International Journal of Technology Assessment in Health Care, **23:4** (2007), 443–448.

DOI: 10.1017/S0266462307070675

Impact of new medical technologies on health expenditures in Israel 2000–07

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Objectives: The aim of this study was to estimate the impact of new medical technologies on public healthcare expenditures in Israel over the period 2000–07.
Methods: For each year, government estimates for the costs of new technologies recommended as high-priority for public funding were summarized. The ratio of projected costs of these technologies to total public healthcare expenditures was calculated and compared with actual governmental budget allocations for new technologies.
Results: Funding all new high-priority medical technologies would have increased healthcare expenditures by 2.1 percent per year. Government allocations for new technologies raised expenditures by 1.0 percent per year.
Conclusions: New medical technologies significantly increase healthcare expenditures in Israel. Budgetary constraints have reduced their actual impact by 52 percent. This study indicates the need for an annual addition of 2 percent to public healthcare budget for funding new high-priority technologies.

Keywords: Healthcare expenditures, National list of health services, New medical technologies

New medical technologies (including drugs, devices, and procedures)—together with demographic changes—have been one of the main drivers behind the continuous rise in medical expenditures experienced in nearly all developed countries and have become the focus of attempts to forecast and control future health budgets.

The quantification of the impact of new technologies on expenditures has, therefore, been the subject of numerous studies. We use costings for proposals for new technologies to be covered by public health provision in Israel to estimate this impact. Such an approach—covering a comprehensive range of new technologies over a period of 8 years—can give a reasonably accurate estimate of the overall effect of new technologies on health expenditures.

All authors contributed equally to this work.

Existing Studies: Summary

Studies to date have generally been of two broad types: top-down or bottom-up.

Top-down Studies. Top-down residual studies typically take the change over time in health expenditures and try to explain it by variables such as the size of the population, the age structure of the population, price changes in the health sector, changes in real incomes, and changes in health insurance cover. Residual changes in health expenditures left after all these factors have been accounted for are attributed to health technology. The advantage of this method is that it results in a clear estimate. The disadvantage is that no direct assessment of the effect of technological change is being made. Residual growth could be explained by factors other than those connected to technological change. A study by Newhouse from

1992 (3) is an early example of this approach. A more recent study using the residual approach published in 2001 for the UK Treasury (7) studied the effect of new technologies in the United Kingdom. An Israeli residual approach study adopted a slightly different methodology (5). Shmueli and Markowitz tried to explain changes in health sector prices rather than expenditures over the period 1972–96. After estimating the impact of changes in the prices of inputs, such as wages and medical equipment, they were left with an annual average unexplained increase in prices of 3.1 percent. They attributed this residual to the introduction of new, relatively expensive, technologies.

A refinement of the residual approach can be found in the Australian study by Banks from 2005 (1). Here, in addition to demographic and other variables used to explain annual changes in health expenditures, a proxy for technological change (US expenditures on health research and development) was used to isolate the impact of new technologies. Most of the top-down studies have concluded that new technologies add around 2 percent a year to overall health expenditures.

Bottom-up Studies. Bottom-up case studies examine particular technologies in depth. Banks (1) presents (for Australia) the impact of particular technologies as well as using a top-down approach. Mohr et al. (2) is a US example of the bottom-up approach. Although providing detailed estimates of the impact of technologies on health expenditures, because these studies examine only a relatively small number of technologies, they cannot provide an answer to the question of how much new technologies overall add to health expenditures. Mohr et al. found that the technologies they studied could explain only 8 percent of the overall effect of all new technologies predicted by the residual approach.

The study presented here aims to use a sufficiently inclusive bottom-up approach to produce a comprehensive estimate of the effect of new medical technologies on health expenditures.

Israeli Health Service Provision

Since a National Health Insurance Law came into force in 1995, all Israeli citizens have access to a National List of Health Services (NLHS). This list covers a very wide range of medical treatments, drugs, devices, and medical procedures. Public health services in Israel are regarded as one of the most generous in the developed world. Tamir et al. emphasize the broad nature of the NLHS (6). Healthcare services in the NLHS are provided by four, not-for-profit, publicly funded health funds. Total health fund budgets are such as to cover all the services contained in the NLHS. Additions to the NLHS—such as the introduction of new technologies—have, by law, to be accompanied by additions to the health funds' budget that fully reflect anticipated costs. Since 1999, proposals for new technologies have been made nearly every year and a special procedure has been established both to assess their budgetary effect and to assign priorities.

