

The International Network of Agencies for Health Technology Assessment

Published Evidence on the Influence of Health Technology Assessment A systematic review

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Summary

- A systematic review was undertaken of reports on HTA influence and its measurement, where influence had been demonstrated.
- The literature search used several electronic data bases to locate reports published between 2000 and 2013 and was supplemented by hand searching the bibliographies of selected papers and through contacts with agencies.
- Inclusion criteria were reliable reports of consideration by decision-makers of HTA findings; comparative studies with measures of technology use before and after dissemination of an HTA; and studies that reported changes in one or more of policy, technology use, health outcomes or research that could be credibly linked to an HTA.
- Information was collected on study setting, technologies that were assessed, types of decision that were informed, approach used to assess HTA influence, indications of HTA influence, measures of influence, and non-HTA influences on outcomes.
- Appraisal of study quality considered whether findings of HTAs were summarized; if the decision making process informed by the HTA and the approach to influence assessment were described; if findings on HTA influence were reported; and whether non HTA influences were considered.
- 46 publications covering 43 studies were selected for review.
- Settings for consideration of HTA influence were national (18), regional (11), both national and regional (3), hospitals (8), and multinational (3).
- The most common approach to appraisal of HTA influence was review of policy or administrative decisions following HTA recommendations. Several publications reported survey findings, and five considered the influence of primary studies.
- Types of decision most frequently informed by HTAs were Influence on routine clinical practice, Coverage, Program operation and Capital funding.
- Opinions on influence were Major influence for 17 studies; Some input to decisions for 10; Some consideration of the HTA for 5 and Minimal for 3. In 8 studies there were mixed opinions on different HTAs.
- The most frequent indications of HTA influence were those on decisions involving resource allocation or related to effects on practice.
- Study quality ratings were high for more than half the reviewed publications. The items most frequently omitted were consideration of non HTA influences and findings of the HTA report(s).
- Some studies noted uncertainties in determining the influence of HTA because of possible effects from other factors.
- The literature on assessment of HTA influence is still quite limited and there is little on longer term effects on clinical practice and health outcomes.
- However, the publications included this review have much useful information related to HTA influence, including approaches that might be more widely applied.



Acronyms and abbreviations

AAA:	Abdominal aortic aneurysm
ACE:	Angiotensin-converting-enzyme
ASERNIP-S:	Australian Safety and Efficacy Register of New Interventional Procedures-
	Surgical
BCBS:	Blue Cross and Blue Shield
CEA:	Cost-effectiveness analysis
CED:	Coverage with evidence development
CEDIT:	Committee for the Evaluation and Diffusion of Innovative Technologies
COPD:	Chronic obstructive pulmonary disease
EU:	European Union
HSR:	Health Services Research
HTA:	Health technology assessment
ICER:	Incremental cost-effectiveness ratio
NHS:	National Health Service
NICE:	National Institute for Health and Care Excellence
PSA:	Prostate-specific antigen
QALY:	Quality-adjusted life year
SBU:	Swedish Council on Technology Assessment in Health Care
SMS:	Scottish Medicines Consortium



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Introduction

HTA is used to inform decisions relating to health care systems. Such decisions may relate to the procurement, funding or appropriate use of health technologies and also to disinvestment of ineffective technologies. Information on the influence of HTA reports is a guide to the effectiveness of an HTA program. Such information is useful in reporting to funders of HTA programs, in quality assurance processes, and in contributing to global indications of HTA achievements. In principle, there will be interest in the influence of HTA on policy and administrative decisions, subsequent administrative action, delivery of health care and on health status [1].

There is still relatively little information available on the influence of HTA on health care decisions and their outcomes. Also, there is limited detail available on methods used to assess HTA influence and the experience of HTA agencies and programs in applying such approaches.

A 2005 review by Gerhardus and Dintsios covered 43 studies that presented a methodology to assess the impact of HTA, investigated the impact of HTA on decision-making processes, or studied the factors that might enhance or hinder the impact of HTA [2]. They concluded that there is little experience with study designs or methods that allow a valid assessment of the impact of HTA reports on the decision making process in the health sector. Also, only limited conclusions related to the impact of HTA reports could be drawn.

A report from ASERNIP-S sought to identify and review policies and processes for the introduction of new interventional procedures into clinical practice. The aim was to determine how decisions about the adoption of these procedures were made and the extent to which evidence-based information, particularly HTAs, were used in the decision-making process [3]. Seven studies were Identified that described outcomes of policies. The results showed that while the safety, efficacy and clinical and cost-effectiveness of new health technologies are important considerations in the decision-making process, a number of other factors also play an important role. Decisions were never based solely on the findings of HTAs. A lack of access to relevant and timely HTAs was identified as an important barrier to an optimal decision-making.

