

GUIDING PRINCIPLES FOR GOOD PRACTICES IN HOSPITAL-BASED HEALTH TECHNOLOGY ASSESSMENT UNITS

Laura Sampietro-Colom

Health Technology Assessment Unit, Research and Innovation Directorate, Hospital Clínic de Barcelona

lsampiet@clinic.ub.es

Krzysztof Lach

Department of Innovation, Fundació Clínic per a la Recerca Biomèdica, Hospital Clínic de Barcelona

Iris Pasternack

University of Helsinki and Helsinki University Hospital

Jean-Blaise Wasserfallen

Health Technology Assessment Unit, Medical Directorate, Centre Hospitalier Universitaire Vaudois

Americo Cicchetti

Graduate School of Health Economics and Management, Università Cattolica del Sacro Cuore

Marco Marchetti

University Hospital “A. Gemelli”

Kristian Kidholm

Center for Innovative Medical Technologies, Odense University Hospital

Helene Arentz-Hansen

Norwegian Knowledge Centre for the Health Services

Magdalene Rosenmøller

Center for Research in Healthcare Innovation Management, IESE Business School

Claudia Wild

Ludwig Boltzmann Institute for Health Technology Assessment

Rabia Kahveci

Health Technology Assessment Unit, Ankara Numune Training and Research Hospital

Margus Ulst

Tartu University Hospital

Objectives: Health technology assessment (HTA) carried out for policy decision making has well-established principles unlike hospital-based HTA (HB-HTA), which differs from the former in the context characteristics and ways of operation. This study proposes principles for good practices in HB-HTA units.

Methods: A framework for good practice criteria was built inspired by the EFQM excellence business model and information from six literature reviews, 107 face-to-face interviews, forty case studies, large-scale survey, focus group, Delphi survey, as well as local and international validation. In total, 385 people from twenty countries have participated in defining the principles for good practices in HB-HTA units.

Results: Fifteen guiding principles for good practices in HB-HTA units are grouped in four dimensions. Dimension 1 deals with principles of the assessment process aimed at providing contextualized information for hospital decision makers. Dimension 2 describes leadership, strategy and partnerships of HB-HTA units which govern and facilitate the assessment process. Dimension 3 focuses on adequate resources that ensure the operation of HB-HTA units. Dimension 4 deals with measuring the short- and long-term impact of the overall performance of HB-HTA units. Finally, nine core guiding principles were selected as essential requirements for HB-HTA units based on the expertise of the HB-HTA units participating in the project.

Conclusions: Guiding principles for good practices set up a benchmark for HB-HTA because they represent the ideal performance of HB-HTA units; nevertheless, when performing HTA at hospital level, context also matters; therefore, they should be adapted to ensure their applicability in the local context.

Keywords: Technology assessment, Hospitals, Guidelines, Best practices

The authors of this study thank the members of the AdHopHTA research project and all the people who have contributed to the research during the different methodologies used to obtain information. Special thanks to Prof. Michael Drummond, who has inspired us with his article on the key principles for the improved conduct of health technology assessments for resource allocation decisions. The full list of acknowledgments is available in Supplementary Table 1.

Source of Funding: The study has been co-funded by the EC Seventh Framework Programme theme FP7-HEALTH-2012-INNOVATION (AdHopHTA-project, grant agreement no: 305018).

Individual authors are employed and paid by the respective university hospitals (Laura Sampietro-Colom, Iris Pasternack, Jean-Blaise Wasserfallen, Marco Marchetti, Kristian Kidholm, Rabia Kahveci, Margus Ulst) or National HTA Institute (Claudia Wild) or National HTA Agency (Helene Arentz-Hansen) or funded through this research project (Americo Cicchetti, Magdalene Rosenmøller, Krzysztof Lach).

Traditional health technology assessment (HTA) carried out at national or regional (N/R) level for policy decision making has advanced considerably over the past years with the establishment of principles to guide the HTA process and outputs. The principles reflect mandates, objectives, profiles of end-users, and overall characteristics of traditional HTA. These, however, differ for hospitals mostly taking meso- and micro-decisions, that is, on the acquisition and use of new technologies (1). Hospitals, as the main entry point for innovative technologies, require timely and contextualized input for making decisions as regards investments in health technologies (HTs) (2;3). Moreover, the profile of end-users (i.e., clinicians and hospital managers) affects the provision of HTA input targeted at different

informational needs and output measures (1;4). Hospital-based HTA (HB-HTA) designed to meet the local requirements for meso- and micro-decisions is an expanding activity with several initiatives that have been informally collaborating with an attempt to produce guidance for HB-HTA. Yet there is no robust guidance specifically for HB-HTA, unlike the traditional HTA performed at N/R level (5). Given the specific requirements for carrying out HB-HTA, principles devised for traditional HTA do not seem to be fully applicable to it, which creates a need for principles appropriate for HB-HTA. Therefore, this study aims to describe the criteria for good practices appropriate for HB-HTA and also present how European HB-HTA units are performing as regards these criteria.

MATERIALS AND METHODS

Setting up a Research Framework for Good Practice Criteria

As a first step, the EFQM excellence model was selected as a basis to explore the types of good practice criteria that could fit HB-HTA requirements. The EFQM was selected because it is an excellence model that had already been used by hospitals (6), and it would provide a common language for a dialogue and mutual understanding between hospital management and HB-HTA units. It is composed of the following overarching criteria: leadership; people; strategy; partnership and resources; process, product, and services; people, customer, society results; and business results.

