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THE IMPACT OF HEALTH TECHNOLOGY ASSESSMENT REPORTS ON DECISION MAKING IN AUSTRIA

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Objectives: Health technology assessment (HTA) was established in Austria in the 1990s and, since then, it has gained considerable importance. In this study, we aim to analyze whether the HTA reports that have been produced at the Institute for Technology Assessment (ITA) and at the Ludwig Boltzmann Institute for HTA (LBI-HTA) have had an impact on decision making within the Austrian health care system.
Methods: We selected all reports that were intended for supporting (i) reimbursement/investment or (ii) disinvestment decisions. Eleven full HTA reports and fifty-eight rapid assessments fulfilled the inclusion criteria. We used interview data and administrative data on volumes, tariffs and expenditure of products/services to analyze whether and how reports were in reality used in decision making and what the consequences for health care expenditure and resource distribution have been.
Results: Five full HTA reports and fifty-six rapid technology assessments were used for reimbursement decisions. Four full HTA reports and two rapid assessments were used for disinvestment decisions and resulted in reduced volumes and expenditure. Two full HTA reports showed no impact on decision making. Impact was most evident for hospital technologies.
Conclusions: HTA has played some role in reducing volumes of over-supplied hospital technologies, resulting in reduced expenditure for several hospital providers. Additionally, it has been increasingly included in prospective planning and reimbursement decisions of late, indicating re-distribution of resources toward evidence-based technologies. However, further factors may have influenced the decisions, and the impact could be considerably increased by systematically incorporating HTA into the decision-making process in Austria.

Keywords: Health technology assessment, Impact of HTA, Expenditure, Decision making

In Austria, Health Technology Assessment (HTA) was established in the 1990s. It was initially based at the Institute for Technology Assessment (ITA) at the Austrian Academy of Sciences and gained considerable importance with the foundation of a separate research institute in 2006—the Ludwig Boltzmann Institute for HTA (LBI-HTA).

The LBI-HTA is a non-university research institute that is primarily financed by public research budgets and co-funded by partners from the health care system. The latter are the main public payers in the Austrian health care system (Ministry of Health, social health insurance funds, public hospital owners) and academic institutions. Additionally, a small number of projects can be commissioned by means of third-party payment from public institutions.

It is the aim of the LBI-HTA to provide independent and objective information on health technologies of various kinds for decision makers. Reimbursement or disinvestment decisions (meaning rationalization in cases of oversupplied technologies) are made by different bodies and on different levels of the health care system depending on the type of service provided. Table 1 gives an overview of the decision structure. HTA can be used in most decision processes, but there are no mandatory requirements to do so. If HTA reports are used, they need primarily to be in German language and they have to be produced within a time period that is strongly linked to the decision-making process. In some cases, reports need to be in a pre-defined format. The types of reports include full HTA reports and rapid technology assessments (which are called decision support documents). The HTA research should ultimately result in more efficient use of resources and it should support the sustainability of a public health care system. Not least, HTA intends to contribute to improved population health. It is therefore an inherent characteristic of HTA that the research results and its 'products' are to be used by the defined target groups.

To legitimize further research, as well as to guarantee benefits of HTA research and to prioritize future research, we need to evaluate whether the work thus far has had an impact on the Austrian health care system. This is especially interesting because, unlike other countries, there have not been any (legally binding) requirements to use the results produced by the institute in decision making.

Based on these considerations, we initiated a research project to evaluate the impact of HTA research that has been conducted at the ITA and at the LBI-HTA. From the multiple dimensions of impact that we addressed during the evaluation project, we focus in this study on one element, which is the impact of HTA research on reimbursement/investment and disinvestment decisions that may have consequences for volumes supplied, expenditure/or resource distribution. Hereby we

We are grateful to our interview partners for their time and their valuable information, and to all the persons who provided data for the project. There are no sources of funding.