Niessen et al. [4] reported that 30 studies, including some on HTAs, found that use of economic evidence had a "substantial" impact on health care policymaking; 27 studies emphasized at least one other criterion. A further 11 studies found only a limited impact and two studies showed no impact.

INAHTA had obtained some information on HTA influence from its members through surveys but had not reviewed the available literature. At the 2012 Annual Meeting of INAHTA it was decided that the working group on impact of HTA would undertake a systematic review of reports on HTA influence and its measurement, where influence has been demonstrated.

Organization of the systematic review process

Development of the approach to the systematic review was undertaken by core members of the working group. A first consideration was how work on the systematic review might be shared, taking account of the availability of working group members and the many other commitments of INAHTA agencies.



SBU agreed to perform the literature search and to provide project support associated with this. Five groups of reviewers were formed by core members and their colleagues to share the tasks of abstract selection and data extraction.

A protocol for the review was developed by members of the project team. It was agreed that the term "HTA influence" would be used rather than "HTA impact", this being the preference of several reviewers as representing a more realistic indication of the place of HTA in decision making. Publications on clinical guidelines were to be excluded.

The initial intention was not to specify date limits for the literature search. However, a preliminary search by SBU indicated that this would result in a larger number of abstracts than could readily be dealt with by the reviewer groups. Publication dates for the initial search were therefore limited to 2000-2012.

Objectives and research questions

It was agreed that the objectives of the systematic review were to obtain information on the influence of HTAs on health care decisions and their outcomes, and on the methods used to measure such influence. Both full HTAs and rapid HTAs (reports that took between 1 and 6 months to prepare) would be considered. The research questions for the review were:

- What health care decisions have been influenced by HTA, and in what ways?
- What methods have been used to assess HTA influence?
- What outcomes related to use of health technologies have been linked to HTA?

Methods

Data identification and retrieval strategy

A literature search was conducted in March 2013 and updated in June 2014. Published literature was identified through searching PubMed, Embase, Cinahl

Cochrane Library, PsychInfo, CRD= NH Seed, HTA, DARE, NHS Evidence, and the Swedish HTA database for reports published between 2000 and 2014 There were no language restrictions. Information on the search strategy is in Appendix A. The searches were supplemented by hand searching the bibliographies of selected papers and through contacts with agencies.

Inclusion criteria were publications that reliably reported consideration by decision-makers of HTA findings and/or recommendations; comparative studies that included relevant measures related to use of a health technology before and after dissemination of an HTA; and studies that reported changes in one or more of the following that could be credibly linked to information provided by an HTA:

- policy related to a health technology
- use of a health technology in a health care system
- relevant health outcomes associated with use of a health technology
- increased level of research or initiation of research

Expert opinion, correspondence, commentaries and duplicate publications on the same study were excluded.



Study selection procedures

Initial screening of publications identified by the literature search was undertaken by the groups of reviewers from the project team. Each group was allocated a list of citations. Titles, abstracts and keywords were checked for their relevance to the review topic. Any citations considered relevant by the reviewers or for which there was uncertainty were retained at that stage.

Selected publications were considered independently by the groups of reviewers. Publications were selected for inclusion if the reviewers agreed that they met the inclusion criteria. Differences between reviewers were discussed and resolved by consensus.

Data handling and quality assessment

The data extraction form used to record information from the selected studies is shown in Appendix B. The form included description of the selected publication, the study setting, health technologies that were assessed, type(s) of decision informed by the assessment, approach used to assess HTA influence, main indications of HTA influence, measures and/or opinion on influence, and non-HTA influences on outcomes. Data were extracted by the five groups of reviewers and checked for their eligibility for inclusion. Any disagreements were resolved through discussion.

For publications covering many HTA reports, the technologies were listed but other elements in the data extraction were based on the summary information that was provided, rather than considering each recommendation and its impact individually.

In some cases, the authors' opinion on level of HTA influence was reported, or was apparent from details presented in the reviewed publication. When this was not the case, a judgement on the level of influence was made by the reviewers. Level of influence was recorded on a four point scale used in previous INAHTA projects.