Second, a review of the scientific literature was carried out to identify: (i) articles describing good practices in general HTA carried out at N/R level and; (ii) articles describing practices in HB-HTA. This review resulted in the identification of thirty-nine potential criteria which were classified according to the overarching criteria of the EFQM model.

Refinement of Good Practice Criteria

A focus group involving eight HB-HTA stakeholders identified twenty-five additional relevant criteria to be considered for good practices in HB-HTA (7) (Table 1). The complete list of criteria identified by both the literature review and the focus group was carefully analyzed (e.g., looking for consistency in definitions, redundancies in concepts, etc.) which resulted in a final list of forty-two criteria for good practices in HB-HTA units.

Consensus on the Importance of the Identified Criteria

The forty-two identified criteria were subsequently exposed to the views of a wider sample of stakeholders in a Delphi panel ($N = 48$) to assign importance ratings (Supplementary Table 2). The results from the Delphi panel along with the evidence accumulated in the AdHopHTA research project (8) were used to develop a final set of criteria for good practices in HB-HTA units (Figure 1).

Defining the Guiding Principles for Good Practices in HB-HTA Units

A content analysis of the final set of criteria was carried out with the aim of grouping the criteria in similar concepts to present them in a more succinct manner. Subsequent discussions with experienced HB-HTA units in the AdHopHTA project were used to define the final fifteen guiding principles for HB-HTA good practice categorized under four dimensions (Table 2). Finally, nine guiding principles were selected as core based on the expertise of HB-HTA units participating in the project. The guidance and tools for a pragmatic application of these guiding principles are available in the Toolkit for HB-HTA (9).

The resulting fifteen guiding principles were validated by agreement with: (i) clinicians and hospital managers from European partner countries; (ii) the Advisory Board of the project consisting of representatives from not-for-profit organizations and commercial enterprises; (iii) participants of an international workshop, including head of the economic evaluation, chief physician and CEO affiliated to university hospitals, patients' representative, and industry's representative, among others—all familiar with HTA.

More details about methods of the AdHopHTA project are available at www.adhophta.eu (8).

RESULTS

Assessment Process

Guiding Principle 1: The HB-HTA Report Should Clearly State Its Goal and Scope, Reflect the Hospital Context, and Take into Account the Informational Needs of Hospital Decision Makers. To ensure the quality and clarity of HB-HTA reports, the assessment question (scope) should be defined through TICO (technology, the name and type of the technology; indication, the target disease, individuals, and purpose of the HT; comparator, technology used in the hospital; outcomes, expected from using the HT). This activity should always be performed with hospital professionals who are going to use and pay for the technology; leading to the selection of meaningful outcomes for both clinicians and financial managers (1). Current HB-HTA units use PICO instead of TICO. During the scoping, they involve both health professionals (physician requesting the technology, nurses, bioengineers, and planning professionals) and the financial manager.

Local context's characteristics is crucial for HB-HTA. Specific hospital clinical and economic information should be incorporated into HB-HTA reports, complementing global evidence. Current HB-HTA units do take into account the hospital context (e.g., real hospital healthcare cost data). Additionally, some of them carry out data collection activities jointly with clinicians to produce the clinical and cost data needed in the assessment.

The *informational needs of hospital decision makers* for an HB-HTA report include: the health problem and current use of the technology; clinical effectiveness; safety; cost and economic evaluation from the hospital point of view; organizational aspects, political, and strategic aspects for the hospital related

Table 1. Good Practice Criteria Identified through HB-HTA Experience and Contribution from Hospital Management and HTA Stakeholders*

ENABLERS	
Leadership Strategy	<ul style="list-style-type: none"> • <i>Leaders</i> of the HB-HTA unit act as a role model, promoting the unit inside and outside the organization (formal and active leadership). • The strategy of the HB-HTA unit is defined based on the <i>culture and strategy of the hospital</i>, as well as on its vision, mission, and values. • The HB-HTA unit's strategy is <i>linked to national, regional, and European HTA strategies</i>.
People	<ul style="list-style-type: none"> • The organization has clearly stated <i>career development plans</i>, related training programs and other actions favoring the development of skills and abilities • There are frequent encounters and/or joint spaces allowing for interaction between the HB-HTA unit, its customers, and other relevant stakeholders, creating a <i>good working environment</i> and a joint working culture.
Partnership and resources	<ul style="list-style-type: none"> • The HB-HTA unit has adequate space, equipment, materials, and technological support. • There is a strategy for seeking additional funds for the development of additional evidence when gaps in knowledge are identified.
Processes, products, and services	<ul style="list-style-type: none"> • Patients are involved in the assessment process (hospital level). • Assessment results and decision taken are communicated to patients. • There is a <i>follow-up process</i> on how results are implemented.
RESULTS	
Customer results	<ul style="list-style-type: none"> • Customers <i>value</i> HB-HTA. • Customers' <i>expectations</i> are met by the HB-HTA unit. • Customers are willing to <i>repeat and recommend the service</i> by the HB-HTA unit.
People's results	<ul style="list-style-type: none"> • People working for the HB-HTA unit are <i>satisfied</i> with their work, development and professional fulfilment, motivation, and sense of belonging. • People working for HB-HTA unit value their <i>opportunities for professional growth</i> within the field, such as networking.
Society results	<ul style="list-style-type: none"> • Professionals within the hospital and relevant people outside the hospital are aware of the <i>need for and usefulness of the HB-HTA unit</i>. • Relevant <i>stakeholders are informed</i> of the use and benefits of HB-HTA. • HB-HTA is widely known and/or this knowledge is actively generated via scientific papers, other publications, specific training, and scientific meetings.
Business results	<ul style="list-style-type: none"> • HTA results have an impact on the technology <i>adoption process</i> and its implementation. • Demands are satisfied. • There is some degree of recognition achieved (reputation & market position). • HB-HTA complies with its budget. • There is a return on investment (costs of HB-HTA unit compared to benefits generated) derived from the assessment. • Productivity indicators are available. • HB-HTA contributes to the overall performance of the hospital in terms of: achievements of benefits/health outcomes to end-users (patients/overall population), and operational efficiency.