Technology Assessment and Approval Process in Israel

There are two stages in the process of approving new medical technologies for inclusion in the NLHS: the assessment of candidate technologies, and the decision which of the technologies assessed to include in the NLHS within the framework of a predetermined budget allocation.

Health technology assessment, performed by the Ministry of Health, integrates clinical, epidemiological, and economic considerations and aims to identify the added clinical value of each technology and its budget impact. The Ministry of Health uses data from health funds and technology suppliers, as well as national data resources. Budget estimates consider the number of possible users of a new technology, the cost per user, and possible health costs savings if new technologies replace existing technologies. For each technology assessed, a net economic impact is projected.

The decision-making process is undertaken within a Public National Advisory Committee. This committee is appointed by the Ministers of Health and Finance and made up of representatives of the government, health funds, physicians representing the Israeli Medical Association, health economists, and the general public. The committee receives technology assessments prepared by the Ministry of Health, and these, together with a set of predefined criteria, as well as ethical and legal considerations, form the basis for its decisions. The final priority-setting process conducted by the committee is guided by preliminary priority-setting submitted by the Ministry of Health. The final prioritization of technologies by the committee reflects the different ethical approaches, beliefs, and life experiences of its members.

During this process each technology is graded on a scale of 1 to 10 and placed in one of three groups: Group A, high priority technologies (graded 8–10); Group B, intermediate priority technologies (graded 4–7); Group C – low priority technologies (graded 1–3).

At the end of this procedure, a recommended list of technologies to be included in the NLHS is published. In practice, as a result of budget constraints, only technologies in group A, graded as 10 and 9 (very high and highest priority), have been added to the NLHS.

The process of updating the NLHS begins each year, usually in May, with a call for proposals for new medical technologies to be included in the List for the next year. The process is concluded when the government approves technologies recommended by the committee, in accordance with a predetermined budget. The new technologies then become part of the NLHS to which each citizen is entitled by law. Shani et al. set out a detailed discussion of the process (4).

Table 1. Number of New Technologies by Priority and Type for 2000–07

Year	Priority	Pharmaceuticals	Other technologies	Total
2000	A10	6	3	9
	A9	24	9	33
	A8	13	5	18
	Total	**43**	**17**	**60**
2001	A10	5	0	5
	A9	33	4	37
	A8	41	16	57
	Total	**79**	**20**	**99**
2002	A10	2	0	2
	A9	49	20	69
	A8	83	17	100
	Total	**134**	**37**	**171**
2003	A10	0	0	0
	A9	0	0	0
	A8	0	0	0
	Total	**0**	**0**	**0**
2004	A10	19	7	
	A9			26
	A8	0	0	0
	Total	**19**	**7**	**26**
2005	A10	57	8	65
	A9	31	5	36
	A8	66	6	72
	Total	**154**	**19**	**173**
2006	A10	58	9	67
	A9	34	8	42
	A8	69	7	76
	Total	**161**	**24**	**185**
2007	Proposals made in 2006 covered a 2-year period, so no proposals were submitted in 2007			

MATERIALS AND METHODS

Costs Assessments for New Medical Technologies: 2000–07

For each of the years 2000–07, costs assessments for all the technologies ranked as A8 (high priority), A9 (very-high priority), and A10 (highest priority) were summarized. Table 1 gives the number of technologies each year by priority.

Our aim is to use the costs projected for these new technologies to provide a measure of the extent to which new technologies add to overall public healthcare costs. A minimalist approach would be to take the costs for only those technologies approved for public funding and budgeted for. This approach would give an estimate of the actual cost of new technologies approved since 2000. Such an approach, though, would provide an underestimate of the effect of available new technologies in pushing up healthcare costs because budgetary limitations have excluded effective technologies that would have been approved in the absence of budgetary constraints. It would reflect the budgetary situation in Israel as much as the availability of new technologies. An alternative methodology would include all technologies ranked as at least of high priority (A8, A9, and A10). This strategy would cover all recommended technologies assigned high priority that, in the absence of budgetary constraints, the health system would have adopted, that is, that are judged to be medically and economically effective. This gives a less biased estimate of the impact of new technologies on expenditures without going to the extreme of including all new technologies irrespective of their medical value. We present both estimates.