Appraisal of study quality included consideration of whether findings of HTA(s) were summarized; if the decision making process informed by the HTA and the approach to HTA influence assessment were described; if findings on HTA influence were reported; and whether non – HTA influences were considered. This approach provided further context on each report through five generally applicable indicators that had some relevance to quality but were also related to scope of the study. The information provided was limited, but the questions could be dealt with quickly by reviewers who had little time available. Quality ratings included in the data summary tables were given by the number of indicators that applied to each study, giving scores from 1 to 5. Higher scores tended to indicate that greater confidence could be placed in the quality and applicability of the findings.

Data synthesis

Information from the data collection forms were collated with the aid of interim tables covering sources of information, technologies covered, setting and scope, types of decisions informed by HTAs, indications of HTA influence, non - HTA influences on outcomes, and study quality. Summary tables were then prepared for all studies.



Results

After removal of duplicates, 4,336 publications were identified by the literature search. An overview of publication selection is shown in Figure 1. Adjustments to initial selections were made through exclusion of earlier publications where there had been a series of reports on the same topic, papers that on further inspection were not related to influence of HTA, and publications where there was insufficient information to provide a clear indication of HTA influence. A total of 46 publications covering 43 studies were selected for review.

Sources of information on HTA influence

Of the 46 selected publications, 36 were from refereed journals, 2 were non - refereed articles, 6 were reports from HTA agencies or programs and 2 were reports prepared by consultants.

Reports on measurement of HTA influence were obtained from 16 countries – Austria, Belgium (2), Canada (9), France (2), Finland, Germany, Italy (2), Malaysia, the Netherlands (3), the PRC, Poland, Spain (2), Sweden (6), Switzerland, the UK (8) and the USA (2).

Three publications provided information on more than one country. These included a report on EU countries, an INAHTA report with details from Australia, Brazil, Canada, Spain and the USA, and a survey of Latin American and Caribbean countries.



Figure 1: Selection of publications





Data from the reviewed publications

Summaries of the reviewed publications are presented in two groups. The first includes publications that considered a single health technology, or small numbers of health technologies [5-29]. The second includes publications that had more of a focus on HTA programs and considered larger numbers of technologies [30-50].

Settings and approaches

Settings for consideration of HTA influence were national (18), regional (11), both national and regional (3), hospitals (8), and multinational (3). The selected publications covered a wide range of technologies and approaches to HTA.

Approaches taken to appraisal of HTA influence are shown in Table 1. The most common approach was review of policy or administrative decisions following HTA recommendations, in some cases with review of administrative data. Several publications reported survey findings, sometimes in combination with review of policy or administrative data. Five publications considered the influence of primary studies. In three of these the primary studies were funded under HTA programs.

Types of decision

Types of decisions informed by the HTAs are shown in Table 2. Influence on practice and coverage were the most common categories.

Opinions on the influence of HTAs

Details of opinions on the influence of HTAs are shown in Table 3. Major influence and some input to decisions were the most common opinions. In nine of the reviewed publications, details given indicated that HTA influence had varied for different technologies. Some of the 'minimal' ratings were associated with the early stages of HTA programs or their evaluation. One paper indicated that for some technologies HTA influence was uncertain.

Indications of influence

Table 4 gives a summary of indications of HTA influence that were noted during data extraction of the selected publications. Influence on decisions involving resource allocation was the most frequent indication. There were also a number of indications related to effects on practice.



Table 1: Approaches taken in assessing HTA influence

	Group 1 - Individual technologies	Group 2- HTA Programs	Total
Review of policy, and of acceptance of HTA	12	6	18
recommendations			
Review of policy and of administrative data	4	2	6
Analysis of administrative data	1	2	3
Questionnaire surveys of decision makers or	2	3	5
agencies			
Qualitative interviews with decision makers	1	3	4
Qualitative interviews plus review of decisions	1	1	2
Review of effects of primary studies.	3 ^a	2 ^b	5
	24	19	43

a) Reports on study outcomes - interviews, effects on practice, influence on purchasing decisions b) Use of payback framework including combination of questionnaire, interview, administrative data review

Table 2: Types of decisions informed by HTA

Types of decision	Group 1 – Individual	Group 2- HTA	Total
	technologies	Programs	
Influence on routine clinical practice	17	12	29
Coverage	14	13	27
Program operation	14	6	20
Capital funding	4	10	14
Guideline formulation	5	5	10
Indications for further research	2	6	8
Referral for treatment	4	2	6
Formulary		4	4
Other	3 ^a		3

a) Other decisions: Equipment sales, Legislation to regulate program, Strategy planning process



