Global HTA:
Past, present, and future

Wendy J. Babidge
General Manager, Research Audit and Academic Surgery
Royal Australasian College of Surgeons
Adelaide, Australia

Editor-in-Chief
International Journal of Technology Assessment in Health Care
Cambridge University Press
Cambridge, UK

Associate Professor
Discipline of Surgery, The Queen Elizabeth Hospital
University of Adelaide
Adelaide, Australia

Correspondence to:
Associate Professor Wendy Babidge
wendy.babidge@surgeons.org

Abstract
Health technology assessment (HTA) is a relatively recent innovation that has changed the way decisions are made in healthcare. It is a multidisciplinary process that requires different skill sets and collaboration among various disciplines and agencies. Evidence in the form of systematic reviews or HTAs – and more recently, overviews of systematic reviews – is increasingly being used by decision makers in healthcare globally. Key aims are to reduce duplication of effort and to provide appropriate evidence to assist people to make evidence-informed decisions about healthcare. Global and regional networks have been established to collaborate on reviews and HTAs, share knowledge, and reduce duplication. However, a very real example of inefficient evidence generation for decision making has been seen with the current COVID-19 pandemic where "eminence-based decisions" (based on the opinions of prominent health professionals) led the way early on. Hopefully, lessons can be learned from this in the future.

History of health technology assessment

Health Technology Assessment (HTA) is "a multidisciplinary process that uses explicit methods to determine the value of a health technology at different points in its lifecycle. The purpose is to inform decision making in order to promote an equitable, efficient, and high-quality health system".[1,2]

Technology assessment began in the US in the 1970s at the Office of Technology Assessment, which amongst other areas included a Health Programme.[3,4] This Programme was established due to concerns about the increasing costs and inefficiencies within the health system, and a desire to improve the quality of healthcare. The report on efficacy and safety of medical technologies[4] also stressed the importance of evidence to underpin decisions for the widespread use of technologies. HTA spread to Europe in the 1970s and was first embraced by Sweden.[5]

The publication of a report in 1972 by Archie Cochrane entitled *Effectiveness and Efficiency: Random Reflections on Health Services*[6] has served to underpin the development of HTA over the next four decades. Cochrane, who is considered the father of evidence-based medicine, stressed the importance of using data to compare the benefits and costs of alternatives when making decisions about the use of health technologies (including tests, devices, medicines, vaccines, procedures, programmes, or systems).[1] The randomised controlled trial (RCT) was recommended as the best methodology; however, it was understood that other types of evidence were useful in certain circumstances.

The first Cochrane Centre was established in 1992 in the United Kingdom, under the leadership of Iain Chalmers. Its aim was to enable collaboration on the production of systematic reviews of RCTs and to establish a register of RCTs.[7] Cochrane Centres have subsequently been created in many other countries.[8] This now global network has members and supporters from over 130 countries[9] who work in a voluntary capacity supported by Cochrane Centre staff. Cochrane Collaboration evidence products are aggregated in the Cochrane Library,

There has certainly been a shift from eminence-based to evidence-based decision making, where the clinician's knowledge/expertise is used in conjunction with published research evidence, rather than despite it.

which encompasses the *Cochrane Database of Systematic Reviews (CDSR),* the Cochrane Central Register of Controlled Trials (CENTRAL), and Cochrane Clinical Answers as well as a federated search feature that incorporates results from external databases.

Why HTA is important

In his overview in this issue, Michael Drummond[10] notes how medical decision making, at both the individual and population level, has changed over the past half a century. There has certainly been a shift from eminence-based to evidence-based decision making, where the clinician's knowledge/expertise is used in conjunction with published research evidence, rather than despite it.

HTA has helped support this through its focus on using evidence to support decision making at all levels of the health system, i.e. the macro policy level (structures and systems oversight), the meso healthcare level (functioning of organisations), and the micro clinical level (roles and behaviour of individuals).

