HEALTH TECHNOLOGY ASSESSMENT IN UNIVERSITY HOSPITALS

Sara Perazzi, MSc
Membership & Project Manager
International Hospital Federation

Leah Magid
Student at Boston University
Intern at the International Hospital Federation

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## Contents

- Introduction .................................................................................................................. 3
- What is HTA? .................................................................................................................. 4
- The development of HTA .............................................................................................. 7
- The institutionalization of HTA .................................................................................... 7
- Hospital Based HTA ..................................................................................................... 8
- HTA and University Hospitals .................................................................................... 9
- Conclusion ..................................................................................................................... 12
- References ..................................................................................................................... 13
Introduction

Innovations are meant to provide the potential to improve patient and population health outcomes, increase efficiency, and improve social wellbeing. They may take the form of preventive or treatment measures. Some developments in recent years include immunization programs, expedited HIV test result delivery, digital images, communication programs, policy innovation, and road safety interventions. These changes promote easier and more effective communication among health specialists and between patients and their providers as well as improve overall efficiency in patient care.

Among all possible sources of innovations, health technologies play an important role. According to the World Health Organization (WHO), healthcare technologies are “knowledge and skills in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem and improve quality of lives” (WHO, 2015).

The International Network of Agencies for Health Technology Assessment (INAHTA) defines health technology as “an intervention that may be used to promote health, to prevent, diagnose or treat acute or chronic disease, or for rehabilitation. Health technologies include pharmaceuticals, devices, procedures and organizational systems used in health care” (INAHTA, 2015).

In a global context of increasing cost pressure, limited resources, reforms of healthcare systems and growing participation/expectations of patients, the evaluation of cost-effectiveness of healthcare technologies is crucial for decision makers.

Hospitals and in particular university hospitals are recognized as the main entry for health technology innovations such as devices, medicines, vaccines, procedures, etc. The introduction of technological innovations in the healthcare sector helps to improve the quality and safety of healthcare delivery as well as patients’ outcomes. However, the high cost of healthcare innovations is a major challenge for healthcare decision makers, which can strongly affect the adoption of healthcare technology and its extensive implementation in healthcare facilities.

The raison d’être of Health Technology Assessment (HTA) is to provide recommendations – based on scientific analysis – about healthcare technologies. HTA is a critical component of decision-making process.

The purpose of this white paper is to give an overview of major trends in the worldwide development of HTA. The first part of this document provides a definition and a description of HTA, and presents the major stakeholders. It then summarizes the benefits of HTA, as reported in the literature including the IHF survey on HTA in university hospitals. This document summarize the state of the art and role of HTA and its impact in supporting healthcare leaders in their decision process.
What is HTA?

Policy and healthcare decision makers have to face the tension between new and expensive health technologies and limited financial resources. The Health Technology Assessment is a discipline that has been developed to support and optimize the decision making process.

“HTA is a multidisciplinary field that addresses the clinical, economic, organizational, social, legal, and ethical impacts of a health technology, considering its specific healthcare context as well as available alternatives. The scope and methods of HTA may be adapted to the needs of a particular health system, but HTA processes and methods should be transparent, systematic, and rigorous” (HTAi, 2015).

“HTA is the systematic evaluation of the properties and effects of a health technology, addressing the direct and intended effects of this technology, as well as its indirect and unintended consequences, and aimed mainly at informing decision making regarding health technologies. HTA is conducted by interdisciplinary groups that use explicit analytical frameworks drawing on a variety of methods” (INAHTA, 2015).

Considering the large volume of health technologies available and the limited and incomplete information provided for each of them, an accurate assessment is extremely important for healthcare decision makers. This requires a set of technical, economical and functional information as well as expected outcomes in support to the decision making process on both the introduction and use of innovative health technologies.