Table 3: Opinions on the influence of HTAs

	Group 1 – Individual technologies	Group 2- HTA Programs	Total
Major influence	10	7	17
Some input to decisions	6	4	10
Some consideration of the HTA	4	1	5
Minimal	1	2	3
Mix of influences	3 ^a	5 ^b	8

a) *Major:2, Minimal: 1 // *Some input: 2, Some consideration:2//

*Major: 1, Some consideration: 2, Minimal: 2

b) *Major: 14, Some consideration: 4, Minimal:2// *Major: 46, Some consideration: 17//

*Major:7, Minimal:1, Uncertain:5// *Some input: 3, Minimal: large number //

*Major: 8, Some consideration: 7

Table 4: Indications of HTA influence

Indication	Number of HTAs
Acceptance of recommendations, linked to resource allocation	25
Change in practice pattern	9
Planning process for program	8
Support for and use of screening technologies	6
Incorporation of HTA details in reference material	5
Acceptance of recommendations, clinical indications	5
Influence on research	2
Evaluation of medical device performance	1
Influence on other HTA programs	1

Publication quality

Study quality ratings were high for more than half the reviewed publications (Table 5). The items most frequently omitted were consideration of non - HTA influences and findings of the HTA report(s).

Table 5:	Ratings	of study	quality
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Rating	Group 1 - Individual technologies	Group 2-HTA Programs	Total
5	6	3	10
4	5	9	14
3	7	6	12
2	5	1	6
1	1		1



Details of the reviewed publications

Summary details of the reviewed publications are presented in Tables 6 and 7 with brief additional comments on some of the material in each of the groups.

Publications covering small numbers of health technologies

Medical devices

A Canadian assessment on drug-eluting stents led to these being made available aonly for high-risk patients with AAA [5]. In the UK assessment of a peritoneal drainage catheter system was linked to its availability for persons with treatment-resistant, recurrent malignant ascites [8] Italian reports on robotic surgery [9] and cochlear implantation [10] led to agreement on clinical indications and on criteria for treatment of several patient groups.

In a US study various types of device were evaluated by surgeons using standardized procedures. Their findings were used by a hospital purchasing organization to make procurement decisions [21].

Diagnostic services

A Swedish HTA on preoperative examinations led to a reduction in the use of reduction in use of these services [14]. An HTA from a Swedish county provided input to decisions to fund liquid-based cytology [21]. A UK report considered effects of pediatric radiology guidelines on practice patterns [6]. A US assessment and policy review determined that a pharmacogenomics method for managing the treatment of H. pylori infection was investigational [23].

Screening technologies

Details on HTAs of screening technologies cover both policy decisions and practice patterns after the introduction of screening programs. Three [11-13] cover screening for breast cancer and prostate cancer, and the use of ultrasound in pregnancy. The first of these papers indicated there was minimal HTA influence on the use of these technologies, reflecting lack of a systematic approach to prevention policy and practice in Belgium at that time. In the Netherlands and Sweden there was acceptance of HTA recommendations by government decision makers, and introduction of national programs for breast cancer screening and ultrasound screening in pregnancy. The latter was associated with parents' wish to have a picture of their fetus ("fun echos"). Recommendations against introduction of prostate cancer screening were accepted, but in the event HTA influence on practice patterns was limited by the high rates of opportunistic testing, also noted in a further paper from Sweden [14].

Another paper from the Netherlands also indicated a major influence on maternal screening [16] and there was major HTA influence in the development of programs for fetal abnormalities screening in Finland [18].

A study on newborn screening in the EU countries compared coverage decision processes with and without input from HTAs. Those associated with an HTA were more inclusive, explicit and transparent [17]. Two HTAs on newborn screening in a Canadian province led to introduction and expansion of screening programs [24].



Screening for AAA in a Swedish county was funded and implemented following local HTA [21]. In the PRC, a guideline on pre-natal diagnosis, issued by the Ministry of Health, was based on HTA findings [25]

Pharmaceuticals

A Swedish report on management of moderately elevated blood pressure was associated with changes in the level of use of some drugs [14]. Other Swedish studies contributed to decrease in use of neuroleptics as calming therapy for old persons, and in proton pump inhibitors for functional dyspepsia [14]. Appraisal in the UK on use of Interferons and glatiramer acetate for multiple sclerosis contributed to a decision on provision of conditional support [26].

Surgical and other procedures

A Swiss study on disc arthroplasty contributed to a decision on coverage following CED. In Sweden appraisal of cardiac bypass surgery led to expansion of open heart surgery services and a report on chiropractic care for back pain provided input to decisions by a local health authority [19].

