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TECHNOLOGY ASSESSMENT IN HOSPITALS: LESSONS LEARNED FROM AN EMPIRICAL EXPERIMENT

Emanuela Foglia
Centre for Research in Health Economics, Social and Health Care Management, University Carlo Cattaneo – LIUC

Emanuele Lettieri
Department of Management, Economics and Industrial Engineering, Politecnico of Milano
Centre for Healthcare Improvement, Chalmers University (Sweden)

Lucrezia Ferrario
Centre for Research in Health Economics, Social and Health Care Management, University Carlo Cattaneo – LIUC
lferrario@liuc.it

Emanuele Porazzi, Elisabetta Garagiola, Roberta Pagani, Marzia Bonfanti
Centre for Research in Health Economics, Social and Health Care Management, University Carlo Cattaneo – LIUC

Valentina Lazzarotti, Raffaella Manzini
School of Industrial Engineering and Management, IIEM, University Carlo Cattaneo – LIUC

Cristina Masella
Department of Management, Economics and Industrial Engineering, Politecnico of Milano

Davide Croce
Centre for Research in Health Economics, Social and Health Care Management, University Carlo Cattaneo – LIUC
School of Industrial Engineering and Management, IIEM, University Carlo Cattaneo – LIUC

Objectives: Hospital Based Health Technology Assessment (HBHTA) practices, to inform decision making at the hospital level, emerged as urgent priority for policy makers, hospital managers, and professionals. The present study crystallized the results achieved by the testing of an original framework for HBHTA, developed within Lombardy Region: the IMPlementation of A Quick hospital-based HTA (IMPAQHTA). The study tested: (i) the HBHTA framework efficiency, (ii) feasibility, (iii) the tool utility and completeness, considering dimensions and sub-dimensions.
Methods: The IMPAQHTA framework deployed the Regional HTA program, activated in 2008 in Lombardy, at the hospital level. The relevance and feasibility of the framework were tested over a 3-year period through a large-scale empirical experiment, involving seventy-four healthcare professionals organized in different HBHTA teams for assessing thirty-two different technologies within twenty-two different hospitals. Semi-structured interviews and self-reported questionnaires were used to collect data regarding the relevance and feasibility of the IMPAQHTA framework.
Results: The proposed HBHTA framework proved to be suitable for application at the hospital level, in the Italian context, permitting a quick assessment (11 working days) and providing hospital decision makers with relevant and quantitative information. Performances in terms of feasibility, utility, completeness, and easiness proved to be satisfactory.
Conclusions: The IMPAQHTA was considered to be a complete and feasible HBHTA framework, as well as being replicable to different technologies within any hospital settings, thus demonstrating the capability of a hospital to develop a complete HTA, if supported by adequate and well defined tools and quantitative metrics.

Keywords: Hospital based health technology assessment, HBHTA, Health care technology, Hospital, Decision making

The Italian National Healthcare Service (NHS), within all its Regional components, is facing the challenge of modernizing the current paradigms of care to deliver "*more for less*" (1). In this regard, the capability to select and implement the most promising innovations has emerged as a priority for both policy makers and scholars of technology assessment, because healthcare technologies represent one of the leading causes of increased expenditure (2). The paradox of financing the continuous innovation of current services, while avoiding an unsustainable increase of expenditure in the short-term, may be overcome through the wide diffusion of health technology assessment (HTA) practices (3). HTA aims at providing decision makers with relevant and reliable information that matches different perspectives in a coherent and evidence-based overview (4).

This *modus operandi* should be agreed and implemented across the different levels where decisions regarding innovations are taken (i.e., national or regional healthcare system, organizational/hospital, individual/professional) (5). Although these levels agree with this vision, their maturity regarding the implementation of HTA practices still differs (6). At the institutional level, prestigious and well-established HTA Agencies such as the National Institute for Clinical Excellence (NICE) in England and the Comité dÉvaluation et de Diffusion des Innovations Technologiques (CEDIT) in France have paved the way for the definition of generally accepted good practices for the production of HTA reports that are useful to policy makers for designing their policies. At the professional level, the diffusion of practices, inspired by the evidence-based medicine

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philosophy and of clinical guidelines generated by systematic literature reviews and meta-analyses, have legitimized decision-making processes regarding technologies and health strategies that should be preferred in terms of effectiveness, efficiency and safety.