With the current global COVID-19 pandemic, the importance of evidence has been highlighted by several publications in the journal *Nature*.[11,12] Pearson[12] presented the case for quality evidence, rather than what has occurred where many poor-quality studies have been driven by the need for guidance during the pandemic. The editorial[11] reminds us of the required rigour of evidence and its synthesis, as well as the message that we should learn from what has happened to evidence production during the pandemic. Additionally, in the area of surgery, Kovoor and colleagues[13] found that of studies published over a 7-month period (December 2019 to June 2020) on surgical topics relating to COVID-19, 72% had lower quality designs and 32% were opinion-based. Carley[14] reported that despite a large number of trials being conducted on COVID-19, many were small and with poor design, and some had the potential for direct or indirect harm. However, there has been significant success with trials of vaccines as well as some drug treatments.

There has been a massive increase in evidence produced during the COVID-19 era, which

Network/Organisation	Established	Membership	Website/comments
INAHTA	1992	49 HTA agencies	https://www.inahta.org/
ISPOR	1995	All healthcare stakeholders	https://www.ispor.org/
HTAi[a]	2003	Individuals and agencies	https://htai.org/
EUnetHTA	2006[b]	Organisations across 30 countries	https://eunethta.eu/
RedETSA	2011	Organisations across 19 countries	http://redetsa.org/wp/?page_id=209
HTAsiaLINK	2010	33 HTA agencies	https://www.htasialink.org/
ISPOR Regional	various	Various regional chapters	https://www.ispor.org/member-groups/global-groups/regional-chapters

Table 1. Global and regional health technology assessment networks

Abbreviations: INAHTA, International Network of Agencies for Health Technology Assessment; ISPOR, International Society for Pharmacoeconomics and Outcomes Research; HTAi, Health Technology Assessment International; EUnetHTA, European Network for Health Technology Assessment; RedETSA, Red de Evaluación de Tecnologías en Salud de las Américas; HTAsiaLINK, HTA network of Asia-Pacific region. a Previously ISTAHC 1995 b EunetHTA Project

can make it difficult for decision makers to understand the evidence. Databases such as Epistemonikos,[15] which was established in 2009, have served to support such decision making. This database contains systematic reviews and other types of structured summaries relevant for health decision-making sourced through regular screening of multiple electronic databases, including Cochrane Database of Systematic Reviews and PubMed. A search for COVID-19 on this database (May 2021) resulted in over 113,000 hits for primary studies and 7,200 systematic reviews and broader syntheses in the past year.

This highlights the need for ways to bring the best evidence from different sources together. Collaboration is key for achieving this through regional and global networks.

Global and local HTA – networks and dissemination

With this drive to incorporate the best evidence for decision making, HTA agencies have been established within governments, universities, and other institutions with the aim of generating HTAs that can inform decision making in healthcare.[5,16]

To collaborate, network, and avoid duplication of effort, several global and regional networks have been established. Table 1 shows key examples of global and regional networks, when they were established, their membership types, and a link to their websites. Included in the table are other groups that support the HTA community, which have formed as global and regional societies. They provide networking opportunities through conferences and other educational activities. Key examples of these include Health Technology Assessment International (HTAi)[17] and the International Society for Pharmacoeconomics and Outcomes Research (ISPOR), which is a global network made up of numerous regional chapters whose aim is to develop and advance health economics and outcomes research.

These international collaborations are key to progressing the methodologies and knowledge generated from HTA producers. An example of this is the new definition of HTA[1,2] that was created through a collaborative task group with members from the International Network of Agencies for Health Technology Assessment (INAHTA), HTAi, ISPOR, EUnetHTA, HTAsiaLink, RedETSA, and the HTA Glossary Committee.

With this drive to incorporate the best evidence for decision making, HTA agencies have been established within governments, universities, and other institutions with the aim of generating HTAs that can inform decision making in healthcare.

The World Health Organization (WHO) also has a key interest in HTA, particularly in relation to its mission of achieving universal health coverage.[18] The WHO resolution on HTA[19] led to a call for the WHO to assess the status of HTA globally. The subsequent report found that most HTAs focus on the domains of safety and effectiveness and then economic/ budgetary areas, with much less emphasis on aspects of ethics, equity, and feasibility. For decision making, HTAs were mostly used in an advisory rather than a mandatory capacity. The report also identified barriers to using HTA in decision making, which include inadequate resourcing to conduct HTAs, lack of institutionalisation of HTA, and limited awareness of the importance of HTA in healthcare decision making. This information has been useful as a basis to understand the current issues and needs in the area of HTA.