Table 1. Reimbursement Processes for Austrian Health Care Services

Type of service	Prevention	Outpatient health care (by contracted physicians and health care professionals)	Hospital care	Pharma-ceuticals
Decision making processes and bodies	**Examples** • Vaccination: Ministry of health recommends vaccinations based on expert-advisory board; Ministry, social health insurance and regional governments decide on reimbursement • Mother-child medical card: Ministry of health and social health insurance decide on reimbursement of services based on expert-advisory board • Preventive check-ups: Social health insurance decides on reimbursement based on negotiations with physicians' chamber and quality criteria	Social health insurance decides on reimbursement of services and on the tariffs for these services based on negotiations with statutory interest groups (e.g. physicians' chamber for medical services; physiotherapy association for physiotherapy services)	• Treatment Hospital services are financed via a predefined budget that comes from social health insurance funds and taxes. Reimbursement is based on diagnoses and on a benefit catalogue on reimbursable single medical procedures. Representatives of payers and providers negotiate on the inclusion of those procedures into the catalogue • Infrastructure and personnel decisions are made by single hospitals, hospital associations and/or by regional governments depending on the region and on type/size of investment	Social health insurance decides on reimbursement based on recommendation by medicines evaluation commission. Criteria of 'efficacy', 'quality', 'safety' and 'efficiency' must be fulfilled

Source: Based on information from Antony et al. (3) and Hofmarcher and Rack (9)

address the question of whether HTA research at the ITA and at the LBI-HTA has had an impact in terms of rationalization (reducing oversupply) or re-distribution of resources into evidence-based technologies, and we attempt to calculate this in monetary dimensions.

METHODS

To evaluate the impact on reimbursement/investment and disinvestment decisions and the monetary consequences of that, we first identified all HTA reports produced for that purpose at the ITA and LBI-HTA until April 2010. In other words, we included all the reports that were produced because either the representatives of the funding partners of the LBI-HTA or the third-party payers had expressed their interest in using them for reimbursement/investment or rationalization decisions (which does not guarantee that reports are used in the decision making at the end of the day).

We clustered the reports into two categories according to whether they were intended to be used before reimbursement/investment decisions (category 1) or for disinvestment of oversupplied technologies at a later stage (category 2). In the former cases, we hypothesized that using the HTA report in prospective planning may have resulted in a more active resource allocation toward evidence-based technologies or in avoiding spending for technologies that have not demonstrated a favorable benefit-risk relation. Technologies from the latter category were characterized by disproportionally high uptake or excessive prices, while evidence for their usage was missing. In those cases, the hypothesis was that HTA reports may have resulted in disinvestment of over-supplied or over-priced technologies and, ultimately, in rationalization.

Next, we evaluated the impact by analyzing two empirical sources, which were administrative data from hospitals and social health insurance funds, on the one hand, and interview data from representatives of administrations and payers, on the other hand.

Administrative data included longitudinal information on quantities of technologies or services supplied and the tariffs that have been paid for these technologies. They come from different sources (hospital associations, single hospital units, Ministry of Health, health insurance bodies) and cover different time periods, depending on the technology in question. Furthermore, these data showed whether new technologies from category 1 were included into the publicly funded hospital or health insurance benefit baskets after our report had been published, and which conditions inclusion was based upon.

Quantitative analysis of administrative data was done descriptively. Based on methods identified in the literature (4;10;11), we first analyzed the observed development of volumes and prices, then extrapolated volumes and prices before publication of the HTA report and compared the figures to the real data. By calculating the differences, we generated some rough estimates about cost-containment and re-distribution potentials.

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Interview data were from qualitative interviews where (among other issues) fifteen interview partners were asked how the information produced by the ITA and the LBI-HTA had been used and what the consequences were. In cases where interviewees addressed costs or expenditure, information on their quantitative dimensions was requested. Data were analyzed according to the standards of qualitative text analysis (6;20;21). Whenever interview results are referred to in the result section, the according interview number will be indicated in brackets.

While this method does not allow for identifying causal relationships between HTA research and its effect, we were able to present a rich picture of different perspectives. It was also possible to contrast the results by combining two empirical methods and the data thus obtained. This should enable us to construct a convergent picture of the impact of HTA on reimbursement/investment or disinvestment decisions.