However, at the hospital level, little has been investigated to date, and hospital decision makers are left without clear guidelines and good practices regarding how to select investments in healthcare technologies that are *value for money* (7;8).

On the one hand, the various frameworks developed at the institutional level such as the EUnetHTA Core Model (9), the EVIDEM model for a multi-criteria appraisal (10–12), as well as the traditional cost-effectiveness analysis (CEA), have proved to: (i) be inconsistent with the severe constraints hospitals have in terms of time and resources available for the assessment exercise; (ii) be disconnected with respect to the administrative processes already in place in hospitals, such as budgeting and clinical risk management (13); and (iii) overlook the organizational impacts resulting from the adoption of new technologies/routines (5). On the other hand, the various frameworks developed specifically for HBHTA, for example, the Danish Mini-HTA (14), the essential questions check-list (15), the value/sustainability matrix (13), and the criteria for disinvestment (16), have not emerged as widely diffused practices and have remained local or anecdotal.

Despite the relevance of all the above-mentioned frameworks, they share similar limitations that have encouraged further research. First, they suggest a qualitative approach to technology assessment that does not provide decision makers at the hospital level with quantitative syntheses, as advocated by the consolidated Multi-Criteria Decision Analysis (MCDA). Second, they do not crystallize the metrics that should be used to measure the impacts of different comparable technologies, thus limiting the replicability of the analyses. Third, they are stand-alone proposals for HBHTA that do not guarantee the coherence, as well as the potential integration between the organizational/hospital and the healthcare system/institutional levels.

Some of these limitations, the last two in particular, have recently been addressed within the European project "AdHopHTA" that aims at providing decision makers at the hospital level with guidelines to implement HTA practices in hospitals (17).

The proposed study presents the results achieved through a 3-year experiment developed in the Northern Italian Regions, concerning the implementation of an original HBHTA framework that mitigates the three limitations described above This framework, namely IMPAQHTA (IMPlementation of A Quick hospital-based HTA), (i) has been developed in adherence to the institutional HTA program established in the Lombardy Region (18); (ii) provides hospital decision makers with quantitative data to support their assessments, thus endorsing the diffusion of the MCDA philosophy; and (iii) crystallizes the rationale and the metrics for all dimensions and sub-dimensions of analysis.

MATERIAL AND METHODS

Research Scope

The present study, focusing on the wide implementation in the field of the IMPAQHTA framework, aimed at testing its performances for supporting HBHTA practices in terms of: (i) efficiency, (ii) feasibility, (iii) utility and completeness, considering the related dimensions and sub-dimensions. This "real world" experiment is part of a broader strategy in the Lombardy Region for the institutionalization of HBHTA practices, linked with the Regional HTA activities.

The framework leverages on the dimensions required by the generally accepted Core Model developed by the EUnetHTA Consortium (9). In addition, the IMPAQHTA proposes thirteen sub-dimensions (i.e., the criteria) that should be taken into account for an effective and efficient HBHTA practice. The framework balances completeness (i.e., the capability to cover all the EUnetHTA dimensions) and timeliness (i.e., the capability to deliver the assessments timely) as required in hospitals (13). Furthermore, the framework suggests quantitative metrics for each of the sub-dimensions to provide decision makers with a quantitative and coherent synthesis, as required by EVIDEM (11;12) and in the use of Multi-Criteria Decision Analysis (MCDA).

Table 1 summarizes its dimensions, sub-dimensions and quantitative metrics.

Research Design

The testing aimed at verifying the capability of the framework to provide hospital decision makers with relevant information regarding the technologies under assessment against severe time constraints. In this regard, a rich empirical experiment was designed for the collection of data about several technologies (e.g., drugs, large versus small size equipment, clinical procedures, clinical pathways, ICTs, and medical devices) at a different level of their maturity (e.g., innovative versus consolidated), assessed by different types of HBHTA teams (e.g., mono-disciplinary versus multi-disciplinary; mono-dimensional versus multi-dimensional), within different hospital settings (e.g., small versus large, rural versus city, teaching versus nonteaching, private versus public). This heterogeneity of situations offered the opportunity to verify the generalizability of the IMPAQHTA framework. Further details regarding the empirical testing are provided in the Results section.