Peer-reviewed publications are an important method of disseminating HTAs, which are otherwise often only available on agency or government websites. Publications indexed by global medical literature databases such as Medline and EMBASE provide easier access to publications, rather than having to trawl through the grey literature. The increasing use of Open Access and other publication models is further expanding the availability of HTA research.

Supporting the dissemination of evidence-based information are numerous academic journals that publish specifically on HTA or related to medical decision making (see Table 2 for some examples). In 2016, a journal relating to hospital-based HTA was established – the International Journal of Hospital-based HTA. In this arena, different approaches are used for HTA to guide decision making at the hospital level where the health technologies are used.[20] HTAi has an interest group on hospital-based HTA that maintains the AdHopHTA website and database.[21] AdHopHTA, funded by the European Union, was a research project that developed three products for improving the practice of hospital-based HTA: a handbook of hospital-based HTA, a toolkit for setting up and running a hospital-based HTA unit, and a database of

hospital-based HTA reports. The handbook outlines the principle of hospital-based HTA, which supports the introduction of new health technologies into a hospital based on relevant, objective, comprehensive, and reliable evidence. It is provided in the specific context of the hospital where the technology is being introduced for medical decision making.

Reducing inefficiencies in the HTA process?

The globalisation and broader dissemination of HTA efforts have helped curb one of the challenges of HTA – and systematic reviews more generally – namely, the research wastage that occurs due to duplication of effort. Researchers can now register systematic reviews on PROSPERO, a database run by the Centre for Reviews and Dissemination (CRD) in the UK.[22] Another useful resource, formerly produced by the CRD, is housed by INAHTA (the International HTA Database 2.0) and contains completed and ongoing HTAs.[23]

EUnetHTA, a network of agencies now across 30 countries,[24] has developed a methodology to reduce duplication of effort and standardise the process – the HTA Core Model.[25] This is a framework for assessing evidence across a number of domains; it includes methodological guidance and a common reporting structure. It is available for use globally and encompasses both full and rapid assessments. The collaboration across agencies to produce a single EUnetHTA report reduces the risk of duplication of effort.

Other regional networks have the same aim as EUnetHTA of collaboration and duplication of effort; in Asia this is HTAsiaLink[26] with 33 member agencies and in the Americas RedETSA, formed in 2011 across 12 countries.[27] HTA evidence synthesis helps make sense of the plethora of studies by assessing quality, aggregating where applicable into a more robust evidence source, and noting gaps in the evidence base to alert researchers to priority areas for future work.

Other methodologies have been developed to improve efficiencies in the synthesis of evidence.[28-30] Overviews of systematic reviews bring together data from a variety of systematic reviews to synthesise the evidence for decision making. As these methods are relatively new, there is a need for guidance for researchers who are producing overviews of systematic reviews. A mapping study of existing guidance documents by M. Pollock and colleagues[28] has summarised current methods and identified areas where future methodological research is required[31] with respect to overviews. Another study by A. Pollock and colleagues[29] identified methodological challenges from the five exemplar overviews they assessed, and their recommendations outlined the features required in protocols for overviews. In 2019,[30] empirical findings were used to produce a decision tool to make informed decisions for study inclusion in overviews; this aimed at supporting researchers synthesising knowledge that includes systematic reviews. These studies support this increasingly widespread method for synthesising evidence.

The globalisation and broader dissemination of HTA efforts have helped curb one of the challenges of HTA – and systematic reviews more generally – namely, the research wastage that occurs due to duplication of effort.

A recent editorial[11] not only called out the failure of evidence-based medicine in a global emergency but, on a more positive note, raised the potential for automation of parts of the systematic review methodology to rapidly reduce the timeframe for production. Examples of this include the processes for retrieving the evidence, as well as a first pass procedure for selecting the evidence. This automation will also benefit the efforts for updating systematic reviews, which is essential for keeping up with the most recent evidence, especially at the current time where the evidence is changing so quickly.