RESULTS

From the fifty-one full HTA reports that had been produced until April 2010, eleven fulfilled our inclusion criteria. Furthermore, of three report-series on rapid technology assessment, we included all the reports from the series on single hospital procedure assessment ($n = 42$) and from the series on rapid assessment in oncology ($n = 9$), as well as seven of thirteen further rapid technology reports (see Figure 1).

Six full HTA reports, all those from the rapid technology assessment series on medical procedures in hospitals and on oncological technologies, and five further rapid assessment were mainly used in the decision-making processes *before* the technologies entered the publicly financed domains or before decisions on personnel, infrastructure or general organizational structures had been made. These reports were therefore attributed to category 1. In contrast, the remaining five full HTA reports and two further rapid assessments addressed technologies that had already been included in the publicly funded benefit catalog before the HTA project (category 2).

IMPACT OF REPORTS PRODUCED FOR REIMBURSEMENT/ INVESTMENT DECISIONS

Interview data suggests that in the case of extracorporeal shock wave therapy, the HTA report strengthened the decision by the health insurance fund not to reimburse this type of therapy due to a lack of evidence of its benefit for patients (interview 3). Furthermore, in at least one hospital association, intensive care units have been re-shaped according to the results in the report on intensive care. In other words, units have been re-organized instead of expanded in those hospitals "...where a reorganization has taken place since the report has been published" (interview 9).

Regarding the report on therapeutic conversation, interviews showed that it was used by the health insurance fund in negotiations with the physicians' chamber, which had demanded a higher fee for conversation services. The fee was not increased based on the argument of missing evidence (interview 3). An increase would have resulted in extra costs for the social insurance of 37 million Euros for the services that have since been provided.

Furthermore, as a result of the report on neonatal care for low-risk newborns, the original claim by medical personnel to use additional pediatricians in every single birth unit has been declined by hospital management, as this measure was judged in the HTA report to have only a minor effect on the health of newborns (interview 9). The employment of additional pediatricians would have cost at least 400,000 Euros per year. Instead, neonatal care was reinforced by increasing emergency personnel in high-volume birth units.

In the case of HPV vaccination, public funding was declined. As confirmed by two interviews (interviews 1 and 3), rejection was legitimized by the results of the HTA report. Public funding of the vaccination for girls would have resulted in costs of 12 million Euros per annum, although half of this amount might have been recouped by savings made elsewhere over the long-term (26). Although the minister did commit to improve screening instead of funding vaccinations, according to interview results this has not been done either (interview 3).

In contrast to former reports, the publication of the report on the role and positioning of university outpatient departments did not result in any identifiable consequences.

The report on antenatal care screening programs suggested the elimination of a single examination by an internal specialist due to a complete lack of evidence of efficacy. It was planned by the funders to shift the budget to two additional laboratory tests based on the HTA results. "Although the assessment showed that the service in question does not demonstrate any benefit, it is still part of the antenatal care program because the physicians' chamber has intervened at the ministry of health" (interviews 1 and 3). As a consequence, resources for the antenatal care program were increased instead of re-distributed to more evidence-based technologies.

Four rapid assessments concerned alternative medicine therapies. Use of those therapies had originally been prohibited by the health insurance funds. The reports demonstrated limited evidence for selected indications and were used by both negotiating parties (health insurance fund and physicians' chamber). As a result, the therapies have been removed from the list of prohibited therapies.

