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HOSPITAL-BASED HEALTH TECHNOLOGY ASSESSMENT (HB-HTA): A 10-YEAR SURVEY AT ONE UNIT

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Introduction: Hospital-based health technology assessment (HB-HTA) has been introduced to help hospital management in decision making about the adoption of new health technologies (HTs). We reviewed the accuracy of the expected medical impact of HTs assessed at our hospital, as well as the acceptance of this process by clinicians.
Methods: For each HT adopted between 2002 and 2011, a semi-structured interview with the involved clinician was conducted, assessing (i) the perceived utility of the HB-HTA process, (ii) the accuracy of the new HT's expected medical impact as compared with observed patient data from the year 2012, and (iii) the compliance with the indications of the HB-HTA report.
Results: Over the 10-year period, forty HB-HTAs were carried out, of which thirty-four led to acceptance. Twenty-seven of the twenty-eight clinicians involved in these thirty-four HTs accepted the interview and 85 percent acknowledged the utility of the HB-HTA process. Five of the thirty-four HTs were no longer in use. For the twenty-nine remaining HTs, observed patients' number was as expected in eight, higher in four, lower in fifteen, and not available in two cases. Available average length of stay was 61 percent longer than expected. Two HTs had a higher complication rate and three a lower success rate. Indications evolved in 55 percent of HTs after a few years (seven restrictions, six broadenings, and three other changes).
Conclusions: A HB-HTA process is useful to improve quality in decision making. Follow-up analysis should routinely be performed to adapt HB-HTA reports' conclusions to practical experience and new scientific evidence.

Keywords: Health technology assessment, Hospital, Clinical practice

Health technology assessment (HTA) has been established as a useful tool to inform decision makers about the real value of a specific health technology (HT) in a given healthcare system (1). Some states have set-up a national institute for HTA, such as the National Institute for Healthcare Excellence (NICE) in England, the Haute Autorité de Santé (HAS) in France, or the Swedish Council on Technology Assessment in Healthcare (SBU) in Sweden. These institutes produce reports summarizing an extensive assessment of a given HT, which takes months if not years to complete.

University hospitals are usually the entry point for new HTs. As they are frequently more expensive than existing treatment, their introduction may lead to financial imbalance if it is not adequately managed. To assist the hospital directorate in making a sound science-based decision about introducing a new HT, some hospitals created hospital-based HTA (HB-HTA) units. These units allow producing timely HB-HTA reports, tailored to the hospital context (2). However, the impact of such HB-HTA reports has seldom been studied. A recent systematic review (3) including eighteen studies showed that only four of them reported the impact of the HB-HTA reports and recommendations on hospital decision making. Two of these studies were carried out in Canada: one over 5 years at a surgical department in Calgary (4), and the other one over 8 years at a teaching hospital in Montreal (5). The other two studies were carried out in Europe: one from the HB-HTA unit (CEDIT) covering nineteen university hospital in the region of Paris, France (6), and the other one from the Ludwig Boltzmann Institute (LBI-HTA) serving the whole hospital system in Austria (7).

In Switzerland, no national institute for HTA exists, but Lausanne University Hospital created a HB-HTA unit in 2002. After 10 years of activity, we wanted to assess the HB-HTA process's utility as perceived by our clinicians, and the accuracy of the HB-HTA reports and recommendations over time.

METHODS

All HB-HTA reports published between 2002 and 2011 by our HB-HTA unit were retrieved. For each HT accepted by the hospital management, a semi-structured interview with the clinician responsible for using the HT was conducted by an investigator not involved in the HB-HTA process (XG). The structure of the interview is displayed in Table 1. The interview aimed at assessing (i) the utility of the HB-HTA process as perceived

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Table 1. Semi-structured Interview Guide: Retrospective Assessment of the HTA Process