There are four main factors that led to the development of HTA:

<table>
<thead>
<tr>
<th>Innovation</th>
<th>Costs</th>
<th>Expectations</th>
<th>Effectiveness</th>
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</table>
| • Growing number of innovative healthcare technologies | • Need of an effective distribution of resources for health  
• High cost of innovative healthcare technologies | • Growing participation and involvement of patients in the healthcare system | • Technology to increase health of people  
• Technology to improve working conditions of healthcare personnel |
According to C. S. Goodman, the assessment follows three major orientations (Goodman, 2014):

1. Technology-oriented: the assessment focuses on the characteristics and impacts of a specific technology
2. Problem-oriented: the assessment focuses on the solution / management of a particular problem, condition or disease
3. Project-oriented: the assessment focuses on the implementation and use of a technology in a specific context

These three orientations are not completely isolated and, in the majority of cases, they overlap.

To be consistent and effective, the assessment process should focus on the following specific attributes (Goodman, 2014):

Considering the different elements taken into account, the assessment process will need to be undertaken by a multidisciplinary team able to provide expertise in different domains.

Depending on the type of assessment, the team may include:

<table>
<thead>
<tr>
<th>Doctors</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurses</td>
<td>Economists</td>
</tr>
<tr>
<td>Hospital managers</td>
<td>Social scientists</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>Lawyers</td>
</tr>
<tr>
<td>Technicians</td>
<td>IT experts</td>
</tr>
<tr>
<td>Psychologist</td>
<td>Engineers</td>
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</tbody>
</table>
To measure safety, effectiveness and efficacy dimensions of health technologies, there is need to take into account health outcomes such as mortality, morbidity, quality of life, patients’ satisfaction, etc. (Goodman, 2014)

According to Michael F. Drummond et al. (Michael F. Drummond, 2008) there are 15 HTA principles organized under four sections:

<table>
<thead>
<tr>
<th>Structure of HTA Programs</th>
<th>Methods of HTA</th>
<th>Processes of conduct of HTA</th>
<th>Use of HTAs in Decision Making</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Goal and scope of HTA should be explicit and relevant to its use</td>
<td>5. HTA should incorporate appropriate methods for assessing costs and benefits</td>
<td>10. Those conducting HTAs should actively engage all key stakeholder groups</td>
<td>13. HTA should be timely</td>
</tr>
<tr>
<td>2. HTA should be an unbiased and transparent exercise</td>
<td>6. HTAs should consider a wide range of evidence and outcomes</td>
<td>11. Those undertaking HTAs should actively seek all available data</td>
<td>14. HTA findings need to be communicated appropriately to different decision makers</td>
</tr>
<tr>
<td>3. HTA should include all relevant technologies</td>
<td>7. A full societal perspective should be considered when undertaking HTAs</td>
<td>12. The implementation of HTA findings needs to be monitored</td>
<td>15. The link between HTA findings and decision-making processes needs to be transparent and clearly defined</td>
</tr>
<tr>
<td>4. A clear system for setting priorities for HTA should exist</td>
<td>8. HTAs should explicitly characterize uncertainty surrounding estimates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. HTAs should consider and address issues of generalizability and transferability</td>
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</table>
The development of HTA

Some claim the origin of health technology assessments arose in the eighteenth century when a British scientist performed a study on scurvy treatments by the “arithmetical medicine” method or in the 1830s in Paris on phlebotomy research (Andrew Stevens, June 2003). The real beginnings of technology assessment (TA) came from the US Congress in 1967 to support political decisions and play a role in policymaking (Banta, March 2003). The formal institutionalization took place in 1972 with the creation of the US Congressional Office of Technology Assessment (OTA), in particular with the establishment in 1975 of its health program (Goodman, 2014).

The growth in new technologies registered in the 1970s raised concerns on their potential social, ethical, political and legal impacts (e.g., transplantation, artificial organs, genetics, contraceptives, etc.). In response to these concerns, HTA resulted to be a useful tool in supporting decision-making based on cost-effectiveness analysis.

Simultaneously to the creation of the OTA, practices of HTA started to be implemented in Europe. The first national agency for HTA in Europe was established in 1987 in Sweden (EUnetHTA, 2009). According to David Banta, in the 1990s most of the members of the European Union (UE) commenced national and regional public HTA agencies and programs (Banta, March 2003).