Since 2008, a selected number of high-tech hospital procedures have undergone a standardized rapid technology assessment by the LBI-HTA before a decision was made on the inclusion of the technology into the benefit catalog. Inclusion of a procedure into this catalog is associated with extra fee-for-service reimbursement. Interviews demonstrate that the documents are of high value for the members of the hospital funding boards, and that they have consequently been used in the

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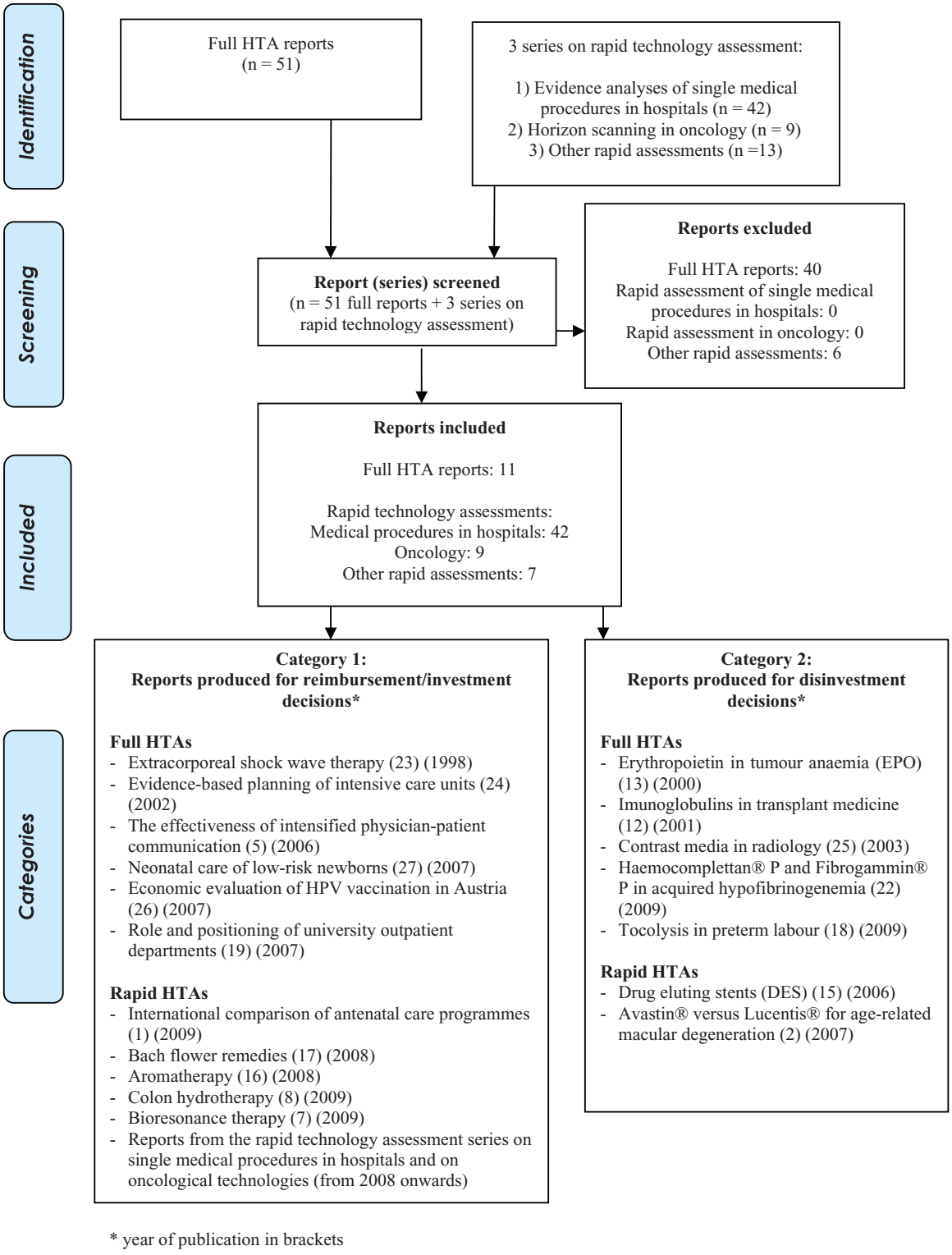

Figure 1. Flow chart of report selection

reimbursement negotiations despite the lack of (legal) requirements to do so (interviews 1 and 2).