Encouraging stakeholders to use HTA

HTA has a broad stakeholder base that includes not only clinicians and governments, but also healthcare institutions, insurers, patients, and caregivers. All these groups need to make decisions about the use of health technologies.

Pearson raises the issue that despite the huge efforts to synthesise the large COVID-19 evidence base, there is no guarantee that politicians will pay attention to the evidence reports produced.[12] More broadly there are some sceptics who follow social media rather than reputable evidence sources, which is definitely discouraged.

An article by Hailey and colleagues[32] reviewed literature published from 2000 to 2015 on the influence of HTAs. They found that while there was some variation in the assessed influence of HTAs, for the most part their impact was positive. Limited studies looked at clinical practice changes or changes in outcomes, and they suggested a place for clinical quality registers to fill this gap in data assessment.

There is also a move to more adaptive evidence synthesis, using real world evidence (RWE), as well as more rapid approaches, such

Journal	Established	Website
International Journal of Technology Assessment in Health Care	1985	https://www.cambridge.org/core/journals/international-journal-of-technology-assessment-in-health-care
Value in Health	1998	https://www.journals.elsevier.com/value-in-health
Value in Health Regional Issues	2012	https://www.journals.elsevier.com/value-in-health-regional-issues
Medical Decision Making	1981	https://journals.sagepub.com/home/mdm
Health Technology Assessment	1997	https://www.journalslibrary.nihr.ac.uk/HTA/#/
International Journal of Hospital Based Health Technology Assessment	2016	http://www.cybelepress.com/ijhbhta.html

Table 2. Health technology assessment journals

as rapid reviews, to make HTA more flexible and user-friendly.

There is growing interest in the use of real-world data (RWD) in HTAs, and RWE has been reported in a number of studies.[33-36] The FDA defines these terms as follows: "RWD are data relating to patient health status and/or the delivery of healthcare routinely collected from a variety of sources. RWE is the clinical evidence about the use and potential benefits or risks of a medical product derived from analysis of RWD."[37] Sherman and colleagues[38] discuss what RWE is and how it can be used. The RWD collected in administrative databases, registries, and other repositories has the potential to produce RWE that can be used in HTAs.[36] Pongiglione and colleagues[36] conclude that RWD, particularly related to medical devices in Europe, has the potential for use in HTAs but that there are challenges. A coordinated approach is needed to strengthen RWD production, design, and analysis. Other barriers to be overcome relate to data quality, quantity, and access. A German study[34] concluded that there were conflicting demands from different stakeholders (for regulators compared with HTA bodies, for example), and Facey and colleagues[33] highlighted that there is considerable collaboration needed between stakeholders to determine how RWE can be developed to inform healthcare decisions. A recent initiative was launched in the Netherlands, the GetReal Institute,[39] to facilitate the adoption and implementation of RWE for healthcare decisions in Europe. In the US, the FDA currently uses RWD and RWE to monitor post-market safety and adverse events, as well as for making regulatory decisions.[40] In Asia, a working group has been established (**REAL** World Data **I**n A**S**ia for H**E**alth Technology Assessment Reimbursement – REALISE) to develop guidance on the use of RWD/RWE for informing decision making in their region.[35] It is clear that there is a place for its use, but strong collaboration and organisation will be required to achieve this goal. There is a need to build research capacity for dealing with RWE and analysing observational data, which is a likely focus for HTA researchers in the near future so that they can capitalise on the potential of RWD to inform healthcare decision making.

Although work is being done by researchers, policy makers, and regulators on expanding RWE use, patient involvement is key for the optimal use of RWE for clinical effectiveness research. The Patient-Centered Outcomes Research Institute has developed a RWE training programme, with the aim of improving patient healthcare decisions.[41] The importance of public and patient involvement in HTA more broadly is covered in a recent special issue in IJTAHC where articles cover strategies for patient and public involvement and engagement, as well as the role of patients in decision making.[42]

There is no doubt that HTA has changed the way decisions are made in healthcare, however there is always room for improvement.