1. Did you personally take part to the assessment carried out by the HTA unit (yes/no)?
2. What reasons let you ask for a technology assessment?
3. How many hours and how many people were necessary for the assessment process?
   - Writing the request
   - Collaborating to writing the report
4. What kind of advantages did you experience with the assessment process?
5. What kind of difficulties did you meet during the assessment process?
6. What points could be improved?
7. Do you consider this process as necessary and/or useful (yes/no)?
8. Medical considerations
   1. Was the assessment report communicated within the clinical department (yes/no)?
   2. Were clinical indications as described in the report respected when the new technology was implemented (yes/no)?
   3. Were the clinical indications mentioned in the report applicable in clinical practice (yes/no)?
   4. Are these clinical indications still valid today (yes/no)?
   5. Were the indications enlarged or restricted (yes/no)?
   6. Was the forecasted activity observed (0 = lower, 1 = as forecasted, 2 = higher)?
   7. How many patients were treated in 2012?
   8. Is the forecasted setting of care (outpatient – inpatient) still valid (yes/no)?
   9. Is the clinical pathway of a patient treated with this technology still valid (yes/no)?
   10. Was the forecasted length of stay observed (0 = lower than forecasted, 1 = as forecasted, 2 = higher than forecasted)?
   11. Was the observed human workload induced by this new technology in accordance with the estimated one (duration of treatment (hours), human resources need (FTP) (0 = lower, 1 = as planned, 2 = higher)?
   12. Was the expected success rate observed (0 = lower, 1 = as expected, 2 = higher)?
   13. Was expected complication rate observed (0 = lower, 1 = as expected, 2 = higher)?
   14. Would you think necessary to reassess clinical indications after a certain period of time (yes/no)?
   15. Was the clinical follow-up requested in the HTA report carried out (yes/no)?

by the clinicians; (ii) the accuracy of the expected medical impact of the new HT as described in the HB-HTA report; (iii) the compliance with the indications for treatment as defined in the HB-HTA report at the time of assessment. The interviews were recorded and reported by the investigator on a separate file for each HT, checked for completeness and accuracy by the senior author (JBW), and summarized in a tabular format. These results were used by the investigator to fulfil the requirements of his master degree in medicine (internal report available in French).

The first objective, the utility of the HB-HTA process as perceived by the clinicians, was assessed qualitatively on the basis of the clinicians' answers to the questionnaire.

The second objective, the accuracy of the expected medical impact of the new HT as described in the HB-HTA report, was assessed quantitatively and qualitatively. The administrative data of patients treated in the year 2012 with each HT included in the study were retrieved from the hospital information system. Number of patients, type of setting (inpatient or outpatient), length of stay (LOS), price of the HT described in the HB-HTA report at the time of assessment were compared with the 2012 patient data. They were rated as concordant for ratios ±20 percent, and otherwise higher or lower. The accuracy of the expected success and complication rates were assessed qualitatively during the interviews with the clinicians.

The third objective, the compliance with the indications for treatment as defined by the HB-HTA report at the time of assessment, was assessed qualitatively. The evolution in the indications for the new HT was assessed during the interview with the clinicians, and categorized into "same," "broadened,, "restricted," or "modified." We finally examined whether there was a correlation between the concordance in patient numbers (concordant, lower of higher) and the evolution in indications.

RESULTS

Over the 10-year period, forty HB-HTA reports were issued, of which thirty-four (85 percent) were approved by the hospital management for clinical use. The list of assessed HTs is displayed in Table 2, together with the year of assessment and the decision of the hospital management.

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Table 2. List of HTA Reports with Their Most Important Characteristics