Table 2 contrasts the recommendations in the reports with the decisions by the board. The table shows the type of recommendation in the report (not recommended, recommended with restrictions, recommended without restriction) and the corresponding decision by the financing board. Overall, forty-two reports have been used in negotiations by decision makers up until July of 2010. In thirty reports (72 percent), authors did not recommend inclusion of the technology into the benefit

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Table 2. Recommendations and Decisions for Inclusion of New Hospital Procedures Into the Hospital Benefit Catalog

Recommendations by LBI-HTA	No. ($n = 42$)	%	Decision by hospital financing board	No. ($n = 42$)	%	Consistency recommendation and decision
Not recommended for inclusion in benefit catalog because of limited evidence concerning efficacy and safety available or a lack of net benefit in comparison to alternatives	30	72	Not included in benefit catalogue Included with restrictions[a]	13 17	31 41	43%
Recommended for inclusion in benefit catalog with restrictions (and re-evaluation at later stage)	12	28	Included with restrictions [a] Not included in benefit catalogue Included without restrictions	6 5 1	14 12 2	50%
Recommended for inclusions in benefit catalog without restrictions	0	0	n.a.	n.a.	n.a.	n.a.
Total	42	100		42	100	

[a] For example, limited to institutions with specific infrastructure or qualification of personnel, to university hospitals or to specialized hospitals, reimbursement may be subject to interdisciplinary discussion on correct indication, treatment and post-treatment care.
n.a., not applicable.

catalog either because limited evidence of efficacy and safety was available or because the new technology did not demonstrate a net benefit in comparison to existing alternatives. The board followed the recommendations in thirteen cases (43 percent), whereas the procedure was included in the catalog in the remaining seventeen cases. Inclusion was, however, subject to defined requirements (e.g., limited to institutions with specific infrastructures), which was a novelty. In twelve reports (28 percent), authors recommended the technology for inclusion in the benefit catalog with restrictions. In six (50 percent) of these twelve technologies, decision makers followed the recommendation and included the technologies on the condition of meeting certain quality criteria. Inclusion was declined in five cases (42 percent); hence the decision was more restrictive than the recommendation. In one case the technology was included, although it had not been recommended in the report.

In summary, in 45 percent (19) of the reports, the recommendation and decision were totally consistent. In 41 percent (17), technologies that had not been recommended were included on certain conditions, while in 12 percent (5), the decision was more restrictive than the recommendation.

Similar to the decision support documents on single medical procedures, the rapid technology assessments in oncology have been helpful. According to interview results (interviews 4, 5, and 9), they were primarily used for establishing formal or informal clinical guidelines thereby limiting the volumes of these usually expensive technologies.

IMPACT OF REPORTS PRODUCED FOR DISINVESTMENT DECISIONS

Table 3 illustrates the quantitative dimensions of the economic impact for those technologies summarized under category 2. While we were not able to quantify the total impact for Austria, the table shows examples of economic effects in single hospital units or in regional public hospital associations.

Four full HTA reports and two rapid assessments identified an over-supply of the technology under evaluation and suggested a more selective use. In the case of Erythropoietin (EPO), 1 year after the report was published, the data from the affected regional hospital association (covering twenty hospitals) showed a reduction in both units consumed and expenditure. Compared with extrapolated data from 2001 to 2009, the observed volumes were reduced by more than 17,000 units. Taking into account price reductions per unit over time, this equates to 8.2 million Euros of reduced expenditure for EPO in this single hospital association. Interview data (interview 9) confirmed that the reduction in EPO units was influenced by the report and showed that the report triggered the introduction of administrative barriers when treating patients with EPO. However, the report did not raise medical personnel's acceptance of the recommendations or result in increased treatment rationality: "Well, physicians are so fed up with the administrative hurdles in the treatment with EPO that they simply don't use it that often anymore."