A Canadian HTA was linked to a decision to fund laparoscopic adjustable gastric banding. Gastric electrical stimulation was not funded as it was considered investigational [25].

Studies with hospitals in Catalan Health Regions provided input to decisions on prioritization procedures for cataract surgery and for hip or knee replacement [20].

Assessments from a Swedish county gave input to decisions on use of bariatric surgery and on denial of coverage for acupuncture as treatment for drug addiction [21].

Respiratory disease, primary studies

A qualitative study of six primary studies on respiratory diseases funded under the Catalan HTA program used semi-structured interviews with researchers and healthcare decision-makers [27]. Participants reported that changes in health services and in clinical practice had resulted from the research.

Public health related studies

A study with a public health theme found a guideline on tobacco prevention prepared by an HTA program had influenced dental professionals in a Swedish county [15]. The authors note that the results were based on self-reported data with no objective validation and that there could have been other influences on clinical outcomes. A further study considered influence of assessments on public health related issues in London, UK [28, 29].



Technology	Country/setting	Type of	Approach used	Indication of	Extent of	Quality
		decision		influence	influence	score
Goeree [5], 2006 Drug-eluting stents	Canada, provincial health system	Coverage, Guideline	Data on introduction and use following HTA & decision maker action	Acceptance of recommendations re availability only for high-risk AAA patients	Major	4
Dunning [6], 2004 Skull X-ray, CT, (paediatric)	England, three hospitals	Guideline, Practice	Sub analysis of prospective cohort study, Monte-Carlo simulation	Guidelines do not increase the workload, but they move patient management from the observation ward to the radiology department	Some input to decisions	3
Schluessmann [7], 2009 disc arthroplasty	Switzerland, National	Coverage Program	Details of registry information following decision to use CED	Coverage provided by insurance program	Major	5
White [8], 2012 peritoneal drainage catheter	England, NHS	Referral, Guideline	Formal decision process linked to HTA findings	Acceptance of recommendation in a Medical Technology Guidance	Some consideration	4

 Table 6: Publications covering HTAs and small numbers of technologies



Table 6 (continu	Table 6 (continued)					
Technology	Country/ setting	Type of decision	Approach used	Indication of influence	Extent of influence	Quality score
Ballini [9], 2010 Robotic surgery	Italy, Hospitals in the Emilia- Romagna Region and regional health authority	Program, Practice, Research	Review of decisions following evaluation by multidisciplinary panel that included systematic review, analysis of local context, and identification of indications with promising clinical return.	Agreement on clinical indications for which the robot should not be used and suspension of these by hospitals and surgeons. Agreement on a list of promising clinical indications and for evaluation locally Proposal by local surgeons, for two multicentre clinical trials	Major	3
Berrettini [10], 2011 Cochlear implantation	Italy, National Agency for Regional Healthcare Services, coordinated by Laszio Region	Referral, Guideline, Practice	Advice re acceptance of recommendations following systematic review on clinical & economic aspects of CI	Recommendations on criteria for treatment of several patient groups were approved with minimal suggestions by members of a coordinating committee that represented all stakeholders	Some consideration	2
Vermeulen [11], 2001 Screening – breast cancer, prostate cancer, ultrasound in pregnancy	Belgium, Flemish Preventive Service	Coverage, Capital funding	Interviews with stakeholders and experts, review of policy	Use of technologies did not follow advice from available assessment. Lack of a systematic approach to prevention policy and practice	Minimal	5

Table 6 (contin	Table 6 (continued)					
Technology	Country/	Type of	Approach used	Indication of	Extent of	Quality
	setting	decision		influence	influence	score
Banta [12], 2001 Screening – a) breast cancer, b) prostate cancer c) ultrasound in pregnancy	Netherlands, National	Coverage, Program, Practice, Research	Appraisal of program implementation, data on use of screening tests	 a) Mammography – CEA etc was followed by national screening program for breast cancer b) Recommended against prostate cancer screening –, accepted by government but "quite a lot" of opportunistic screening. Recommendation re future research accepted by ministry & implemented c) Selective use supported, for high risk groups. However 80 -90% pregnancies screened with US 	a &b Major c Minimal	5
Jonsson [13], 2001 Screening – a) breast cancer, b) prostate cancer, c) ultrasound in pregnancy	Swedish public hospital service	Coverage, Program	Decisions and practice patterns followed HTA recommendations	 a) Strong influence on screening mammography. after publication of the guideline, rapid increase ,all counties offered screening. b) HTA recommendations followed by the county councils, none organised screening programs for prostate cancer. Opportunistic testing thought to be relatively common and increasing in rate. c) Introduction of routine screening was recommended and became routine 	Major	4