*Managers, industry representatives, HB-HTA representatives, a patient representative, and an HTA representative.

to the technology being assessed (4). HB-HTA units include the information needed; however, the strategic aspects remain a challenge as they are addressed superficially or not at all.

Guiding Principle 2: The HB-HTA Report Should Be Performed Systematically Using Good Methods and Appropriate Tools in a Way That Can Be Adapted to Other Hospitals (Transferable). Methods and tools for good quality management and execution of N/R HTA are required (10–15) and available (16–19), but these are not specific for HB-HTA. A review of available external N/R HTA reports is a common practice in HB-HTA units as a starting point of the assessment; which is updated with primary studies when needed. Economic evaluation always takes into account the perspective of the hospital and budget impact analysis is frequently performed. In their economic evaluation, some HB-HTA units adjust the baseline analysis, or “reference

case” of published models, to either the profile of patients in the hospital or its clinical practice. Quality of information used is assessed indicating the levels of evidence.

An HB-HTA report should be produced in a way that can be *adapted to other hospitals (transferability)*. Therefore, the assessment requires explicit reporting and a clear description of the assessment's goal and scope as well as methods used to produce it. The AdHopHTA quality checklist (20) can be of help in making reports transferable. Certain elements of HB-HTA reports can be directly transferred (e.g., systematic review) and used as a starting point for HB-HTA in another setting (12). Current HB-HTA reports provide the information necessary to ensure its transferability to other hospitals. Moreover, the assessment reports include authors' contact information which makes it easier to obtain missing details for report adaptation.

Table 2. Guiding Principles for Good Practices in HB-HTA Units within Dimensions

Dimensions	Guiding principles
1. The assessment process	<ol style="list-style-type: none"> 1. The HB-HTA report should clearly state its goal and scope, reflect the hospital context, and take into account the informational needs of hospital decision makers.^a 2. The HB-HTA report should be performed systematically using good methods and appropriate tools in a way that can be adapted to other hospitals (transferable).^a 3. The HB-HTA process should involve all relevant stakeholders and be conducted in an unbiased and transparent manner ensuring independence and proper communication of its results to hospital stakeholders.^a
2. Leadership, strategy and partnerships	<ol style="list-style-type: none"> 4. The mission, vision, and values of the HB-HTA unit should be clearly defined and coherent with the hospital's overall mission and strategy, and should allow for clear governance of the HB-HTA unit.^a 5. There should be clear leadership at the top of the HB-HTA unit as well as a communication policy/strategy.^a 6. Criteria for the selection of technologies to be assessed should be clearly stated.^a 7. Process of disinvestment of health technologies should be defined and established. 8. HB-HTA units should be willing to improve in the light of its experience and be open to learn and innovate. 9. There should be a clear policy and mechanisms for sharing knowledge and resources. 10. HB-HTA units should collaborate with regional, national, and international HTA organizations.^a 11. Links with key allies and partners should be proactively identified and promoted.
3. Resources	<ol style="list-style-type: none"> 12. Well-defined human resources, recruitment policies, and career development plans should be established.^a 13. Financial resources should be sufficient to cover operational costs and ensure an appropriate place of work.^a
4. Impact	<ol style="list-style-type: none"> 14. Short- and medium-term internal and external impact of the HB-HTA unit work should be measured. 15. Long-term impact of the HB-HTA unit on hospital performance and health of communities should be measured.

*The assessment process (dimension 1) lies at the center of the framework. This is the keystone necessary to achieve the main objective of any HB-HTA unit, which is to provide the high quality information needed by hospital decision makers. The assessment process is driven, governed, and facilitated by leadership, strategy, and partnerships (dimension 2) as well as supported by adequate resources (dimension 3). The conjunction of these three key dimensions conditions the overall performance of the HB-HTA unit, with its expected positive impact of creating value for hospital decision makers, as well as indirectly for society (dimension 4).

^aNine Core Guiding Principles are defined as prerequisites for setting-up and running HB-HTA units.

Guiding Principle 3: The HB-HTA Process Should Involve All Relevant Stakeholders and Be Conducted in an Unbiased and Transparent Manner Ensuring Independence and Proper Communication of Its Results to Hospital Stakeholders. Internal stakeholders at hospital are mainly of three types: those who are going to decide on the investment (i.e., managers and procurement professionals), healthcare professionals (i.e., clinicians, nurses, pharmacists), and patients. Most hospitals with HTA activities involve healthcare professionals in the process (15;21) which is seen as a key success factor (12;22). Participation guarantees that the report is locally relevant (15) and ensures support for the implementation of results (1). In some HB-HTA units, the assessment team includes the requesting clinician and the professionals from the HB-HTA unit. Other practices include a fixed team of five to ten clinicians and a nurse with knowledge of the assessment methods. Professionals from the pharmacy, financial, and procurement departments are also involved in the assessment when needed. The final recommendation is usually issued with the agreement of all participants involved in the assessment process.