Furthermore, data from a single university hospital showed an extraordinarily high usage of immunoglobulins in transplant medicine, compared with other transplant clinics. A decrease in volumes can already be observed after 1998, but this was continued more clearly after 2001 when the HTA report was published. When administrative data between 2002 and 2009 are compared with the extrapolated average use between 1998 and 2001, it was estimated that 20,058 fewer units were consumed after 2001, equating to a reduction in expenditure of approximately 12 million Euros. Yet, while interview results confirmed the HTA report's key role in this process of change (interview 9), the number of immunoglobulin units consumed per transplantation is still much higher in this hospital than in other Austrian hospitals.

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Table 3. Examples of Economic Impact Due to Rationalization

Technology	Type of impact identified	Size of impact		
		Time period analyzed	Unit of analysis	Results
Technologies where over-supply was diagnosed				
EPO in tumor anemia	Reduction in volumes and expenditure	2001–2009	Public hospital association Styria (20 hospitals)	Volumes: −17,437 units Expenditure: −8.2 million €
Immunoglobulins	Reduction in volumes and expenditure	2002–2009	Single university hospital	Volumes: −20,058 units Expenditure: −12 million €
Drug Eluting Stents (DES) vs. Bare Metal Stents (BMS)	Reduction in volumes of DES, slight increase in volumes of BMS, yet big regional variations	2006–2008	All publicly financed hospitals in Austria	Volumes DES: −1,892 Volumes Bare metal stents: +285
Lucentis® vs. Avastin® in AMD	Slower increase of Lucentis volumes; Slower increase of expenditure; More patients could be treated	2006–2009	Single ophthalmology unit	Avoided extra costs 723,000 € +1,800 injections possible
Haemocomplettan® P	Reduction in volumes and expenditure	2009–2010	Single university hospital	Volumes: −10% to −25% Expenditure: −112,000 to −160,000 €
Tocolysis	No impact identified	–	Austrian province of Styria	–
Technologies where excess prices were diagnosed				
Contrast Media	Reduction in price and expenditure	2008	Viennese public hospital association	Expenditure due to price reductions: −1.1 million €

AMD, age-related macular degeneration; EPO, Erythropoietin.

In the case of drug eluting stents, the report was targeted at all public hospitals. While DES use decreased substantially after 2006 in some regions, this was not the case in other regions. Overall DES use decreased by 1,892 units between 2006 and 2008 compared with the extrapolated number of stents that had been used in 2006. Bare metal stent use increased by 285 units during the same time period. Data on expenditure were not available for this technology.

The case of Avastin® versus Lucentis® in the treatment of age-related macular degeneration (AMD) represents a special situation. While only Lucentis® has been approved for this indication, Avastin® is many times cheaper. Hence, supported by the results on the efficacy-safety profile in the report, Avastin® has been used off-label to some extent. Data were available from one single ophthalmology unit only. Although they have shown a steep increase in the use of Lucentis® since 2006, the fact that Avastin® was used in addition to Lucentis® resulted in a slower increase in expenditure than would have occurred using only Lucentis®. Overall, between 2006 and 2009, extra costs of 723,000 Euros were avoided in this ophthalmology unit. At the same time, an extra 1,800 injections could have been applied from the extra available resources. Interview data confirmed that cost containment also occurred in other hospitals (interview 4).

In the case of Haemocomplettan® P, which is used in the treatment of acquired hypofibrinogenemia, disproportionally high volumes have been observed in a single university hospital, compared with others. After the report on Haemocomplettan® P was published at the end of 2009, the volumes of Haemocomplettan® P consumed were reduced by 10 percent to 20 percent in the same hospital in the first quarter of 2010 alone. Estimated savings for this hospital were between 112,000 and 116,000 Euros in 2010. Again, the association with the HTA report was supported by interview data (interviews 4 and 5).

In contrast to the previous reports, no impact could be demonstrated from the assessment on tocolysis. According to interview data, hospital administrators who received the report failed to take active further measures and the report was pigeonholed without any further attention being paid to it: "When the report was published we forwarded it to the heads of the department, but we have not taken efforts to actively implement the results" (interview 9).