RESULTS

Table 2 summarizes the projected costs for those technologies of at least high priority (ranked as A8, A9, and A10) for each of the years 2000–07. Costs of new technologies are compared with the total budget of the health funds.

Over the years 2000–07, new technologies predicted to cost on average €92 million a year have been recommended as at least high priority for inclusion in the NLHS. Variance from year to year reflects not just the availability of suitable technologies but also budget constraints. In 2003, budget constraints were so severe that no recommendations were presented for consideration. The increase in recommendations in the following years reflects in part a loosening of budget restraints. The high level of 2006 recommendations reflects

Table 2. Predicted Costs of All High Priority (and above) Technologies (A8, A9, and A10)

	Total health funds budget	Predicted annual cost of at least high priority technologies	Predicted annual cost of at least high priority technologies as % of total health funds budget
Year	€ million	€ million	
2000	5,095	70	1.4
2001	5,394	123	2.3
2002	4,703	69	1.5
2003	4,118	—	0.0
2004	3,945	34	0.8
2005	4,074	203	5.0
2006	4,212	233	5.5
2007	4,340	—	0.0
Average 2000–07	**4,485**	**92**	**2.1**
Total 2000–07	35,883	732	

Table 3. Predicted Costs of All Very-High and Highest Priority Technologies (A9 and A10)

	Total health funds budget	Predicted annual cost of very-high and highest priority technologies	Predicted annual cost of very-high and highest priority technologies as % of total health funds budget
Year	€ million	€ million	
2000	5,095	67	1.3
2001	5,394	57	1.1
2002	4,703	37	0.8
2003	4,118	—	0.0
2004	3,945	34	0.8
2005	4,074	126	3.1
2006	4,212	207	4.9
2007	4,340	—	0.0
Average 2000–07	**4,485**	**66**	**1.5**
Total 2000–07	35,883	528	

Table 4. Actual Budget Allocated for New Medical Technologies

	Total health funds budget	Actual budget allocated for new technologies	Actual budget allocated for new technologies as % of total health funds budget
Year	€ million	€ million	
2000	5,095	67	1.3
2001	5,394	52	1.0
2002	4,703	34	0.7
2003	4,118	—	0.0
2004	3,945	11	0.3
2005	4,074	69	1.7
2006	4,212	123	2.9
2007	4,340	—	0.0
Average 2000–07	**4,485**	**45**	**1.0**
Total 2000–07	35,883	356	

the decision to bring forward recommendations for 2007. Recommendations, if accepted in total, would have added 2.1 percent per year to total health funds budget over the period 2000–07.

A stricter approach only considers technologies ranked A9 and A10 (very-high and highest priority). Table 3 reproduces Table 2 for A9 and A10 technologies. Adopting all proposed technologies of very-high and highest priority would have added 1.5 percent a year to annual health funds budget.

Table 4 presents the projected costs for those technologies actually approved for inclusion in the NLHS, hence, the actual budget allocation by the government.

As Figure 1 shows, during the years 2000–07, on average, 1.0 percent per year has been allocated to health funds budget for new technologies, which is less than half (48 percent) the budget required for inclusion of all recommended technologies ranked as at least high-priority, and is approximately two thirds (67 percent) of the budget needed for the inclusion of very-high and highest priority technologies. Proposed new technologies costing €376 million a year have remained outside of the list of services and drugs given under the national health insurance law. Some of these will be supplied outside of public finance either through supplementary health insurances or directly by the patient.

Limitations of the Findings

The above estimates assume that the predicted costs of new technologies accurately reflect actual costs. Predicting the future costs of new technologies is especially hazardous because usually there is little experience on which to base estimates and in many cases even experience from other countries is unavailable, either because the technologies have yet to be introduced there or because they have been in use for only very short periods of time. Costings tend to be based on estimates of the number of potential patients and of the cost per patient. Uncertainty over both these factors is particularly high, and in practice, total costs may turn out to be significantly different from those predicted.

A further complication is that in many cases new technologies replace, at least partially, existing technologies. Costings have, therefore, to include the possible impact of new technologies on other medical technologies. Ministry of Health predictions of the net cost of new technologies may, therefore, be inaccurate if they fail to estimate correctly the number of actual users of the technology, the cost of the new technology, and the extent to which other treatments are displaced.