External stakeholders include patients and industry. Most HB-HTA units lack experience on patient involvement in the assessment, nevertheless there is one HB-HTA unit that reported

asking patients for example, on quality of life and overall experiences with the HT studied. HB-HTA units do not systematically involve industry in their assessments. Nevertheless, they are approached when scientific literature required in the assessment is not available.

The carrying out of HB-HTA in an *unbiased and transparent manner* is highly valued in hospitals (12;22). Mechanisms used to assure it by hospitals differ. Some hospitals document every step of the assessment process and put this information into the intranet of the hospital. Other hospitals carry out internal (professional in-hospital) or external reviews of the assessment.

Ensuring independence from particular interest groups is key for HTA (11;13). Some existing HB-HTA units address the issue of independence mostly by including in the HB-HTA report a disclosure statement from the participants. When a clinician with conflict of interest is a member of the HB-HTA committee, he or she is asked not to comment or vote on final recommendation.

Good communication of results of the assessment is crucial for stakeholder understanding (12). The HB-HTA unit should ensure that both clinical and economic information presented

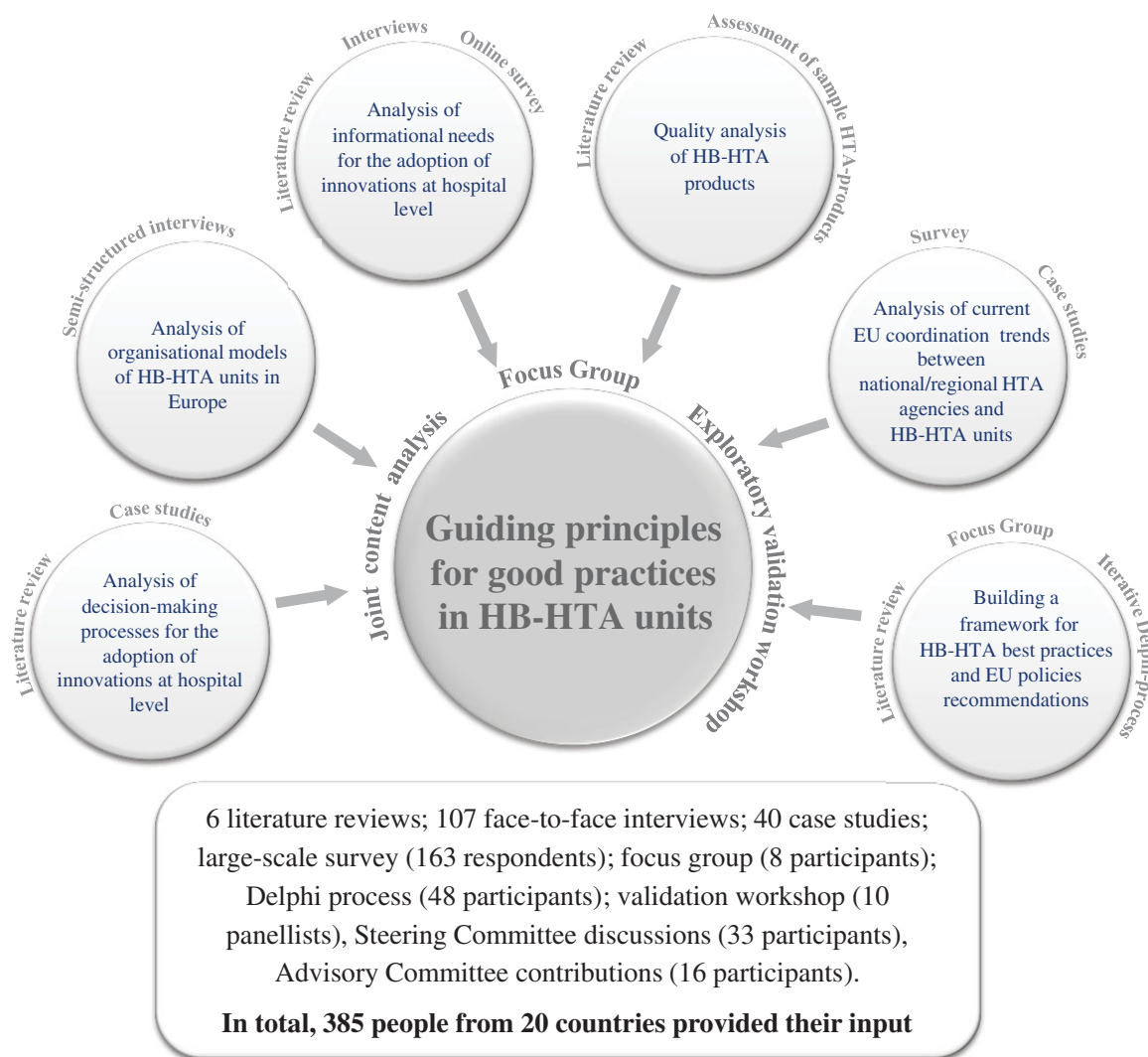


Figure 1. Activities and methods of the AdHopHTA research project.

in HB-HTA reports are understood by all those who are going to use them. Some hospitals work closely with the clinician and the manager throughout the assessment process sharing findings and explaining them in an understandable manner; or use tools that present the technology's benefits and risks at a glance (3).