All the professionals within the HBHTA teams attended a dedicated 12-day pretraining course aimed at providing them with an in-depth understanding of technology assessment methodology at both the national/regional and organiza-

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Table 1. IMPAQHTA Dimensions and Sub-dimensions

Dimensions	Rational	Sub-dimensions	Quantitative measures
General relevance	Scientific and empirical evidence analysis aimed at providing a comprehensive description of the general relevance for both the technology and the population	Quality of scientific evidence	Considering four dimensions (quality of scientific evidence concerning the comparators, consistency, completeness and utility of the results), using a four-item evaluation scale derived from 'Get Five' approach: the higher the average measure, the more preferable the technology
		Description of the pathology and the related technologies	• Prevalence or incidence of the pathology affecting the population related to the catchment area of reference (local, regional, national, etc.) • Number of potential patients treated with the innovative technology, divided by the population affected by the specific analysed disease
Safety	This dimension leads to the evaluation of: • adverse events, mortality, or morbidity • consistency of the innovative technology with health and safety policies • consistency of the innovative technology with its Guidelines or Protocols	Seriousness of adverse events (mild, moderate or severe adverse events)	• Incidence of adverse events, divided by the population treated with the technology • Mortality and morbidity rates • Administration of a qualitative questionnaire aimed at rating the consistency of the innovation with regard to: (i) health and safety policy and (ii) guidelines and protocols, using a 7-item Likert Scale (the higher the average measure, the more preferable the technology)
Efficacy	Analysis of the efficacy data retrieved from the scientific literature, referring to how the innovative technology performs in the clinical trials	Efficacy data	i.e. mortality rate related to the use of technology, percentage of success of the treatments compared, sensitivity or specificity of diagnostic images, etc. revealed in randomised controlled trial or literature evidence
Effectiveness	Analysis of the effectiveness data of the innovative technology, based on the hospital setting, referring to how the innovative technology works in the real world evidence and in community settings	Effectiveness data	i.e. mortality rate related to the use of technology, percentage of success of the treatments compared, sensitivity or specificity of diagnostic images, etc. based on the real hospitals setting in which technologies are adopted
Economic financial Impact	Economic and financial impact evaluation, considering: (i) the healthcare process taken into account, (ii) the new technology budget impact implementation, and (iii) the amount of resources spent in relation with effectiveness and efficiency outcomes	Activity Based Costing (ABC) Analysis	Process costs comparison considering all the direct costs, and, where possible, the indirect ones (the lower the economic value, the more preferable the technology)
		Complete Health Economic Evaluation	Cost-effectiveness, cost-utility and cost-benefit analysis, calculated as pathway or process costs divided by the outcome indicator (measured with physical, humanistic, or economic units)
		Budget Impact Analysis	Target population multiplied by the pathway or process costs (considering either the ceasing or the incremental costs, comparing at least two different scenarios)

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Table 1. Continued

Dimensions	Rational	Sub-dimensions	Quantitative measures
Equity	Evaluation of all aspects related to the introduction of the innovative technology, considering the perspective of the patient, and the following aspects: • access to care on a local level • access to care for the target treated population, including persons of a legally protected status • hospital waiting lists improvement • invasiveness	Equity data	Administration of a qualitative questionnaire aimed at rating the variables related to the equity dimensions, using a 7-item Likert Scale (the higher the average measure, the more preferable the technology)
Legal, social, and ethical impact	Analysis of the social and ethical issues that the innovative technology could have on the system, considering the following aspects: • customer satisfaction • productivity loss • market regulation	Legal aspects	Administration of qualitative questionnaires aimed at rating the variables related to the legal, social and ethical dimension, using a 7-item Likert Scale (the higher the average measure, the more preferable the technology)
		Social and ethical impact	Reduction in productivity loss (in terms of days, hours or minutes, evaluated considering the patient's gross monthly income)
Organizational impact	Evaluation of organizational changes occurring after the innovation implementation. The qualitative impact investigates the perception of clinicians, and health professionals, involved in this innovation change management. The quantitative impact aimed at the determination of the investment needed if organizational changes occur. The following aspects are investigated: • additional people • training courses • meetings needed to communicate the technological change • additional equipment, or spaces needed • learning time of the innovative technology	Quantitative impact	Ceasing or incremental costs evaluation and forecast, related to the adoption of the innovative technology in clinical practice, compared with the standard one, considering additional persons, training courses, additional equipment, spaces, or rooms needed
		Qualitative impact	Administration of qualitative questionnaires aimed at rating the variables related to the organizational dimension, using a 7-item Likert Scale (the higher the average measure, the more preferable the technology) both in the short- term (12-month) and in the long-term (36-month) period

tional/hospital level, in terms of goals, technical approaches, and international experiences, as well as the dimensions and metrics proposed by the IMPAQHTA. In particular, 9 days were dedicated to the detailed explanation of the EUnetHTA Core Model dimensions. Theoretical and practical sessions were designed to evaluate the understanding on these topics, including written exercises. Any professional attaining unsatisfactory results was required to retake the evaluation before being involved in the empirical testing regarding the production of the final HBHTA report.