Conclusions

There is no doubt that HTA has changed the way decisions are made in healthcare, however there is always room for improvement. Recent methodological changes, such as the incorporation of real-world evidence, challenge the traditional processes for synthesising data. The HTA community is growing globally, and through this many collaborations are possible. Efforts are being made to better engage with all HTA stakeholders through both individual pursuits and an increasing number of international networks. Together as a community, we can improve the healthcare provided to our societies.

Conflicts of interest

The author is employed by Cambridge University Press that publishes the journal, IJTAHC, which is the journal of HTAi.

References

1. O'Rourke B, Oortwijn WJ, Schuller T. The new definition of health technology assessment: A milestone in international collaboration. IJTAHC. 2020;36(3): 187-190.
2. O'Rourke B, Oortwijn WJ, Schuller T. Announcing the new definition of health technology assessment. Value Health. 2020;23(6):824-5.
3. Institute of Medicine (US) Council on Health Care Technology; Goodman C, editor. Medical Technology Assessment Directory: A pilot reference to organizations, assessments, and information resources. Washington (DC): National Academies Press (US), 1988. Congress of the United States Office of Technology Assessment Health Program. Available from: https://www.ncbi.nlm.nih.gov/books/NBK218464/
4. Office of Technology Assessment Health Program: Washington DC. Assessing the efficacy and safety of medical technologies. 1978. Office, U.S. Government Printing, NTIS order #PB-286929.
5. Banta D, Kristensen FB, Jonsson E. A history of health technology assessment at the European level. IJTAHC. 2009;25(S1):68–73.
6. Cochrane AL. Effectiveness and efficiency: random reflections on health services. London: Nuffield Provincial Hospitals Trust; 1972.
7. Chalmers I, Dickersin K, Chalmers TC. Getting to grips with Archie Cochrane's agenda. BMJ. 1992; 305(6857):786–8.
8. Chalmers I. The Cochrane Collaboration: Preparing, maintaining, and disseminating systematic reviews of the effects of health care. Ann N Y Acad Sci. 1993;703(1): 56–165.
9. What is Cochrane? 2021 [cited 2021 May 15]. Available from: https://www.cochrane.org/about-us .
10. Drummond M. Medical decision making at the individual and population level: The increasing role of evidence. Med Writ. 2021;30(3):8–15.
11. Evidence-based medicine: how COVID can drive positive change. Nature. 2021;593:168.
12. Pearson H. How COVID broke the evidence pipeline. Nature. 2021;593: 182–5.
13. Kovoor JG, Tivey DR, Ovenden CD, Babidge WJ, Maddern GJ. Evidence, not eminence, for surgical management during COVID-19: A multifaceted systematic review and model for rapid clinical change. BJS Open. 2021;5(4):zrab048.
14. Carley S, Horner D, Brody R, Mackway-Jones K. Evidence-based medicine and COVID-19: what to believe and when to change. Emerg Med J. 2020;37:572–5.
15. Episemonikos. 2021 [cited 2021 May 15]. Available from: https://www.epistemonikos.org/en/
16. Banta D, Behney CJ. Office of Technology Assessment health programme. IJTAHC. 2009;25(Suppl 1):28–32.

