the considerations relevant to decisions about acquisition of new medical technology at the hospital level; and b) creating a basis for the development of a research tool that will examine the function of the Israeli health system in assessment of new medical technologies.

## **BACKGROUND**

### **The Israeli Healthcare System**

The Israeli healthcare system is a semi-public system, dominated by the Ministry of Health (MOH) and the country's sick funds (HMOs). The MOH has ministerial responsibility for the planning, regulation, and coordination of the healthcare system, for the general assessment and control of health funds operation, and for implementation of legislation in these areas. The largest of these funds, Clalit Health Services (CHS), is responsible for the care of about 60% of the Israeli population. Health funds provide prescribed services to members, through salaried staff or through a combination of contractual freestanding providers and salaried staff. The government, through the MOH, owns and operates 45% of the total general hospital beds and is also responsible for the operation of mental health services and psychiatric hospital beds. CHS owns and operates 30% of the nation's general hospital beds. Not-for-profit institutions own and operate almost all the remaining general hospitals. A very small portion of general hospital beds are operated by private for-profit entities. The distribution of hospital beds and hospitals' main characteristics are presented in Table 1. CHS purchases roughly half of its hospital services from the government and other hospitals at official rates set by the MOH. The other sick funds, which do not own hospitals, purchase those services at official rates almost entirely from the government, CHS hospitals, and the not-for-profit hospitals, which operate as semi-public facilities.

### **Regulation of Medical Technology in Israel**

In its deliberations, the State Commission of Inquiry into the Functioning and Effectiveness of the Israeli Health Care System ("Netanyahu Commission") addressed the subject of technology policy in the Israeli healthcare system. Among the commission's recommendations was the importance of establishing a Drug, Medical Accessories, and Medical Equipment Authority within the MOH that would carry out registration and licensing not only of drugs, but also of accessories and medical equipment—from the standpoint of safety and utility,

**Table 1.** Hospital Characteristics

Type of hospital	Government and municipal	Clalit Health Services	Public not for profit <sup>a</sup>	Private	Total
Total (no.)	11	8	14	11	44
Total beds (% of total)	5,579 (43.8%)	4,037 (31.7%)	2,553 (20.0%)	566 (4.5%)	12,735 (100%)
Average no. of beds per hospital	507	505	182	52	289
<i>Hospital's size</i>					
Small (up to 200 beds)	1	1	7	11	20 (45%)
Medium (200–500 beds)	5	4	4	0	13 (30%)
Large (over 500 beds)	5	3	3	0	11 (25%)

<sup>a</sup> Including small hospitals operated by the Mission.

according to standards set by the Ministry. In addition, the commission found it fitting and proper that within the framework of the Division for Technology Policy and Quality Control, a unit should be established for assessment of medical technology that would engage in formulation of policy vis-à-vis new medical technologies (and at times even old ones) (11).

Since the recommendations of the Netanyahu Commission, the Division of Technological Policy has been founded within in the MOH as well as the Unit for Medical Accessories and Devices (AMAR). In addition, the Center for Technology Assessment in Health Care was established as well as committees whose role is to advise the Minister of Health and make decisions on technologies that will be added annually to the “basket of services” (9). These changes improved tremendously the process of approval of new technologies in general, and primarily drugs. However, when one addresses technological policy and adoption of technologies by the healthcare system, one should differentiate between formal approval to employ a technology and the adoption and use in clinical practice. In Israel, as in most other Western countries, there is a monitoring mechanism for the use of drugs and medical equipment. Thus, for example, one cannot use a given drug without its safety and utility having been assessed and added to the List of Approved Drugs in Israel, even if the drug is already in use in other countries (10). This is also the case of new medical equipment monitored by the MOH Unit for Medical Accessories and Devices. Similar to other countries, acquisition of capital-intensive technologies such as CTs and MRIs requires MOH approval (known in the United States as Certificate of Need). Contrary to the excellent monitoring of drugs and medical devices, there is almost no control of medical and surgical procedures (5), and the decisions to employ one technology or another are made for the most part at the hospital level. Furthermore, formal approval and registration in Israel does not necessarily require utilization in actual practice at various levels of the healthcare system.

### Decision Making and Criteria for Acquisition of New Technology

The need to make decisions about new medical technologies appears often in the managerial decisions made by administrators of health institutions, sick funds, insurance companies, and other similar bodies. Managers often encounter requests from physicians to purchase new technologies that may assist in diagnosis, treatment, and prevention of diseases. Acquisition of a particular technology can enhance the stature of the organization and its ability to attract patients. Purchase of new technologies often entails high budgetary commitments, and administrators are forced to make decisions about new technologies before they have clear evidence regarding the clinical utility of the technology, its effectiveness, or its economic advantages. Under such circumstances, balanced decision-making processes are of

utmost importance (14). Because administrators of medical centers and policy makers in the healthcare system on the national level are forced to make decisions from various perspectives, they are likely to interpret some of the criteria employed in decision making in a different manner. In addition, the responsibility of managers and the desire for managerial autonomy of the organization they head are likely to serve as an incentive for stressing certain criteria at the expense of others in the decision-making process (15).