Data Collection

The empirical testing was conducted over a 3-year period (2012–2014). Data were collected from multiple sources.

First, all the professionals completed an *ad-hoc* questionnaire, administered through the "LimeSurvey" online tool, aimed at collecting information regarding the technology assessment exercise, the performance of their team and their general level of satisfaction with the IMPAQHTA framework. Second, a representative from each HBHTA team was selected for a semi-structured interview, lasting an average of 90 minutes, aimed at gathering a better understanding of the "pros" and "cons" of the IMPAQHTA framework. Third, it was possible to gain access to the HBHTA reports delivered by the teams, the evidence on which these reports were based, and the presentations delivered to the hospital Board by the HBHTA teams.

Data Analysis

Data were first described using means and frequencies. For each HBHTA exercise, data were stratified according to: (i) professionals involved, (ii) technologies under assessment, (iii) hospital setting in which the HBHTA evaluation was conducted.

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The main performances of the IMPAQHTA framework were analyzed with respect to: (i) its utility, feasibility and completeness; (ii) feasibility of the dimensions and sub-dimensions; (iii) efficiency, in terms of time spent to implement the framework and produce an HBHTA report; and (iv) replicability in every hospital setting, for the evaluation of different healthcare technologies.

RESULTS

After a detailed description of the sample, results are presented as follows: (i) main results in terms of utility, feasibility, and completeness of the IMPAQHTA framework, dimensions, and sub-dimensions; and (ii) main results in terms of efficiency, feasibility, and overall quality of the IMPAQHTA framework.

Description of the Empirical Sample

The IMPAQHTA framework was empirically tested over a 3-year period (2012–2014) within twenty-two hospitals in Northern Italy, for assessing thirty-two different healthcare technologies and involved seventy-four professionals organized into HBHTA teams. The HBHTA teams were composed of three professionals on average: 66 percent of teams were composed of more than a single individual, each from a different specialty, while the remaining 34 percent was composed of a single person, acting as an "Ambassador" (19), demonstrating the need for professionals who are able, or trained, to conciliate and/or coordinate different perspectives in the assessment. The majority (66 percent) of professionals was physicians or healthcare professionals (nurses and technicians).

The HBHTA teams assessed different healthcare technologies: drugs (19 percent), large-size equipment (19 percent), clinical procedures (16 percent), ICTs (16 percent), and clinical pathways (13 percent). These technologies were innovative (56 percent), as well as mature/consolidated (44 percent).

The HBHTA teams were affiliated to hospitals (50 percent), Local Health Agencies (18 percent), and Scientific Institutes (18 percent). The empirical sample included: 73 percent of healthcare organizations with more than 400 beds (versus 27 percent with less than 400 beds), with a multispecialty case-mix (59 percent versus 41 percent mono-specialty organizations). The assessment was conducted in public (86 percent versus 14 percent private ownership) and urban settings (55 percent versus 45 percent in rural areas).

More details are shown in Table 2.

Table 2. Sample Description

Participants		No. ($N = 74$)	%	Mean age
Health professional		29	39%	43.6
Clinician		20	27%	45.4
Clinical engineer		14	19%	36.4
Administrative employee		7	9%	35.4
Pharmacist		4	5%	45.3
Technologies		**N. (N=32)**	**%**	
Drug		6	19%	
Large size equipment		6	19%	
Clinical procedures		5	16%	
ICT		5	16%	
Clinical Pathway		4	13%	
Device		3	9%	
Small size equipment		3	9%	
Settings		**No. ($N = 22$)**	**%**	
Organizational setting	Hospital Authority	11	50%	
	Local Health Authority	4	18%	
	Scientific Institute	4	18%	
	Teaching hospital	2	9%	
	Private Hospital	1	5%	
Hospital size	Small	6	27%	
	Medium	8	36%	
	Large	8	36%	
Hospital case-mix	Generic	13	59%	
	Specialist	9	41%	
Ownership	Private	3	14%	
	Public	19	86%	
Rural or town designation	Rural	10	45%	
	Urban	12	55%	