Leadership, Strategy, and Partnerships

Guiding Principle 4: The Mission, Vision, and Values of the HB-HTA Unit Should Be Clearly Defined and Coherent with the Hospital's Overall Mission and Strategy, and Should Allow for Clear Governance of the HB-HTA Unit. HB-HTA units should have an explicit mission coherent with the hospital's mission, its strategic planning (23), and with the hospital's values. Currently, some HB-HTA units express the mission in general terms (e.g., "providing information to hospital decision makers about new and existing health technologies"); while others are more explicit (e.g., "to ensure that the hospital would only use effective and cost-effective interventions"). Whatever the case, the stated mission should be explicitly linked to the role of the HB-HTA unit, and not as another aim of the hospital. This is achieved in

different ways, for instance by adhering to a specific document on how new HTs should be introduced into the hospital, stressing the need for the clinician to contact the HB-HTA unit, or including the need for assessment of new HTs in the hospital strategic plan.

Healthcare organizations require explicit rules for *governance and authority* (11;24). In the case of HB-HTA units clear governance consists in: (i) designating its place in the general organization of the hospital, and (ii) defining how its work is related to hospital departments. As to the former, a clear position in the organizational chart of the hospital is desirable. Most HB-HTA units have a clear position in the organizational chart (e.g., formal units working directly for the CEO, the CMO or under the Research and Innovation Directorate). Authority of HB-HTA unit differs among hospitals. While in one hospital it is mandatory to consult the unit when a new HT is considered for the investment, in others, this activity is voluntary, although highly recommended, especially for costly and sophisticated HTs.

Guiding Principle 5: There Should Be Clear Leadership at the Top of the HB-HTA Unit as Well as a Communication Policy/Strategy. Well-defined and active leadership in HTA organizations is an important prerequisite for their organizational climate and improved performance (10). HB-HTA leaders should promote HB-HTA activity inside the hospital and engage personally in communication activities with current and potential customers. Current practice shows that leaders of HB-HTA units work closely with heads of clinical departments to identify technologies to be assessed and also to make the clinicians aware of the support that the unit can provide them with in introducing HTs. Cooperation with heads of departments also include the support for introducing of HTA methodology in clinical trials, and promotion of HB-HTA in the national and international clinical scientific societies.

Visibility of the HB-HTA unit can be enforced through a *good policy/communication strategy*. Active communication inside the hospital includes making hospital decision makers more aware of the potentialities and value of HB-HTA. This is currently communicated through specific courses on HB-HTA and lectures for hospital departments, or by presenting specific case-studies in clinical rounds at hospital departments. The hospital website is the communication tool most often used, where full HB-HTA reports are available. Chapters dealing with HB-HTA are delivered for books and journals addressed either to clinicians or to healthcare managers. Most hospitals participate in national and international conferences by invitation as a speaker or by presenting results from their assessments. Visibility of HB-HTA unit is also reached through collaboration with other hospitals including guidance on setting up an HB-HTA unit, and hosting professionals who want to learn about HB-HTA.

Guiding Principle 6: Criteria for the Selection of Technologies to Be Assessed Should Be Clearly Stated. Scant resources call for prioritization of technologies to be assessed (10;11;15;21;24–28). For HB-HTA, screening guides (checklists) with specific criteria are available (12;25). Nevertheless, in practice prioritization is an *ad-hoc* activity. In some hospitals, the choice of topics is prioritized according to urgency, potential budget impact, the uncertainty of health benefits to be expected, concerns about the level of proof of the health benefits, and the presence of significant legal or ethical issues (15).

Guiding Principle 7: Process of Disinvestment of Health Technologies Should Be Defined and Established. Partial or total removal of resources allotted to technologies with limited therapeutic benefit prevents inefficiencies and makes it possible to re-invest in other HTs of greater benefit (25;29). Disinvestment activities at hospitals are usually undertaken due to budget cuts. This activity, under the umbrella of HB-HTA, is now being adopted by a few hospitals. Among the few examples that yet exist are proactive disinvestment process in surgical meshes for inguinal hernia repair, and targeting the use of expensive drugs only at patients where there is incontestable evidence of their benefits.

Guiding Principle 8: HB-HTA Units Should Be Willing to Improve in the Light of Its Experience and Be Open to Learn and Innovate. Capacity to learn from experience and look for innovative ways to adapt in a changing environment requires a system of self-evaluation and monitoring (14;25;26). Most HB-HTA units currently do not use formal and structured systems to review their performance and to adjust to new requirements. Like their clinical peers in the hospital, who quickly adjust their patterns of care to new patient needs, most follow a pragmatic approach supervising closely in an *ad-hoc* way both the running of the HB-HTA unit and the assessments produced, proposing appropriate changes.

Guiding Principle 9: There Should Be a Clear Policy and Mechanisms for Sharing Knowledge and Resources. Hospitals with experience in HB-HTA should share their experience with other hospitals (26). Sharing of knowledge and information is done internally (i.e., in-hospital) and externally (i.e., national/international level). The former include HTA courses organized for staff. Courses outside the hospital are also held, including national HTA training days and its place in hospitals, or bringing HTA courses into MBA programs. Sharing knowledge internationally is mostly performed thorough the participation in the Interest Subgroup of the International Society for Health Technology Assessment and in its Annual Meeting.