Three studies published recently examined the strategy of decision making in adoption of new technologies. In a study carried out in 1989 among 50 university hospitals in Canada, it was found that only 23 of the institutions had a formal structured system responsible for technology assessment (6). Fifteen hospitals appointed a committee whose role was to assess technologies, and nine assigned a specific department with the mission. In 34 of 43 hospitals in which there was information on technological assessment, the information was used in decision making regarding new technologies. A similar situation exists among hospitals in the United States; in a survey carried out in 1992 among senior administrators at 12 university hospitals, it was reported that project cost was the most significant criterion in decision making (11 among 11 hospitals that responded to the survey). Most of the hospitals that participated in the survey reported that the decision-making process in their hospital was political, informal, or carried out ad-hoc (14). In order to make the best use of new technologies, hospitals need, first and foremost, to develop criteria upon which decision making will be based. Hospitals must take into account client expectations vis-à-vis the hospital and the technologies.

It is possible to classify considerations in the adoption of new technology into three primary systems. Greer (2;3;4) defined them as the fiscal-managerial, the strategic-institutional, and the medical-individualistic systems. None of these perspectives, as they will be described forthwith, succeeded in explaining in an acceptable manner the adoption of technologies. In the various hospitals, more or less dominant motivation could be found within the hospital—as the outgrowth of strategic aims, demographic factors, or dominant coalitions within the hospital. But each of the perspectives relates to motivation for adoption of technology in a partial manner, while in practice none of the explanations stand alone but are integrally linked, complementing one another.

The fiscal-managerial system alludes that a hospital's motivation for making a profit is common to hospitals operating both on a commercial and a nonprofit basis, but the clearest motive of behavior for private hospitals is to achieve maximization of profit. Therefore, profitability will constitute the primary and decisive consideration in adoption of new technologies. The strategic-institutional approach holds that health institutions adopt capital-intensive technologies unrelated to their cost in order to achieve technological superiority, to enhance their image and prestige as leaders in the technological realm, as a device to attract doctors and patients. The medical-individualistic perspective focuses on delivery of services according to the definition and demands of physicians and the hospital medical administration. This prospect rests on the fundamental assumption that the physicians and the hospital adopt new technologies based on clinical needs of the populations they serve, even if fiscal considerations, competition, or calculations of hospital prestige suggest alternative actions. On the contrary, hospitals will not adopt a technology, even if it is prestigious or highly profitable, if patients cannot derive significant benefit from it.

## METHODS

### The Research Instrument

The research instrument was constructed following a comprehensive literature review of journals concerning health policy and technology assessment. Papers presenting various

decision-making models for acquisition of technology and technology policy were identified. The literature review allowed formulation of criteria considered by decision makers when they decide to purchase and use (or withhold the use) of new technologies (8;12;13). Decision makers at different levels were interviewed in-depth and were asked to indicate their considerations in acquiring medical technology. Their responses were compiled into a list of criteria/considerations that were added to those identified in the literature review. The resulting questionnaire was sent to medical center directors, along with a letter explaining the goals of the study. The questionnaire included 31 possible considerations for decision making concerning the acquisition of new medical technology by medical centers. The interviewees were asked to indicate, on a 6-point Likert scale, the relevance of each consideration in the decision-making process (0 = completely irrelevant, 5 = highly relevant).

### **Research Population**

The research population included general hospital directors. The hospitals included were chosen from a list compiled by the MOH; very small and Mission-owned hospitals were excluded. In all, questionnaires were sent to 31 hospital directors. In addition, doctors who had in the past served as hospital directors and/or vice directors were interviewed, along with doctors who were involved in establishing technology policy. These responses were not included in the current study.

### **Data Analysis**

The directors' responses were fed into a computer and analyzed by a database program. The weight given to each of the criteria was calculated using a simple average of the responses. The criteria were divided into eight main groups of considerations as follows: formal approval, clinical considerations, prestige and competition among hospitals, impact on hospital's profitability and other economic components, pressures exerted inside and outside the hospital, the need for personnel training, available information regarding the new technology, and the influence of the technology on hospital exploitation. The sample was stratified in three subpopulations according to hospital size (small, large, or medium) and ownership (governmental/municipal, CHS, public/not for profit, and private). The responses were analyzed, and differences among types of hospitals according to the subgroups mentioned above in ranking each criterion were examined. The one-way ANOVA test (F test) was used to analyze differences in criteria ranking.