HTA report	Year	Decision	No. of patients per year		Concordance	Evolution of indications
			Expected	Observed (2012)		
Sirolimus-eluting stent for acute coronary syndrome	2003	Accepted	100	Abandoned	NA	
Left ventricular assist device for end-stage heart failure	2003	Accepted	3	Abandoned	NA	
ExPRESS miniature tube shunt for advanced glaucoma	2003	Accepted	50	Abandoned	NA	
rtPA for acute treatment of ischemic stroke	2003	Accepted	20	120	Higher	No
Intracardiac echocardiographic guidance during transcatheter device closure of patent foramen ovale	2004	Accepted	25	25	Yes	No
Minimal invasive parathyroid surgery	2005	Accepted	15	17	Yes	No
Percutaneous kyphoplasty for vertebral fractures	2005	Denied				
Photoselective vaporization for prostate cancer	2005	Accepted	120	15	Lower	Restriction
Photodynamic therapy for early bronchial and esophageal cancers	2006	Accepted	5	Abandoned	NA	
Hypnosis in major burns	2007	Accepted	30	24	Yes	Broadening
Excimer laser-assisted nonocclusive anastomosis for intracranial bypass	2007	Denied				
Motion Maker™ robot for neuromotor rehabilitation	2008	Denied				
Percutaneous or transapical aortic valve replacement (TAVI)	2008	Accepted	20	36	Higher	Modification
RE-MOTION™ total wrist prosthesis	2009	Accepted	7	Missing	NA	
Hexvix™ for detection of bladder cancer	2009	Accepted	68	73	Yes	Restriction
Propofol for endoscopy	2009	Accepted	4'600	700	Lower	No
Cerebral micro dialysis for patients with traumatic brain injury	2009	Accepted	40	23	Lower	No
Single-use external fixation system Xpress™ for fracture reduction	2009	Accepted	36	4	Lower	Modification
FLIXENE™ graft for hemodialysis access	2009	Accepted	40	16	Lower	No
Microporous stent grafts for cerebral aneurysms	2009	Accepted	5	2	Lower	Broadening
Penile implant for gender reassignment surgery	2010	Accepted	3	2	Lower	No
SuperDimension® lung navigation system for bronchoscopy	2010	Accepted	100	8	Lower	Restriction
Clofarabine for treatment of acute leukemia	2010	Accepted	5	1	Lower	Broadening
Plerixafor to mobilize hematopoietic stem cells for autologous stem cell transplantation	2010	Accepted	7	8	Yes	Restriction
BarrX system for radiofrequency ablation in Barrett's esophagus	2010	Accepted	10	10	Yes	Restriction
SpyGlass® direct visualization system for cholangioscopy	2010	Accepted	15	7	Lower	Restriction
Intra-operative radiotherapy (IORT) for breast cancer	2010	Denied				
Chlorhexidine-impregnated sponges for central venous catheters dressings in intensive care	2010	Accepted	3'000	20'000	Higher	Broadening
Radioembolization for hepatic metastases	2011	Accepted	20	29	Higher	Broadening
Melody Valve™ for transcathether pulmonary valve therapy	2011	Accepted	2	2	Yes	No
Hyperthermic intraperitoneal chemotherapy	2011	Accepted	12	8	Lower	Restriction
Cryotherapy ablation of tumors	2011	Accepted	30	24	Yes	Broadening
3D scanning for protective helmets after craniotomy	2011	Accepted	10	Missing	NA	
eSVS Mesh graft for coronary bypass	2011	Denied				
Percutaneous closure of the left atrial appendage for atrial fibrillation treatment	2011	Accepted	10	2	Lower	No
Percutaneous mitral valve repair	2011	Accepted	10	3	Lower	No
Renal sympathetic denervation for resistant hypertension	2011	Accepted	20	10	Lower	No
Endovascular treatment for ruptured abdominal aortic aneurysms	2011	Accepted	7	3	Lower	Modification
Sutureless aortic valve replacement	2011	Accepted	10	Not yet in use	NA	
Kyphoplasty for acute vertebral compression fractures	2011	Denied				

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Utility of the HB-HTA Process as Perceived by Clinicians

Out of the twenty-eight clinicians responsible for using these thirty-four HTs, twenty-seven accepted the interview; 85 percent of them (23/27) acknowledged the utility and necessity of the HB-HTA process. For thirteen of them (48 percent), continuous improvement in care provided to patients justified that the hospital takes action to introduce new HTs. For six of them (22 percent), the HB-HTA process provided a welcome frame and support in case of serious complications experienced with the use of the HT. For six of them (22 percent), the HB-HTA process mandated creating protocols of use and assessing the clinical impact of the HT, which were favorably considered. Budgetary impact assessment was mentioned as a limiting factor only by four clinicians (15 percent). A negative opinion was expressed by only four clinicians (15 percent), who considered the process as useless and an additional hurdle set-up by the hospital administration. However, the HB-HTA reports remained rather confidential, as they were not diffused to their colleagues inside the involved clinical service by twenty-two of the twenty-seven responsible physicians (81 percent).