Perceptions of Professionals Concerning the IMPAQHTA Framework, in Terms of Its Dimensions and Related Sub-dimensions

The results presented in this section are based on the self-reported perceptions of the seventy-four professionals involved as evaluators in the HBHTA teams, concerning completeness, utility and feasibility. Their judgement was reported using a 7-item Likert scale (1 = low, 7 = high) regarding the utility (e.g., the relevance) and the complexity (*e.g.* the difficulty to cope with their assessment) of the proposed eight dimensions. In addition, they stated their perception regarding the easiness and the completeness of quantitative metrics proposed for the various dimensions. The results are shown in Table 3.

The eight dimensions were perceived as relevant to produce an exhaustive HBHTA report to inform decision making within hospitals (scores were always higher than 5.5 over 7 with the notable exception of the "equity" dimension).

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Table 3. Healthcare Professionals' Perception Concerning the IMPAQHTA Dimensions and Sub-dimensions

Dimensions	Utility	Complexity
General relevance	5.86	3.39
Safety	5.66	3.36
Efficacy	5.70	3.42
Effectiveness	5.88	3.53
Economic and financial impact	6.34	3.36
Equity	4.94	3.52
Legal, social and ethical impact	4.95	3.61
Organizational impact	5.83	3.30
Sub-dimensions (quantitative metrics)	Easiness	Completeness
Quality of scientific evidence	5.08	5.92
Description of the technology	5.19	5.88
Seriousness of the adverse events	4.89	5.58
Efficacy data	4.61	5.63
Effectiveness data	4.53	5.48
Activity based costing analysis	5.23	5.94
Health economic evaluation	4.98	5.77
Budget impact analysis	5.00	5.84
Equity data	5.20	5.39
Legal aspects	5.06	5.28
Social and ethical impact	5.14	5.31
Organizational impact – quantitative	5.25	5.78
Organizational impact – qualitative	5.22	5.69

Note. Results are expressed by mean values according to a 7-item Likert scale (1 = low and 7 = high).

The professionals declared that they did not experience particular difficulties in evaluating the eight dimensions, remarking a difference in the "legal, social and ethical impact" whose average score was 3.61 over 7.

Taking into account the thirteen sub-dimensions, the professionals were positive regarding the easiness and completeness of the proposed quantitative metrics, whose scores on easiness were higher than 4.53 (this score was for "effectiveness data retrieval") and on completeness were higher than 5.31 (this score was for "social and ethical impact").

The professionals' perceptions in terms of completeness, utility, and feasibility were compared with respect to: (a) the professionals' background, (b) the technology under assessment, and (c) the hospital setting where the HBHTA exercise was performed, as shown in Table 4. No significant differences emerged with respect to the professional background and the nature of the technology under assessment.

With regard to hospital settings, the data show that teaching hospitals and scientific institutes appreciated more the IMPAQHTA framework in terms of completeness (6.38 versus 5.92), utility (6.38 versus 5.61) and feasibility (6.38 versus 5.40).

Other Self-reported Performance Measures

The IMPAQHTA framework was tested with respect to its efficiency. In this regard, the HBHTA teams reported that they spent an average of 85 hours (e.g., 11 working days) to collect past evidence regarding the technology and the comparator, to draft the HBHTA report and to synthetize their assessment in a concise, quantitative index, in accordance with the MCDA approach.

Within this timeframe, all the HBHTA teams performed a complete HBHTA evaluation covering the eight dimensions proposed by the IMPAQHTA framework. Considering the sub-dimensions, the HBHTA teams found them feasible, covering on average twelve sub-dimensions: all the thirteen sub-dimensions were examined in 59 percent of cases and eleven sub-dimensions were examined in 16 percent of cases. When a sub-dimension was not included in the HBHTA reports, the reason was that this sub-dimension did not apply to the technology under assessment (e.g., considering the introduction of an innovative drug, the "*effectiveness*" dimension was not always evaluated due to the lack of "real world" data deriving from observational study or empirical testing).

The delivered HBHTA reports showed an acceptable level of evidence: in fact, the "*general relevance*" dimension was supported by an average of 6 references from past studies, the "*efficacy*" dimension by an average of 5.4 references and the "*safety*" dimension by an average of 2.8 references.