## **RESULTS**

Twenty-nine of the 31 questionnaires sent out were returned completed (a 94% response rate); however, two of the questionnaires were not analyzed because the respondents did not include identifying details. Twenty-two questionnaires were filled out by hospital directors (of whom two had in the past served as General Directors of the MOH), four by vice directors, and one by an administrative director. Thus, the final response rate was 87%. The relevance of each group of considerations in the decision process (on a 1–5 scale) is presented in Table 2. The ranking of the five most relevant and the five least important specific considerations are presented in Table 3. Differences were found in the ranking of relevant considerations in decision making by the various hospitals (Table 4). Directors of government and municipal-government hospitals attached the greatest importance to clinical considerations and implications regarding the new technology. Moreover, in comparison to other hospitals they also attached very high importance to formal approval in acquiring and using new technologies (for example, by the FDA or the Israeli MOH). The most noticeable considerations among the CHS' hospital directors were those concerning

**Table 2.** Ranking of Groups of Considerations (All Hospitals)

Criteria	Average ranking
Clinical considerations and implications	4.50
Impact on hospital's profitability and other economic components	4.37
The need for personnel training	4.35
Available information regarding the new technology	4.15
Formal approvals	4.06
Influence on hospital's exploitation	3.82
Prestige and competition among hospitals	3.63
Pressures exerted inside and outside the hospital	2.67

**Table 3.** Ranking of Specific Considerations

Consideration	Average ranking
<i>Most important considerations (descending order)</i>	
The new technology is associated with large capital investment	4.85
Decreased efficacy of the new technology compared to the existing technology	4.70
The use of the new technology could lead to decreased side effects	4.67
The new technology was approved by the Ministry of Health	4.56
The use of the new technology could lead to a decrease/increase in complication rate	4.56
There are sufficient data in medical literature regarding the results of clinical trials.	4.52
<i>Less important considerations (ascending order)</i>	
Commercial pressures exerted by the industry	1.48
Other hospitals cover and use the new technology	3.07
The technology could be applied on an outpatient basis	3.21
Pressures exerted by directors of medical wards or senior physicians	3.22
Demand and pressures exerted by patients	3.30

**Table 4.** Differences Among Hospitals According to Hospital Ownership

Consideration/hospital	Government and municipal	Clalit Health Services	Public not for profit	Private	<i>p</i> Value
Clinical considerations and implications	4.44	4.63	4.33	4.5	NS
Impact on hospital's profitability and other economic components	4.37	4.35	4.37	4.37	NS
The need for personnel training	4.22	4.81	4.13	4.0	NS (.069)
Available information regarding the new technology	3.89	4.44	4.13	4.2	NS
Formal approvals	4.33	4.08	4.12	3.45	NS
Influence on hospital's exploitation	4.09	4.00	3.44	3.4	NS
Prestige and competition among hospitals	3.85	3.81	3.17	3.27	NS
Pressures exerted inside and outside the hospital	3.0	2.82	2.33	2.07	NS

**Table 5.** Differences Among Hospitals According to Hospital Size

Criteria	Large hospitals	Medium hospitals	Small hospitals	<i>p</i> Value
Clinical considerations and implications	4.42	4.55	4.50	NS
Impact on hospital's profitability and other economic components	4.33	4.50	4.11	NS
The need for personnel training	4.14	4.54	4.17	NS
Available information regarding the new technology	3.86	4.31	4.17	NS
Formal approvals	4.28	4.21	3.42	.039
Influence on hospital's exploitation	3.92	4.02	3.29	NS (.096)
Prestige and competition among hospitals	3.83	3.79	3.0	NS
Pressures exerted inside and outside the hospital	2.93	2.88	1.94	NS (.059)

the need for large capital investment and the need to train skilled personnel to operate the new technologies. Surprisingly, directors of private hospitals do not attach greater importance to criteria concerning the new technology's effect on hospital profits and other economic aspects. Directors of larger hospitals (over 500 beds) believe that the most important group of considerations is that relating to economic components and their impact on the hospital's profitability (Table 5). Among those factors, both groups of hospitals attach the greatest importance to the need of a large capital investment. Noteworthy is the relatively high importance attached by directors of large hospitals to considerations regarding the formal approval of the technology by the FDA and the Israeli MOH.

## DISCUSSION

The impact of new technology on the healthcare system's costs seems to be crucial in all Western countries. In this era of budget constraints, decision makers are forced to make timely decisions regarding the adoption and utilization of new technologies, usually in a situation where relevant information is lacking. Therefore, in order to make the best use of new technologies, hospitals need, first and foremost, to develop criteria upon which decision making will be based. The present survey is the first study in Israel that aims to examine the consideration of hospital directors in adopting new technologies. The results of this study cannot be compared to studies performed elsewhere, because none of the studies cited above has concentrated on factors considered by hospital directors. Moreover, the structure of the Israeli healthcare system is unique in some ways: the MOH, which is responsible for the regulation of the system, also owns and operates a large proportion of hospital beds on one hand, and on the other, has an essential impact on the incentives to adopt or reject a new technology. Even the most comprehensive studies (12;13) relate to considerations of medical directors of health plans and not to hospitals. Nevertheless, most of these studies were performed in the U.S. system, which is based mainly on private providers. Therefore, the incentives given to medical directors are quite different compared with those of the semi-public system in Israel. The present study is a basis for a future study that will map and describe the function of hospital decision makers within the area of new technology assessment and the decision-making process in the adoption of new healthcare technologies.



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