The Ministry of Health does not revise its estimates in the light of actual experience, so national figures comparing

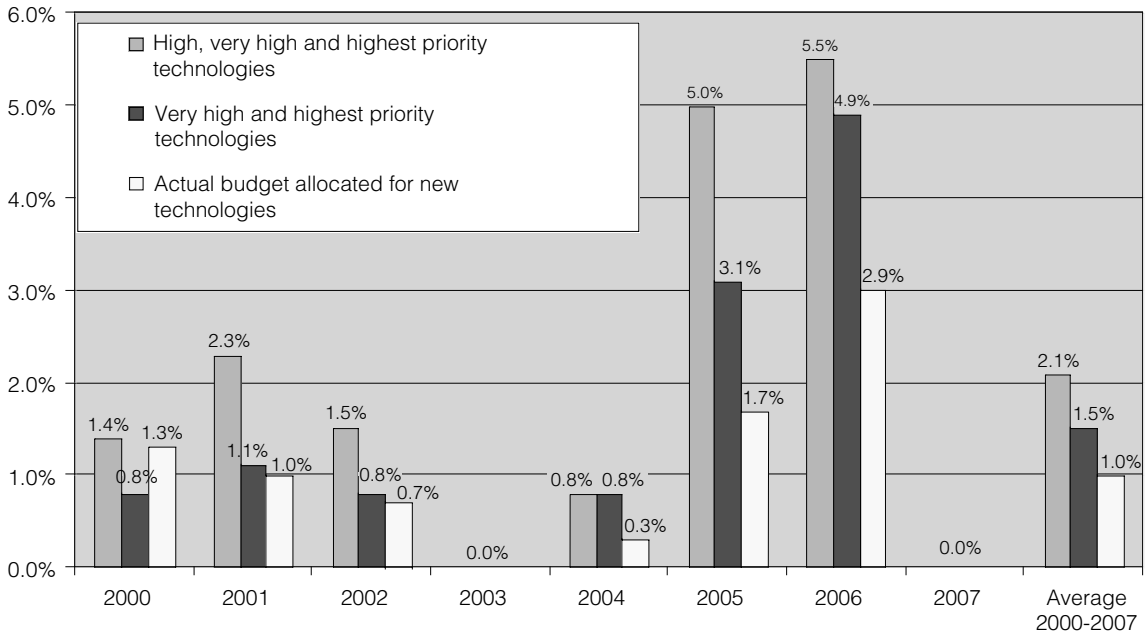

Figure 1. Required versus actual budget allocations for new medical technologies as a percentage of total health funds budget for 2000–07.

actual with predicted costs are not available. Data from Maccabi Healthcare Services indicate that actual costs for those technologies budgeted for have been some 10 percent above Ministry of Health projections. This estimate takes into account reductions in expenditures on technologies directly replaced by the new technologies (a new generation drug replacing an older generation drug) but not the possible costs changes associated with changes in wider health service usage, such as reduced hospital admissions and procedures and physician visits. Moreover, although Maccabi Healthcare Services insures 1.7 million people—almost a quarter of the Israeli population—it may not be possible to extrapolate this estimate to the national level as Maccabi's purchase costs and usage patterns may not necessarily reflect national costs and patterns. For example, the largest health fund in Israel with 2.5 times more members than Maccabi may well benefit from lower prices. Notwithstanding these limitations, Maccabi's data indicate that the costs projected for new technologies are unlikely to be far off actual costs.

CONCLUSIONS

Most previous studies have concluded that new medical technologies add around 2 percent a year to total health expenditures. We find that in Israel, over the years 2000–07, the inclusion of all high priority new technologies would, in the absence of budget constraints, have added 2.1 percent per year to health expenditures. The inclusion of very-high priority technologies would have added 1.5 percent per year to health expenditures. Those technologies actually funded for increased spending by 1.0 percent per year. These results are consistent with most top-down studies.

The relevance of these findings to health policy is twofold; the first universal, the second specific to Israel. They give an indication of the extent to which the continuous pressure of new medical technologies increases health expenditures, pressure that can only increase with the aging of populations. In addition, they show to what extent budget constraints in Israel have prevented the adoption of important high-priority medical technologies.

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