According to a study realized in 2015 by the World Health Organization, most of the 111 countries who participated to the Global Survey on Health Technology Assessment “have a process of collecting and analyzing information about health technologies or interventions and assessing their impact” (WHO, 2015).

The institutionalization of HTA

The need for a formal organization and dissemination of the outcomes of the HTA lead to the growing institutionalization of this practice. Since the 1980s, HTA has traditionally focused on the macro-level and most developed countries have created national agencies or organisms with the objective of informing policy-makers. These are, particularly in Europe, mostly governmental agencies, such as the National Institute for Health and Care Excellence in UK (NICE, 2016), the Haute Autorité de Santé in France (HAS, 2016), the Italian Society of HTA in Italy (SIHTA, 2016) and the Rede Brasileira de Avaliação de Tecnologias em Saúde in Brazil (REBRATS, 2016).

In another context, for example the USA, private agencies such as the Blue Cross Blue Shield Association (BCBS, 2016) play an important and parallel role to the one of public agencies.

In recent years, networks with a regional or global dimension have been established in response to the need to:

- Coordinate a growing number of national agencies worldwide
- Support institutionalization of HTA practices
Some international organizations are:

<table>
<thead>
<tr>
<th>HTAi</th>
<th>INAHTA</th>
<th>EUnetHTA</th>
<th>EuroScan</th>
</tr>
</thead>
<tbody>
<tr>
<td>A global collaboration forum for all stakeholders involved in HTA</td>
<td>A collaborative network of 54 HTA agencies from 33 countries</td>
<td>A collaborative network of HTA organizations in Europe</td>
<td>An international collaborative network of HTA agencies for sharing information</td>
</tr>
</tbody>
</table>

The above-described agencies are international networks that aim to collect the available information, facilitate the exchange and collaboration, and reduce risks of duplication both of efforts and of resources.

The impact of the role of HTA agencies is globally recognized, especially at the macro level as they play a key role in the decision making process for technology adoption. However, at the micro level, these analyses do not cover specific elements such as:

- Nature of infrastructure
- Strategical priorities of the hospital
- Technologies already available in the hospital
- Professional competencies of the staff
- Nature of patients

Over the last years, in response to this concern, the tendency has been a growing decentralization of HTA practices, in particular with the establishment of specific hospital HTA units.

**Hospital Based HTA**

According to the HTAi, “one of the first HTA agencies in Europe has been established at a “hospital” level. The CEDIT (Comité d’Evaluation et de Diffusion des Innovations Technologiques), established in 1982, probably the first example of HTA Agency in Europe, is an hospital-based agency for the assessment of medical technology” (HTAi).

Hospital-Based HTA (HB-HTA) units works with the objective to provide a clear, transparent and contextualized information. HB-HTA allows to focus the research on technologies that represent a real strategical interest for the hospital and, at the same time, facilitates the measurement of the impact of implementation based on effective data of the infrastructure itself (Sampietro-Colom, 2014).

To strengthen the implementation and the impact of HTA at the hospital level, the European Union funded the AdHopHTA research project: Adopting Hospital Based Health Technology Assessment. This project has developed several tools for the hospital community: a handbook, a toolkit and a HB-HTA database (AdHopHTA, 2016).
HTA and University Hospitals

According to the WHO, “HTA institutions are often linked to universities” (WHO, 2011) and it is globally recognized that most of the health technology innovations are implemented in hospitals and, in particular, university hospitals.

The IHF Secretariat has developed a short survey on HTA practices in University Hospitals. This survey has been launched worldwide within IHF Members in order to investigate major trends among University Hospitals. Responses were collected between March and May 2015 and the outcomes were presented during the XXVI ALASS Congress, held in September 2015 in Ancona, Italy.