The organizational, equity, and social impact dimensions were supported by collecting the opinions of an average of five senior healthcare professionals through a structured questionnaire.

DISCUSSION

The IMPAQHTA framework derived from the deploying at the hospital level of the HTA program that the Lombardy Region activated at the Regional level in 2008 (12;18). Translating the framework from the Region to the hospitals required taking into account the difficulties hospitals face in adopting HTA-based practices for decision making, in particular the severe constraints hospitals have in terms of time available for the assessment and human resources needed. In addition, hospital decision makers require HBHTA reports that provide evidence regarding the organizational impacts due to the adoption of new technologies/routines (13).

According to these needs, the present study reports the main results achieved by the IMPAQHTA framework in a large-scale empirical implementation in Northern Italy. Results were satisfactory in terms of feasibility, that could in the future pave the way for the adoption of this HBHTA framework as

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Table 4. Healthcare Professionals' Perception Concerning the IMPAQHTA Completeness, Utility, and Feasibility

			Completeness	Utility	Feasibility
Professional background		Administrative employee	6.29	6.00	5.71
		Clinical engineer	6.14	6.00	5.14
		Clinician	6.00	5.85	5.15
		Health professional	6.07	6.05	5.62
		Pharmacist	6.00	5.75	6.00
HBHTA team's composition		Mono-dimensional team	6.00	5.82	5.64
		Multi-dimensional team	6.05	6.10	5.57
Nature of the technology under assessment		Clinical pathway	6.00	6.50	6.25
		Clinical procedures	6.40	6.40	5.80
		Device	6.00	5.33	5.33
		Drug	6.00	6.00	5.17
		ICT	5.80	6.40	5.80
		Large-size equipment	6.00	5.50	5.50
		Small-size equipment	6.00	5.67	5.33
Settings	Hospital type	Hospital authority	6.00	6.09	5.45
		Local Health authority	5.75	5.75	5.75
		Private hospital	6.00	5.00	5.00
		Scientific institute	6.25	6.25	5.75
		Teaching hospital	6.50	6.50	7.00
	Hospital size	Small	6.00	5.83	5.67
		Medium	5.88	6.13	5.88
		Large	6.25	6.13	5.50
	Hospital case-mix	Multi-specialty	5.85	5.92	5.46
		Mono-specialty	6.33	6.22	6.00
	Hospital ownership	Public	6.05	6.11	5.74
		Private	6.00	5.67	5.33
	Hospital location	Rural	5.90	6.00	5.50
		Urban	6.17	6.08	5.83

Note. Results are expressed by mean values according to a 7-item Likert scale (1 = low and 7 = high).

reference practice within any Italian hospitals. During the 3-year empirical experiment, thirty-two different technologies were assessed by the HBHTA teams that analyzed the eight dimensions defined by the Lombardy regional HTA program. This was facilitated by the crystallization of thirteen sub-dimensions measured through quantitative methods that make clear to all evaluators "*where*" and "*how*" to focus their efforts, with the result of a "*quick*" but complete HBHTA. The completeness of the HBHTA reports is encouraging for the future: the well-established Danish Mini HTA check-list, although composed only of four dimensions and twenty-six questions, never produced complete HBHTA reports (20).

The recent lessons learned from the 10-year Argentinian experience (21) with eighteen *"quick and dirty"* HBHTA reports show that hospitals need to focus their HTA practices on a limited list of necessary dimensions of assessment as the time constraints they have to face, do not allow the implementation of highly sophisticated, and holistic, frameworks. The IMPAQHTA framework allowed for the production of relevant, multidimensional reports within a limited period of time, according to what hospitals need to take informed choices (22).

In this regard, it could be useful to discuss the results with respect to the recent evidence emerging from the European "AdHopHTA" project (17). Both projects used the EUnetHTA Core Model (9) as a "backbone" for designing the framework and deploying the multidimensional assessment. This confirms the establishment of the EUNetHTA Core Model as a valuable and reliable reference for both HTA and HBHTA in Europe. In this regard, the IMPAQHTA and the AdHopHTA sub-dimensions are consistent with the information hospital managers in Europe need within their decision-making processes, as reported in literature (23;24).