17. Banta D, Jonsson E, Childs P. History of the international societies in health technology assessment: International Society for Technology Assessment in Health Care and Health Technology Assessment International. IJTAHC. 2009;25(Supplement 1);19–23.
18. 2015 Global survey of health technology assessment by national authorities. 2015 [cited 2021 May 15]. Available from: https://www.who.int/health-technology-assessment/MD_HTA_oct2015_final_web2.pdf?ua=1
19. Sixty-seventh World Health Assembly WHA67.23 Health intervention and technology assessment in support of universal health coverage. 2014 [cited 2021 May 15]. Available from: https://apps.who.int/gb/ebwha/pdf_files/WHA67/A67_R23-en.pdf
20. McGregor M, Brophy JM. End-user involvement in health technology assessment (HTA) development: a way to increase impact. IJTAHC. 2005;21(2):263–67.
21. AdHopHTA: an European project on hospital based health technology assessment [cited 2021 May 15]. Available from http://www.adhophta.eu/
22. PROSPERO International prospective register of systematic reviews. [cited 2021 May 15]. Available from: https://www.crd.york.ac.uk/prospero/
23. International HTA database [cited 2021 May 15]. Available from: https://database.inahta.org/
24. EUnetHTA. [cited 2021 May 15]. Available from: https://www.eunethta.eu/
25. Kristensen FB, Lampe K, Wild C, Cerbo M, Goettsch W, Becla L. The HTA Core Model® —10 Years of developing an international framework to share multidimensional value assessment. Value Health. 2017;20(2):244–50.
26. Teerawattananon Y, Luz K, Yothasmutra C et al. Historical development of the HTAsiaLINK network and its key determinants of success. IJTAHC. 2018:34(3):260–6.
27. RedETSA. Our history [cited 2021 May 15]. Available from: http://redetsa.org/wp/?page_id=334
28. Pollock M, Fernandes RM, Becker LA, Featherstone R, Hartling L. What guidance is available for researchers conducting overviews of reviews of healthcare interventions? A scoping review and qualitative metasummary. Syst Rev. 2016;5(1):190.
29. Pollock A, Campbell P, Brunton G, Hunt H, Estcourt L. Selecting and implementing overview methods: implications from five exemplar overviews. Syst Rev. 2017;6(1):145.
30. Pollock M, Fernandes RM, Newton AS, Scott SD, Hartling L. A decision tool to help researchers make decisions about including systematic reviews in overviews of reviews of healthcare interventions. Syst Rev. 2019; 8(1):29.
31. Chapter V: Overviews of Reviews [cited 2021 May 15]. Available from: https://training.cochrane.org/handbook/current/chapter-v
32. Hailey D, Werkö S, Rosén M, et al. Influence of Health Technology Assessment and its measurement. IJTAHC. 2016;32(6):376–84.
33. Facey KM, Rannanheimo P, Batchelo, L, Borchardt M, de Cock J. Real-world evidence to support Payer/HTA decisions about highly innovative technologies in the EU – actions for stakeholders. IJTAHC. 2020;36:459–68.
34. Sievers H, Joos A, Hiligsman, M. Real-world evidence: perspectives on challenges, value, and alignment of regulatory and national health technology assessment data collection requirements. IJTAHC, 2021;37(e40):1–8.
35. Lou J, Kc S, Toh KY, et al. Real-world data for health technology assessment for reimbursement decisions in Asia: current landscape and a way forward. IJTAHC. 2020;36(5):474–80.
36. Pongiglione B, Torbica A, Blommestein H, et al. Do existing real-world data sources generate suitable evidence for the HTA of medical devices in Europe? Mapping and critical appraisal. IJTAHC. 2021;37(1):e62.
37. Framework for FDA's real-world evidence program. 2018 [cited 2021 May 15]. Available from: https://www.fda.gov/media/120060/download
38. Sherman RE, Anderson SA, Dal Pan GJ, et al. 'Real-world evidence — What is it and what can it tell us? NEJM. 2016;375(23):2293–97.
39. GetREAL Institute [cited 2021 May 15]. 2021 Available from: https://www.getreal-institute.org/about-us/
40. National Evaluation System for health technology (NEST). 2019 [cited 2021 May 15]. Available from: https://www.fda.gov/about-fda/cdrh-reports/national-evaluation-system-health-technology-nest
41. Building Capacity for Patient Engagement in Real-World Evidence Development. 2019 [cited 2021 May 15]. Available from: https://www.pcori.org/research-results/2019/building-capacity-patient-engagement-real-world-evidence-development
42. *IJTAHC* Special Issue: Patient and Public Involvement in HTA. April 2021. Guest Editors Sophie Söderholm Werkö and Sophie Staniszewska. 2021 [cited 2021 May 15]. Available from: https://www.cambridge.org/core/journals/international-journal-of-technology-assessment-in-health-care/special-issue-patient-and-public-involvement-in-hta

Author information

Wendy Babidge, PhD, has worked in the field of HTA for 23 years at the Australian Safety and Efficacy Register of New Interventional Procedures – Surgical (ASERNIP-S), the Royal Australasian College of Surgeons. Since 2015 she has been employed by Cambridge University Press as Editor-in-Chief of the international journal of the HTAi Society, IJTAHC.