Guiding Principle 10: HB-HTA Units Should Collaborate with Regional, National, and International HTA Organizations. Successful collaboration between HB-HTA units and N/R HTA organizations consists in good leadership, competent personnel, better use of resources, strategic and political support across levels and relevant outputs. Improved efficiency may be achieved through sharing resources (e.g., library) and exchanging knowledge (30;31). Currently, in countries with legislation mandating the use of HTA in decision making, linkages between HB-HTA and N/R HTA are stronger or are perceived as more useful. For example, the Managed Uptake of Medical Methods program (MUMM) in Finland fosters collaboration of all hospital districts in the country with the Finnish HTA Office (32). Informal collaborations also exist, especially for mutual strategic or political support and joint efforts in capacity building in HTA.

Guiding Principle 11: Links with Key Allies and Partners Should Be Proactively Identified and Promoted. Partners can be domestic (i.e., in-hospital or close at hand), national, or international. In-hospital partnerships are established by close collaboration with clinical departments (e.g., some are closer to IT departments, others to diagnostic imaging or laboratory departments). In the immediate surroundings of hospitals, most HB-HTA units have domestic alliances which aim to cover unmet technical needs (e.g., university libraries). Partnerships outside the hospital include interactions with other domestic hospitals, scientific societies, and companies that work closely with clinicians. HB-HTA units around the world are informally supporting each other, which also contributes to their consolidation inside their own hospital. These interactions lead

to the creation of informal HB-HTA networks in different continents (e.g., Pan-Canadian HB-HTA network and the EU HB-HTA network).

Resources

Guiding Principle 12: Well-Defined Human Resources, Recruitment Policies, and Career Development Plans Should Be Established. Professionals are the main asset of any organization and key for its success. Establishing explicit criteria for hiring staff, giving clear job descriptions and designing mechanisms to encourage teamwork is recommended (10;11;24;25). The HB-HTA unit should have a basic organizational structure, that is, core staff with specific profiles working on a full-time basis as well as *ad-hoc* experts. Most active HB-HTA units' staff includes medical doctors, economists and public health specialists. However, they also look for *ad-hoc* expertise among their hospital colleagues (e.g., clinicians, bioengineers, nurses) and outside the hospital (26). While more developed HB-HTA units have well developed job descriptions, the newly funded ones rather invite hospital professionals with specific interest or skills to collaborate.

Successful HTA programs (24) ensure proper *career development plan*; which assures high quality assessments and increase the confidence of hospital decision makers in the results received. Nevertheless, current HB-HTA units have informal career development plans. Most heads of units identify potentially interesting training activities on an *ad-hoc* basis and offer them to staff.

Guiding Principle 13: Financial Resources Should Be Sufficient to Cover Operational Costs and Ensure an Appropriate Place of Work. The availability of specific resources devoted to HB-HTA is key for the development of its activity (12) and the success of the unit itself. Senior hospital managers need to be aware of the basic needs of an HB-HTA unit, and be sensitive to them. Clinicians should also know about the need to have proper funds to carry out the HB-HTA work. The HB-HTA unit should have an allotted budget ideally coming from the hospital, aimed at maintaining a core structure and covering its operational costs. Once basic support is granted a strategy for seeking additional funds could be implemented. Most HB-HTA units do not have a specific budget assigned by the hospital, which mainly provides the working space and covers the salary of the head. Most HB-HTA units, therefore, look for complementary sources of funding (e.g., research projects).

Impact

Guiding Principle 14: Short- and Medium-Term Internal and External Impact of the HB-HTA Unit Work Should Be Measured. *Impact measurement* is a good practice (10;24;33;34) although is rare among HTA organizations (35). One short-term impact measurement is the use of the assessment report by decision makers (36). Another is checking if recommendations made by the HB-HTA reports are followed. Correspondence between recommendation provided by current

HB-HTA reports and decisions is very high (up to 99 percent and 100 percent concordance in some hospitals).

The level of *follow-up* and monitoring of recommendation varies. HB-HTA units are small and have no resources to closely follow-up the implementation of their recommendations. Nevertheless, some perform an annual audit for specific assessments providing medium-term impact data (e.g., a 10 percent decrease in unnecessary laboratory tests).

HB-HTA should also demonstrate that it generates *economic value* for the hospital. Some hospitals measure the global impact of the recommendations in financial terms, for example, systematically updating the net present value for the hospital of HTs which have been recommended and for those that were rejected. This is compared with the cost of running the HB-HTA unit, which yields an indirect estimation of the efficiency of the unit. Another indicator is the amount of money obtained from external sources and how this contributes to the sustainability of the HB-HTA unit. Performance indicators, such as productivity, can also be used (10), for example, number of reports, dissemination activities, training activities.

Customer satisfaction is another indicator, but it is not often formally measured by most HB-HTA units. Satisfaction is usually informally perceived by the head of the unit through periodic interactions with clinicians. Formal measurement is performed by some units through a satisfaction survey of all professionals who collaborated in the assessments. *Measurement of staff satisfaction* is another indicator (10). Some HB-HTA units periodically carry out formal written assessments of job satisfaction. Others explore it in informal ways or through indirect indicators (e.g., retention of staff and clinical collaborators).

Timely delivery of assessment results influences customer satisfaction and ensures the usefulness of HTA (10;12;22;26;37–39). This is especially relevant for hospitals, where decisions in real-life have to be taken usually more quickly than at N/R level (15). Current HB-HTA units deliver answers on time; moreover, the involvement of the clinicians who request the assessment through all the process ensures keeping them updated on findings throughout the process.