Accuracy of the Expected Medical Impact of the New HT as Described in the HB-HTA Report

Of the thirty-four HTs adopted, five (18 percent) were not in use in 2012 (Table 2): two had been withdrawn (ExPRESS tube for glaucoma, photodynamic therapy for bronchial and esophageal cancer), two replaced by another HT of the same nature (sirolimus stent, left ventricular assist device), and one was awaiting introduction (suture-less aortic valve). Of the twenty-nine remaining HTs, the observed number of patients treated in 2012 was in accordance with expectations (±20 percent) in eight cases (28 percent), higher than expected in four cases (14 percent), lower in fifteen cases (52 percent), and not available in two cases (7 percent). Detailed distribution of the observed versus expected numbers of patients are displayed in Table 2.

A modification in the setting of treatment was observed in four cases: in two of them, when both outpatient and inpatient treatments were planned, but inpatient treatment was preferred (endocavitary guidance for foramen ovale closure, cryotherapy for cancer). On the other hand, a shift to outpatient treatment was observed in two other cases, for which it was considered as possible (Spyglass cholangioscopy, liver radioembolization).

LOS could be assessed in eighteen of twenty-nine HTs (67 percent). For eleven of them, the LOS was not reported in the HB-HTA report, as the new HT was expected to have no impact on it. For the seven others, the observed LOS in 2012 was higher than forecasted by an average of 61.2 percent.

Price of HTs was available in fourteen of twenty-nine HTs (48 percent). The price of devices observed in 2012 was higher than expected for nine of them (64 percent) and lower for five of them (36 percent). Most of these variations were linked with fluctuations in devices' prices.

Two HTs had a higher complication rate than expected. For one (Biopatch with chlorhexidine), complications were mild and did not prevent its use, while for the other (Sunchip system for hypothermic intra-abdominal chemotherapy), complications were severe and limited its use to selected cases.

In three of twenty-nine HTs (10 percent), a diminution in expected success rate was reported. In two cases (Green light PVP laser and Superdimension bronchoscopy system), pre-existent alternatives were preferred, while for the third one (cerebral micro-diagnosis for patients with traumatic brain injury), its use was not questioned despite an observed failure rate of 20 to 30 percent, as no real alternative exists.

Finally, we discovered that two HTs were not used as forecasted because the necessary staff increase had not been accepted by the hospital directorate (Propofol use in endoscopy and hypnosis in major burns).

Compliance with the Indications for Treatment as Defined in the HB-HTA Report at the Time of Assessment

Indications as mentioned in the HB-HTA report were initially followed in 26 out of twenty-nine HTs (90 percent). For the past three, technical difficulties limited its use in one HT (Microporus stent grafts for treating cerebral aneurysm), while the infrastructure necessary for using the Superdimension lung navigation system for bronchoscopy was not available for all patients as initially planned. Finally, compliance with indications could not be assessed in the third HT (sutureless aortic valve replacement), as it had not been introduced at the time of the study.

Over time, indications changed in sixteen of twenty-nine HTs (52 percent). Indications were broadened for six, and restricted for seven of them. For the last three of them, a modification of the spectrum of use by the addition of another HT or a change in treatment modality was observed. Detailed results for each HT is displayed in Table 2. There was no correlation between the evolution in indications overtime and the concordance in forecasted versus observed patient numbers.

Finally, clinician preferences seemed to play an important role. Clinicians taking over responsibility for the field in which their predecessors had required the introduction of a given HT did not always share the same opinion about the utility of this HT (one example was the Superdimension bronchoscopy system). As a consequence, the HT was not used as initially forecasted.