Table 6 (continued)								
Technology	Country/	Type of	Approach used	Indication of	Extent of	Quality		
	setting	decision		influence	influence	score		
Britton [14],	Sweden -	Capital d	Decisions/ trends in use of	a) Major decrease in pre- op exams	Minimal :			
2002	National and	Practice a,	technologies, following HTA	b) Levelling off in increase of ACE inhibitor,	c,d)	4		
a) Preoperative	local	b,c,e,g	recommendations	calcium channel blocker prescriptions	Some			
examinations	(counties)	Equipment		c) Huge increase in PSA test use	consideration			
b) Management		sales d		d) Increase in sales of BDM machines	: b)			
of moderately				e) Slow decrease in use of antipsychotic	Some input			
elevated blood				drugs, larger in Kronoberg County which	to decisions:			
pressure,				made a concerted effort to reduce	e, g)			
c) Prostate				f) National trend in prescriptions for PP	Major: a)			
cancer				inhibitors unclear, overall cost for anti-				
screening.				dyspepsia drugs 8% less.				
d. Bone density				Decrease in PPI use in Skellefteå County				
measurement				through local drug committee initiative				
e. Neuroleptics								
as calming								
therapy for old								
persons								
f. Proton pump								
inhibitors for								
functional								
dyspepsia								



Table 6 (continued)								
Technology	Country/ setting	Type of decision	Approach used	Indication of influence	Extent of influence	Quali ty score		
Axelsson [15], 2006 Tobacco prevention	Sweden, Dental hygienists & dentists in Stockholm County	Practice	Questionnaire survey, comparison with previous investigation, reference to SBU report and a guideline	Awareness of guideline reported by 90% hygienists, 66% dentists Information in guideline used by 54% hygienists, 34% dentists 25% of dental professionals reported increased tobacco cessation consultation However, no change in number of patients receiving cessation support or the mean time for these activities	Some input to decisions	5		
Stemerding [16], 2001 Maternal screening	Netherlands, national	Coverage, Capital funding, Program	Analysis of medical journals and government reports	Noted control and regulation of serum screening by the political decision-makers, allocation of funding. A counter influence was promotion by the medical community,	Major	5		
Fischer[17], 2011 Newborn screening	EU countries	Coverage	Association between HTAs and coverage decisions in EU countries 7 decisions with HTA, 15 without	Association between HTA and coverage decision processes was more explicit, inclusive, and transparent than non HTA-related decisions	Some consideration	3		
Autti-Ramo [18], 2007 Fetal abnormalities screening	Finland, national	Referral, Program, Practice Legislation to regulate program	Relationship of decisions to HTA recommendations	HTA provided information on options for optimum screening programs, identified major policy questions that required public discussion. National committee subsequently opened up this discussion	Major	5		



Table 6 (continued)							
Technology	Country/	Type of	Approach used	Indication of	Extent of	Quality	
	setting	decision		influence	influence	score	
Carlsson [19], 2001	Sweden,	Coverage,	Review of administrative,	a). HTA, other reports linked to	Some input to	a) = 2	
a) Cardiac bypass	national and	Practice	policy developments	change in policy and expansion of	decisions	b)= 4	
surgery	local HTA			open heart surgery services			
b) Chiropractic	initiatives			b). Results of RCT, including costs,			
care for back pain				were input to decision by politicians at			
				local level (no difference in cost-			
				effectiveness)			
Gagnon [20], 2006	Spain,	Coverage	Semi-structured interviews,	The study confirmed that economic	Some		
a. insulin pump	hospitals	Program	transcripts classified	considerations are central to decision	consideration	2	
b. prioritization for	within	Practice	according to theoretical	making at the management level.		3	
cataract surgery	Catalan		dimensions and contextual	Adoption of HTA recommendations			
c. prioritization	Health		factors	depends on a conjunction of factors			
systems for hip or	Regions			(institutional, organizational,			
knee replacement				professional) that is unique to the			
				specific technology assessed.			
Bergh [21], 2010	Sweden,	Coverage b,d	Review of HTA use by client	a) Use by local authorities & regions	Some		
a) Bariatric surgery	Västra	Program a,b	organizations,	b) Funded and implemented	consideration:-		
b) Screening for	Götaland	Practice c	implementation of	c) Widely recommended for screening	a,c)	2	
abdominal aortic	County		recommendations	d) Coverage denied	Some input to	2	
aneurysm					decisions: b,d)		
c) Liquid-based							
cytology							
d) Auricular							
acupuncture for							
drug addiction							