The *external* impact of the HB-HTA unit's work outside the hospital should be measured. Indirect indicators such as the frequency and number of requests for talks or training activities can be used to this end. Most HB-HTA units perform talks and trainings for private (e.g., industry) and public (e.g., patient and scientific societies) organizations nationally and internationally. Other units have developed courses on HB-HTA that are included in formal educational activities (e.g., International Master in HTA-Ulysses). Scientific outreach can also be measured by the number of papers in scientific journals and presentations at national and international scientific meetings. Most HB-HTA units have a long track record of this.

Guiding Principle 15: Long-Term Impact of the HB-HTA Unit on Hospital Performance and Health of Communities Should Be Measured. The results from HB-HTA

activities might also be expected to increase the ability of hospitals to use their resources more efficiently (37). This long-term measurement is difficult to perform because it requires devoting considerable resources. Furthermore, proving a direct cause-effect relationship between an HB-HTA unit's performance and hospital impact is very challenging. Another challenging measurement is the impact of the work of the HB-HTA unit on the health of communities. This type of impact measurement can include indicators, such as how the work performed by HB-HTA contributes to the quality of life of a population and efficient use of limited resources in the healthcare system. Although chosen as a guiding principle, this type of measurement is extremely difficult and is not currently performed by any HB-HTA unit (10).

DISCUSSION

The guiding principles in this research have been inspired by the EFQM business model because it is the framework most frequently used by healthcare centers when looking at the excellence of their quality. The use of other business model frameworks might yield a different result. Nevertheless, if this were the case, the final set of guiding principles would probably not be very different because, although inspired by the EFQM model, they come from the multi-method research carried out in the AdHopHTA project and the experience of professionals performing HB-HTA. Methods used in the project have relied on convenience samples, which could not be representative of the universe of hospital decision makers. Nonetheless, the selection was performed taking into account their expertise in the field and potential for substantive input to the project.

CONCLUSIONS

Guiding principles for good practices in HB-HTA constitute an important advancement of HB-HTA, especially in the light of the limited published body of knowledge available in this field. These guiding principles represent the ideal framework for performance of HB-HTA units; nevertheless, when performing HTA at hospital level, context also matters and, therefore, they should be adapted to ensure their applicability and feasibility in the context of a specific hospital or country.

SUPPLEMENTARY MATERIAL

Supplementary Tables 1 and 2

<http://dx.doi.org/10.1017/S0266462315000732>

CONFLICTS OF INTEREST

The authors report no conflict of interest.

REFERENCES

1. McGregor M. What decision-makers want and what they have been getting. *Value Health*. 2006;9:181-185.

2. Cicchetti A, Marchetti M, Bidino R, Corio M. Hospital based health technology assessment world-wide survey. Hospital based health technology assessment Sub-Interest Group; http://www.htai.org/fileadmin/HTAi_Files/ISG/HospitalBasedHTA/2008Files/HospitalBasedHTAISGSurveyReport.pdf 2008;41 (accessed January 18, 2016).
3. Sampietro-Colom L, Morilla-Bachs I, Gutierrez-Moreno S, Gallo P. Development and test of a decision support tool for hospital health technology assessment. *Int J Technol Assess Health Care*. 2012;28:460-465.
4. Kidholm K, Ølholm A, Birk-Olsen M, et al. An interview study in nine European countries. *Health Policy (New York)* [Internet]. Elsevier Ireland Ltd; 2015; <http://dx.doi.org/10.1016/j.healthpol.2015.08.011> (accessed January 18, 2016).
5. 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; discussion 362-368.
6. Vallejo P, Saura RM, Sunol R, et al. A proposed adaptation of the EFQM fundamental concepts of excellence to health care based on the PATH framework. *Int J Qual Health Care*. 2006;18:327-335.
7. Rosenmøller M, Sampietro-Colom L, Farré M, et al. D 4.1 Review of best practices on undertaking and using HTA at Hospital level and description of European policies affecting Hospital based HTA. 2013. Confidential deliverable; The AdHopHTA Project (FP7/2007-13 grant agreement nr 305018).
8. AdHopHTA (Adopting hospital-based Health Technology Assessment in EU) research project, funded by the European Commission under the 7th Framework Programme (Grant Agreement 305018) [Internet]. 2012-2015 [cited 2015 Jun 29]. www.adhophta.eu (accessed June 29, 2015).
9. AdHopHTA partners. The AdHopHTA toolkit: A toolkit for hospital-based Health Technology Assessment (HB-HTA); Public deliverable, The AdHopHTA Project (FP7/2007-13 grant agreement nr 305018); 2015 [cited 2015 Sep 29]. <http://www.adhophta.eu/toolkit> (accessed June 29, 2015).
10. Lafortune L, Farand L, Mondou I, Sicotte C, Battista R. Assessing the performance of health technology assessment organizations: A framework. *Int J Technol Assess Health Care*. 2008;24:76-86.
11. Goodman C. Toward international good practices in health technology assessment. *Int J Technol Assess Health Care*. 2012;28:169-170.
12. Gagnon M-P, Abdeljelil AB, Desmarts M, et al. *Opportunities to promote efficiency in hospital decision-making through the use of health technology assessment*. Canadian Health Services Research Foundation (CHSRF) – Research Reports, CHSRF series of reports on cost drivers and health system efficiency. Ottawa, CHSRF; 2011:1-28.
13. Lavis JN, Oxman AD, Moynihan R, Paulsen EJ. Evidence-informed health policy 1 - synthesis of findings from a multi-method study of organizations that support the use of research evidence. *Implement Sci*. 2008;3:53.
14. 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; discussion 280-282.
15. McGregor M, Brophy JM. End-user involvement in health technology assessment (HTA) development: A way to increase impact. *Int J Technol Assess Health Care*. 2005;21:263-267.
16. EUnetHTA Joint Action 2, Work Package 8. HTA Core Model[®] version 2.1 [updated April 22, 2015]. <http://www.corehta.info/BrowseModel.aspx> (accessed July 14, 2015).
17. Lampe K, Mäkelä M. (editors). EUnetHTA core model for medical and surgical interventions. 1.0R, 2008. www.eunetha.net (accessed November 3, 2014).