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Furthermore, it could be interesting to report how the two frameworks deal with political and strategic aspects that past studies (e.g., 12;25) argued relevant for hospitals. While the AdHopHTA project proposes the creation of a new dimension to take these topics into account, the IMPAQHTA framework includes them in the "*safety*" dimension, claiming that in hospitals the concept of "*safety*" is not limited to adverse events or deaths due to the innovation of care delivery, but should also include the consistency with local policies and hospitals guidelines/protocols/procedures. Similar differences may be found with the comparison of the AdHopHTA "*clinical effectiveness*" versus the IMPAQHTA "*general relevance,*" regarding the sub-dimension "*characteristics of evidence.*" As result, it emerges that the two frameworks are grounded on the same sub-dimensions, even though aggregated in different dimensions, leading to a complete assessment.

Despite the similarities mentioned above, one main difference emerges. While the AdHopHTA framework suggests qualitative methods to assess the ten dimensions, without proposing specific metrics for them, the IMPAQHTA framework(being designed for allowing MCDA approaches) endorses a more quantitative approach to provide hospital decision makers with a quantitative synthesis of the assessment, thus facilitating the discussion regarding the impacts on the different dimensions and the convergence toward an agreed decision (25). An example is the "*ethical, safety, social, and legal aspects*" that, as claimed by the AdHopHTA project are not always included in the assessment (23), have been operationalized within the IMPAQHTA framework to facilitate their inclusion in the HBHTA implementation.

The proposed HBHTA framework, however, has some limitations. The sample was composed of professionals, all of them volunteers, with specific motivation to learn how to assess a technology within the healthcare sector; this could limit the replicability of the experiment, even if it does not weaken the effectiveness and the efficiency of the IMPAQHTA model. Therefore, training courses are recommended to ensure a specific HTA background and a correct implementation of the proposed framework.

As the organizational impact is currently based on the perception of each professional interviewed regarding their own work setting, an objective sub-dimension for a quantitative evaluation of the change management process could overcome this possible limitation.

CONCLUSION

The present study offers new insights, that advance the ongoing debate regarding the importance and feasibility of technology assessment in hospitals, as they are at the forefront of technological innovations and are thus the first required to take decisions and actions for the adoption of new healthcare technologies. However, despite the relevance of these choices, hospitals have less time, knowledge, and resources compared with HTA Agencies to carry out these assessments.

Due to the lack of HBHTA practices that produce relevant and timely reports to support an evidence-based and multidimensional choice, the IMPAQHTA framework has narrowed the previously mentioned gap and has shown that it could support the implementation of technology assessment practices within hospitals. Results, in terms of perceived relevance and easiness of use, as well as efforts required are promising across different HBHTA teams, different healthcare technologies, and different hospital settings. This supports the argument that the IMPAQHTA framework could be considered as a valid alternative for current HBHTA practices, within hospitals, thus leading to the coverage of all the EUnetHTA Core Model dimensions, and avoiding the need to select only few domains due to time and resources constraints.

The adoption of the proposed framework within every hospital setting would facilitate a rapid and evidence-based assessment, supporting top management with quantitative indicators useful for the determination of the comparative value of technologies. To make this possible, the introduction of *ad hoc* training programs is, therefore, highly recommended, to develop healthcare professionals' skills.

Finally, it could be an interesting topic for future researches to study whether and how team effectiveness, or other organizational factors, interact with the IMPAQHTA framework, as well as the creation of appropriate criteria to allow clinicians to communicate better with management, thus facilitating the evaluation and the immediate introduction of innovative technologies within healthcare organizations.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

REFERENCES

1. Hood C. A Public Management for All Seasons? *Public Adm*. 1991;69:3-19.
2. Greenberg D, Peterburg Y, Vekstein D, Pliskin JS, Decisions to adopt new technologies at the hospital level: Insights from Israeli medical centers. *Int J Technol Assess Health Care*. 2005;21:219-227.
3. Drummond MF, Schwartz JS, Jönsson B, et al. Key principles for the improved conduct of health technology assessments for resource allocation decisions. *Int J Technol Assess Health Care*. 2008;24:244-258.
4. Zanaboni P, Lettieri E. Institutionalizing telemedicine applications: The challenge of legitimizing decision-making. *J Med Internet Res*. 2011;13:e72.
5. Battista RN. Expanding the scientific basis of health technology assessment: A research agenda for the next decade. *Int J Technol Assess Health Care*. 2006;22:275-280.
6. Frønsdala KB, Faceya K, Klempa M, et al. Health technology assessment to optimize health technology utilization: Using implementation initiatives and monitoring processes. *Int J Technol Assess Health Care*. 2010;26:309-316.