Table 6 (continued)								
Technology	Country/	Type of	Approach used	Indication of	Extent of	Quality		
	setting	decision		influence	influence	score		
Burns [22], 2007		Capital	Evaluation by surgeons of	Products from 8 vendors evaluated and	Major			
clip appliers,	USA –	funding	comparable medical	ranked for ergonomics, functionality,		2		
staplers, trocars,	Surgical		devices in standardized	performance, clinical acceptability.				
suture and needle,	practices		surgical procedures, and	1 vendor received consistently higher				
endoscopic			use of evaluation findings	ratings than the others across all				
specimen retrieval			by a hospital purchasing	product categories; 2 received				
device			organization	consistently low ratings for several				
				product categories. Findings were used				
				by the purchasing organization to select				
				with				
BCBS [23], 2008	USA.	Coverage.	Review of policy response	Policy statement that genotyping to	Maior	2		
Pharmacogenomics	National	Referral	to assessment	determine cytochrome p450 (CYP2C19)	,			
-				genetic polymorphisms is considered				
				investigational for managing the				
				treatment of H. pylori infection. No				
				change in 2011				
Chen [24], 2009	PRC,	Guideline	Responses to contracted	Guidelines issued by the Ministry of	Major	1		
a) Assisted	National	Practice	assessments, action by the	Health, based on HTA material				
reproductive			Ministry of Health					
technology								
b) Prenatal								
diagnosis								



Table 6 (continued)								
Technology	Country/	Type of	Approach used	Indication of	Extent of	Quality		
	setting	decision		influence	influence	score		
Borowski [25], 2007 a) Laparoscopic adjustable gastric banding b) Fetal fibronectin assay c) Gastric electrical stimulation d) Newborn cystic fibrosis screening e) Newborn metabolic screening	Canada, Alberta health ministry & health care system	Coverage (b-d) Program (a,b,d,e) Practice (d,e)	Formal decision process linked to HTA findings, review of health ministry decisions	 a) To be publicly funded; regions to determine whether they will offer bariatric surgery b) Regions to introduce service and determine best service delivery model c) Not funded because of investigational nature d) Introduction of province-wide screening, funding provided e) Expansion of list from 3 to 16 conditions, funding provided 	Major	4		
Buxton [26], 2006 Interferons and glatiramer acetate for multiple sclerosis	UK – England and Wales	Coverage Practice	Example from review of development of economic evaluation of health technologies in the UK and its impact on decision making	NICE deemed none of the drugs to be cost effective at incremental cost per QALY of £35 000–104 000. Department of Health intervened with scheme that accepted a maximum threshold cost per QALY of £36 000. If the patient's progress failed to equate with an ICER of £36000 or less the cost of the drug to the NHS would be rebated.	Some input to decisions	2		



Table 6 (continued)							
Technology	Country/	Type of	Approach used	Indication of	Extent of	Quality	
	setting	decision		influence	influence	score	
Solans-Domènech	Spain –	Program	Qualitative study of six	Most participants indicated changes in	Some input to	3	
[27], 2013	Catalan health	Practice	projects on respiratory	health services or clinical practice had	decisions		
a. Exacerbation of	system		diseases funded between	resulted from research.			
COPD, - prognostic			1996 and 2004. Semi-	"The barriers and facilitators identified			
factors			structured interviews with	were mostly organizational (in			
b) Risk factors			15 researchers and 8	research management, and clinical			
predisposing to			healthcare decision-makers	and healthcare practice) Both the			
acute exacerbation				expected and achieved impacts			
of COPD				enabled the identification of the gaps			
c) Validation of a				between what is expected and what is			
diagnostic procedure				truly achieved."			
in sleep apnea-							
hypopnea syndrome,				No specific recommendations for			
d) Cost-effectiveness				policy makers;			
of home care in							
exacerbation							
episodes of COPD							
using a respiratory-							
function unit							
e) Management of							
bacterial resistance							
in the ICU							
f) Phenotypic							
characterization of							
COPD							



Table 6 (continued)							
Technology	Country/	Type of	Approach used	Indication of	Extent of	Quality	
	setting	decision		influence	influence	score	
Bowen 2007 [28],	UK – City:	Guideline	Qualitative strategy to	Increased consultation with public	Some input	3	
Opinion Leader	strategies		evaluate 4 health impact	health staff by GLA	to decisions		
Research [29], 2003	from the	Strategy	assessments (HIAs) of draft	Wider consultation during			
	Greater	planning	mayoral strategies.	development of a strategy			
Draft Economic	London	process	Included group discussions,	Strategies were revised as a result of			
Development, Waste,	Authority		in depth interviews,	outputs from HIAs			
Energy, London Plan	(GLA)		questionnaires	Strategy team reported few barriers to			
strategies				incorporating recommendations into			
				the final strategy document.			