We have received a total of 25 valid answers from the following 19 countries:

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>RESPONDENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>Brussels University Hospital / CHU Liege</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>Medical University of Pleven</td>
</tr>
<tr>
<td>Colombia</td>
<td>University Hospital FSFB</td>
</tr>
<tr>
<td>Denmark</td>
<td>Odense University Hospital</td>
</tr>
<tr>
<td>Estonia</td>
<td>Tartu University Hospital</td>
</tr>
<tr>
<td>Finland</td>
<td>Kuopio University Hospital / Turku University Hospital</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>Prince of Wales Hospital</td>
</tr>
<tr>
<td>Italy</td>
<td>University Hospital A. Gemelli</td>
</tr>
<tr>
<td>Kenya</td>
<td>Aga Khan University Hospital / Kenyatta National Hospital</td>
</tr>
<tr>
<td>Lebanon</td>
<td>CHU Notre Dame des Secours</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Aga Khan University Hospital</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippines Hospital Association / Wesleyand University Hospital</td>
</tr>
<tr>
<td>Portugal</td>
<td>Centro Hospitalar e Universitário de Coimbra</td>
</tr>
<tr>
<td>Spain</td>
<td>Hospital Clinic Barcelona / University Hospital of Seville / Hospital Universitario Cruces</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Centre Hospitalier Universitaire Vaudois</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Changhua Christian Hospital</td>
</tr>
<tr>
<td>Turkey</td>
<td>Ankara Numune Hospital</td>
</tr>
<tr>
<td>UAE</td>
<td>Thumbay Hospital Dubai</td>
</tr>
<tr>
<td>USA</td>
<td>University HealthSystem Consortium</td>
</tr>
</tbody>
</table>

Out of all respondents, 23 university hospitals rely on the recommendations of HTA for decision-making and only the two following cases are exceptions:

- the Medical University of Pleven in Bulgaria, for which the implementation of new technologies depends entirely on the Ministry of Health; and
- the University HealthSystem Consortium, which, despite having answered in the name of 117 university hospitals, stressed the complexity of the American health system and lack of a uniform response.
As it can be noticed from the chart below, more than half (59%) of those who resort to the recommendations of HTA do it systematically. About 40% of respondents use HTA for investment of capitals while 27% in anticipation of the increase in recurrent costs.

In most cases, HTA is considered as a tool to “drive” and “orient” decision making. However, for 30% of cases, it is a mandatory process and therefore any new technology will be implemented only according to HTA recommendations.

This survey shows that, with the exception of the “Prince of Wales” hospital of Hong Kong, recurring only to local public agencies, all respondents have internal units of HTA. In addition, more than 50% complete information through the recommendations of local or national public agencies.
It can also be noted from the chart below that, HTA plays an important and strategic role in the improvement of patient safety (92%) and cost-effectiveness (92%) as well as to support the purchasing process (71%).

Introducing new technology in a hospital implies the need for a short and long-term assessment of both its economical and practical impacts. Whether systematic or punctual, in 82% of cases, monitoring systems are in place and this process is conducted in 100% of cases inside the healthcare facility.
Conclusion

Healthcare systems continue to evolve and hospitals are challenged by several factors including the ageing of the population, the increasing number of people with multiple chronic conditions and limited resources. In this context, it is an evidence that health technology innovations have a strategic function for healthcare facilities.

The literature review realized for this study demonstrated that large scale, long term and evidence-based studies on HTA are limited. Nevertheless, there are some evidence and experiences that reinforce the effectiveness and cost-effectiveness of HTA models.

The result of this study showed that HTA recommendations are "optimal" when contextualized. HB-HTA units have the merit of proposing solutions that are responding to the specific needs of a hospital or department and therefore responsive to the requirement of cost-effective investments. It is however possible to extrapolate and generalize certain elements of the HTA recommendations, in particular the technological and scientific dimension. It is therefore evident the importance of international platforms that facilitate access to information available and reduce the risk of duplication.

HB-HTA units are still essentially established within University Hospitals; however, considering the growing number of successful experiences and the increasing cost pressure, it can be assumed that these units will also be implemented in other health care facilities.

This research has provided important insights about HTA. The next step will be to explore ways of spreading best practices and defining the role of healthcare managers in this context.
References


Michael F. Drummond, J. S. (2008). Key principles for the improved conduct of health technology assessments for resource allocation decisions. 24(3).