Finally, one category 2 assessment focused on prices rather than volumes. The study analyzed different types of radiology contrast media that were characterized at the time by considerable price differences. Because no difference in efficacy or safety was identified in the study, transparent and competitive

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bidding was opened for the products. According to the Viennese audit court (14) and confirmed by the interviews (interview 9), expenditure for contrast media in the Viennese hospital association was reduced by more than 1 million Euros.

DISCUSSION

The results demonstrate that the majority of the reports have been used in decision processes that were related to reimbursement/investment or disinvestment, and that they had at least had a selective effect on volumes supplied, expenditure and/or resource distribution.

Most frequently the impact was related to high-tech hospital technologies. Hence, the reports primarily affected hospital financing and expenditure. Additionally, the reports had an influence on expenditure for public health programs that are within the Ministry of Health's responsibility. To a smaller extent, expenditure for the social health insurances was affected by the reports.

While interview data supported the picture that was given by analyzing the administrative data, responses from the interviewees also made clear that changes in volumes or expenditure are not necessarily due to health professionals' increasing awareness or acceptance of HTAs, but may be due to organizational and administrative changes and regulations that were triggered and/or justified by the HTA reports. In other words, HTA plays an important role in the administrative processes of the health care system, but only a minor one at the level of the individual professionals.

However, some changes may also have been influenced by factors other than or in addition to HTA. For example, at the same time that our report on drug eluting stents was published, there was a controversial international discussion on the safety of this device, which may have triggered the changes in volumes we identified in the data. In the case of HPV vaccination, the media was full of reports on an unexplained death after a vaccine shot at the time the report was published. This negative attitude toward the vaccination may have been an additional factor that influenced the decision. Another example is the report on Avastin® versus Lucentis® in Ophthalmology. While interviews confirmed the important role of the report in avoiding excessive expenditure, a part of the effect may have been due to the medical doctors' increasing resistance to use the much more expensive Lucentis®.

Additionally, we do not know what the impact would have been without the LBI and ITA reports. For example, decision makers could have used reports from international HTA institutions or the same decisions would have been made without HTA reports. While the former scenario is rather unlikely because of the formal requirements for using HTA reports in Austria described in the introduction, the latter remains open for further investigations.

While reduced expenditure was demonstrated for several over-supplied technologies, it is not clear whether HTA simply resulted in cost-containment or whether the actual mission of the LBI-HTA—to re-distribute resources into evidence-based technologies for which there is an objective need—has been achieved. The case of HPV vaccination demonstrates the risk that HTA may be used selectively to simply contain costs. On the other hand, the standardized use of rapid technology assessments in annual negotiation processes on hospital procedures has demonstrated that at some levels HTA has been systematically rather than selectively included indecision making. The overall trend since the 1990s is that HTA was originally used mainly *after* technologies had been included into the publicly financed system, while more recently HTA has increasingly been used prospectively before reimbursement or investment decisions are made. To a large extent, decision makers have followed the recommendations in the reports indicating that technologies that lack a firm evidence-base no longer unrestrictedly diffuse into the publicly financed system.

The results demonstrate that doing HTA research within the current legal and organizational context requires strong HTA proponents at different levels within the Austrian health care system. Otherwise, the reports are neither known nor used in decision-making processes. As some examples have shown, even if the reports are used in decision making, they may not necessarily result in a rational decision because of powerful interest groups. This makes it clear that the impact of HTA is multi-dimensional and cannot be reduced to the question whether decisions follow the recommendations in the reports.

CONCLUSION

HTA has played an essential role in reducing the use of technologies which are not supported by a firm evidence base. This has resulted in reduced expenditure for single technologies for several providers. More recently, HTA has been systematically used in reimbursement decisions which may result in evidence-based re-distribution of resources in the long run. Nevertheless, there is considerable potential to increase the quantitative dimension of the impact on decision making and the related economic consequences in Austria. The impact of HTA, as demonstrated in this study, is only one of many dimensions of impact that may result from HTA. Further research is needed to determine whether HTA finally results in improved population health and overall better health care systems.

CONFLICT OF INTEREST

Both authors report having no potential conflicts of interest.

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