18. Lampe K, Pasternack I, (editors). EUnetHTA. HTA core model for diagnostic technologies. 1.0R, 2008. www.eunethta.net (accessed September 23, 2014).
19. Hailey D. Toward transparency in health technology assessment: A checklist for HTA reports. *Int J Technol Assess Health Care*. 2003;19:1-7.
20. Ølholm AM, Kidholm K, Birk-Olsen M, et al. D2.2: Quality assessment of hospital-based HTA products. 2014, Confidential deliverable; The AdHopHTA Project (FP7/2007-13 grant agreement nr 305018).
21. Stafinski T, Topfer L-A, Zakariasen K, Menon D. The role of surgeons in identifying emerging technologies for health technology assessment. *Can J Surg*. 2010;53:86-92.
22. Gallego G, van Gool K, Kelleher D. Resource allocation and health technology assessment in Australia: Views from the local level. *Int J Technol Assess Health Care*. 2009;25:134-140.
23. Haselkorn A, Rosenstein AH, Rao AK, Van Zuiden M, Coye MJ. New technology planning and approval: Critical factors for success 13. *Am J Med Qual*. 2007;22:164-169.
24. Moharra M, Espallargues M, Kubesch N, et al. Systems to support health technology assessment (HTA) in member states of the European Union with limited institutionalization of HTA. *Int J Technol Assess Health Care*. 2009;25(Suppl 2):75-83.
25. Poulin P, Austen L, Kortbeek JB, Lafrenière R. New technologies and surgical innovation: Five years of a local health technology assessment program in a surgical department. *Surg Innov*. 2012;19:187-99.
26. Juzwishin D, Olmstead D, Menon D. Hospital-based technology assessment programmes: Two Canadian examples. *World Hosp Health Serv*. 1996;32:2-9.
27. Golan O, Hansen P, Kaplan G, Tal O. Health technology prioritization: Which criteria for prioritizing new technologies and what are their relative weights? *Health Policy (New York)*. 2011;102:126-135.
28. Rubinstein A, Pichon-Riviere A, Augustovski F. Development and implementation of health technology assessment in Argentina: Two steps forward and one step back. *Int J Technol Assess Health Care*. 2009;25(Suppl 1):260-269.
29. Elshaug AG, et al. Challenges in Australian policy processes for disinvestment from existing, ineffective health care practices. *Aust New Zealand Health Policy*. 2007;4;23.
30. Arentz-Hansen H, Bjørnebek Frønsdal K, Fure B, et al. D3.1: Bridging Hospital HTA and National/Regional HTA Activities. 2013, Confidential Deliverable; The AdHopHTA Project (FP7/2007-13 grant agreement nr 305018).
31. Pasternak I, Halmesmäki E, Roine R, et al. D3.2: Portfolio of patterns of collaboration between hospital-based HTA and national/ regional HTA agencies. 2014, Confidential Deliverable; The AdHopHTA Project (FP7/2007-13 grant agreement nr 305018).
32. Mäkelä M, Roine RP. Health technology assessment in Finland. *Int J Technol Assess Health Care*. 2009(Suppl 1):102-107.
33. Granados A, Jonsson E, Banta HD, et al. EUR-ASSESS Project Subgroup Report on Dissemination and Impact. *Int J Technol Assess Health Care*. 1997;13:220-286.
34. Bennie M, Dear J, Hems S, et al. An investigation into the effect of advice from the Scottish Medicines Consortium on the use of medicines in Scotland's Health Service. *Br J Clin Pharmacol*. 2011;71:283-288.
35. Neumann PJ, Drummond MF, Jönsson B, et al. Are key principles for improved health technology assessment supported and used by health technology assessment organizations? *Int J Technol Assess Health Care*. 2010;26:71-78.
36. [No authors listed]. Health technology assessment. *Int J Technol Assess Health Care*. 2009;25(Suppl 1);10.
37. Attieh R, Gagnon M-P. Implementation of local/hospital-based health technology assessment initiatives in low- and middle-income countries. *Int J Technol Assess Health Care*. 2012;28:445-451.
38. Andradas E, Blasco J-A, Valentín B, López-Pedraza M-J, Gracia F-J. Defining products for a new health technology assessment agency in Madrid, Spain: A survey of decision makers. *Int J Technol Assess Health Care*. 2008;24:60-69.
39. Luce BR, Brown RE. The use of technology assessment by hospitals, health maintenance organizations, and third-party payers in the United States. *Int J Technol Assess Health Care*. 1995;11:79-92.