https://doi.org/10.1017/S0266462317000356 Published online by Cambridge University Press

7. Lettieri E. Uncertainty inclusion in budgeting technology adoption at a hospital level: Evidence from a multiple case study. *Health Policy*. 2009;93:128-136.
8. Gagnon MP, Desmartis M, Poder T, Witteman W. Effects and repercussions of local/hospital-based health technology assessment (HTA): A systematic review. *Syst Rev*. 2014;3:129.
9. EUnetHTA, The HTA Core Model, Version 2.1, April 2015. http://meka.thl.fi/htacore/model/HTACoreModel2.1.pdf (accessed July 8, 2015).
10. Goetghebeur M, Wagner M, Khoury H, Levitt RJ, Erickson LJ, Rindress D. Evidence and Value: Impact on DEcisionMaking – the EVIDEM framework and potential applications. *BMC Health Serv Res*. 2008:8;270.
11. Thokala P, Duenas A. Multicriteria decision analysis for health technology assessment. *Value Health*. 2012;15:1172-8112.
12. Thokala P, Devlin N, Marsh K, et al. Multiple criteria decision analysis for health care decision making — An introduction: Report 1 of the ISPOR MCDA Emerging Good Practices Task Force. *Value Health*. 2016;19:1-13.
13. Lettieri M, Masella C, Nocco U. Budgeting and health technology assessment: First evidence obtained from proposal forms used to submit the adoption of new technology. *Int J Technol Assess Health Care*. 2008;24:502-510.
14. Ehlers L, Vestergaard M, Kidholm K, et al. Doing mini-health technology assessments in hospitals: A new concept of decision support in health care? *Int J Technol Assess Health Care*. 2006;22:295-301.
15. Uphoff ME, Krane D. Hospital-based technology assessment: Essential questions and an operational model. *Public Prod Manage Rev*. 1998;22:60-70.
16. Mitton C, Dionne F, Damji R, Campbell D, Bryan S. Difficult decisions in times of constraint: Criteria based resource allocation in the Vancouver Coastal Health Authority. *BMC Health Serv Res*. 2011;11:169.
17. Sampietro-Colom L, Lach K, Cicchetti A, et al. The AdHopHTA handbook: A handbook of hospital-based Health Technology Assessment (HB-HTA); Public deliverable; The AdHopHTA Project (FP7/2007-13 grant agreement nr 305018); 2015. http://www.adhophta.eu/handbook (accessed July 8, 2015).
18. Radaelli G, Lettieri E, Masella C, Merlino L, Strada A, Tringali M. Implementation of Eunethta core model® in Lombardia: The VTS framework. *Int J Technol Assess Health Care*. 2014;30:105-112.
19. Cicchetti A, Manca A, Ruggieri M. L'utilizzo dei modelli decisionali per le valutazioni economiche dei farmaci in Italia: stato dell'arte e prospettive future. *PharmacoEconomics – Italian Research Articles*. 2007;1:19-46.
20. Kidholm K, Ehlers L, Korsbek L, Kjaerby R, Beck M. Assessment of the quality of mini-HTA. *Int J Technol Assess Health Care*. 2009;25:42-48.
21. Demirdjian G. A 10 year hospital-based health technology assessment program in a public hospital in Argentina. *Int J Technol Assess Health Care*. 2015;31:1-8.
22. McGregor M. Impact of TAU reports, Technology Assessment Unit (TAU) of the McGill University Health Centre (MUHC): McGill University Health Centre; 2008.
23. Ølholm AM, Kidholm K, Birk-Olsen M, Christensen JB. Hospital Managers' need for information on health technology investments. *Int J Technol Assess Health Care*. 2015;31:414-425.
24. Kidholm K, Ølholm AM, Birk-Olsen M, et al., Hospital managers' need for information in decision-making–An interview study in nine European countries. *Health Policy*. 2015;119:1424-1432.
25. Lettieri E, Masella C. Adopting ICTs in healthcare organisations: A framework to measure value and sustainability. *Int J Healthc Technol Manage*. 2006;7:319-332.

https://doi.org/10.1017/S0266462317000356 Published online by Cambridge University Press