DISCUSSION

This study allowed assessing the impact of a HB-HTA process and unit at a university hospital, and found that the accuracy of HB-HTA reports forecasts was limited, especially in the long-term.

Although such studies are still scarce, four of them were previously published, but each with a somewhat different focus.

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Poulin et al. (4) retrospectively assessed the 5-year HB-HTA activity of a unit located in a surgical department in the Calgary Health Region in Canada, and described the difficulties linked with the approval or rebuttal of 68 clinician requests, so that conditional approval appeared as the best way to avoid selecting and investing in inefficient HTs.

In Canada as well, but in Montreal, McGregor and Brophy (5) summarized the 8-year experience of the HB-HTA unit at McGill University Centre, focusing on the budget impact of the decision process in fifty-five requests. Rejecting nearly half of them allowed saving amounts up to several million dollars per year.

In France, Bodeau-Livinec et al. (6) assessed the activity of the CEDIT (French translation of the Committee for the Assessment and Dissemination of Technological Innovation), serving the thirty-nine university hospitals in the Paris region. Of thirteen HB-HTA reports produced over a 4-year period (1995–98), ten had a definite impact on the adoption or rebuttal of the HTs by the hospitals' directorates.

Finally, in Austria, the Ludwig Boltzmann Institute for HTA, responsible for HB-HTA for the hospitals of the whole country, published forty-two rapid HTA reports over a 10-year period, with a high rate of negative recommendation (72 percent). Even if hospitals only partly followed the recommendations (in approximately 50 percent of the cases), they saved again several million € over the whole period.

As compared with these other four studies, our adoption rate of 85 percent was rather high. Therefore, our study design focused on the practical impact of adopted HTs in an effort to identify the unwanted consequences of this hospital policy. We discovered several of them, which will be discussed below.

First, our study showed that follow-up of the impact of HB-HTA reports was hampered by technical difficulties in retrieving data for thoroughly assessing the long-term outcome of these new clinical practices. For example, available data allowed assessing LOS in only eighteen of thirty-four HTs (53 percent). A specific effort to collect appropriate data is unavoidable if close monitoring is contemplated.

The matter is further complicated by the fact that initial projections can be subjected to several distortions. Most estimates tended to be over-optimistic about the number of patients likely to be treated by the new HT and the corresponding LOS. Then, the success rate of a new HT was sometimes limited by its impact on the availability of hospital's infrastructure and/or human resources. These two aspects should be assessed at the same time as the HT to grant a global approval before HT introduction.

Furthermore, clinical practice is relentlessly evolving, so that indications and physicians' preferences tend to change over time, explaining some of the discordances found between forecasted and observed patient numbers. This reality should be incorporated into the impact assessment of any new HT on a long-term basis. Revision of indications and recommendations at regular intervals should be carried out to limit this kind of surprise.

On the other hand, the finding that the acknowledgment of the HB-HTA process's utility among clinicians was quite high (85 percent) is encouraging. This figure is very similar with the findings of two earlier studies, reporting 80 percent (8) and 76 percent (9), respectively.

However, our survey has several limitations. Our HB-HTA unit serves a single hospital and issued a small number of HB-HTA reports. In addition, it did not address the financial impact the decisions had on the hospital's budget, or the clinical impact they had on patients' outcome. These two important issues should be incorporated into future follow-up studies.

CONCLUSION

Our survey at Lausanne University Hospital adds useful information from an additional country (Switzerland) to the few studies published over the effects and impact of local HB-HTA reports (two from Canada, one from France, and one from Austria), which was recently reviewed (3). Its main message is that routine follow-up of HB-HTA reports is very important to inform the hospital management about the outcome of its decisions. HB-HTA was recently made more visible by the handbook issued by the European "AdHopHTA" project (Adopting Hospital-based Health Technology Assessment) (2). This work should make it possible for every hospital to acquire the tools and skills to better assess the real value of new HTs. Only with this information can quality and safety of care be guaranteed, and reasonable investment decisions be taken.

CONFLICTS OF INTEREST

None declared.

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