Publications on HTA programs and larger numbers of technologies

Table 7 gives summary details for 19 studies that focused on the influence of HTA programs or assessments of larger numbers of technologies. Further information is given in Appendix C.

National programs

Six publications looked at national programs in Austria, Belgium, Germany and Sweden, covering a range of technologies [30,31,39,47-49].

Two of these [30, 39] were concerned with whether HTA advice had been accepted in making coverage decisions (both reported major influence). Two publications also covered other types of decision. The Belgian report, prepared as part of requirements for the agency reporting to government, dealt with assessment reports prepared over a three year period [31]. The Swedish report considered the effect of HTA reports published over a five year period on decisions, guidelines and practice patterns [49]. Influence at both national and regional (county) levels was considered.

A review of the first 10 years of the UK NHS HTA Programme concluded that it had had a perceived impact on policy and to some extent on practice [48]. A paper from the Netherlands that took a similar approach reported early findings, information on influence was still limited at that stage [47].

Pharmaceuticals

There were also reports with a national perspective that were concerned with drugs. A French HTA program had a major influence on coverage decisions on large numbers of medicines over many years [42]. A decision to retain drugs for elderly patients was contrary to recommendations made by the HTA program.

A Polish program provided input to decisions on a number of drug therapies [41]. The authors suggest that the opinions of the members of the Drug Management Team within the Ministry of Health, and price negotiations with manufacturers, could help in reaching decisions.

In contrast, two studies from the UK which made use of administrative data found that negative appraisals of drugs had had little influence on their use [43,44]. These variations in experience seem to reflect differing administrative arrangements in the countries.

Regional programs

Two studies reported influence of Canadian provincial HTA programs. One considered the influence on policy decisions based on CED decisions [32]. The other first used qualitative research to obtain opinions from clients of the program, followed by broader reviews of the program that included description of the influence of several HTAs [33-35].

Hospitals

Four publications were concerned with HTA and hospitals. A study in Malaysia covered public hospitals in the country and used a survey to obtain opinions from stakeholders on a range of issues, including a number related to use of HTA [40].

A report on HTA for hospitals in Paris identified assessments that had major influence, but made the point that in several cases it was difficult to confidently identify HTA influence because of experience



gained from separate studies or of effects from external factors [38]. Staff restrictions and prior introduction of technology were mentioned for two of the "uncertain" cases.

Canadian publications reported successful local HTAs for a group of Montreal hospitals and for informing decisions on surgical technologies in the Calgary Health Region [36,37].

Other topics

Two publications were concerned with the use of rapid HTAs and included information on their influence [45, 46].

Another report described a survey of decision makers in Latin American and Caribbean countries on their use of HTAs from other jurisdictions [50], giving an example of a further area of HTA influence.



Author,	Country/setting	Type of	Approach used	Indication of	Extent of	Quality
Technology		decision		influence	influence	score
Mad [30], 2012	Austria, public	Coverage	Analysis of whether HTA advice	HTAs recommended coverage with	Major	5
25 HTAs + 9	health care system		to regulate coverage was	limitations for 11 interventions and did		
updates			accepted by the Ministry of	not recommend for 22. Ministry decided		
			Health	on acceptance in 7 cases, rejection in 18		
				and changed the status to 'subject to		
				approval' in 7		
				(Appendix C)		
Vinck [31], 2013	Belgium - National	Coverage	Review of impact of reports	11 reports with recommendations	Major	5
		Capital	published during 2009-2011.	aimed at health care professionals		
78 reports		funding	Information from project staff,	classified as "not measured"		
including HTAs,		Formulary	other contacts, websites,	About half of the remaining 67 reports		
HSR, Good		Program	legislation.	had a direct impact and about one third		
Clinical Practice		Practice	Direct impact if at least one	were currently under discussion		
		Research	recommendation was	In the case of one HTA report a decision		
			implemented; indirect impact if	was taken that went directly against		
			recommendations featured in	recommendations		
			debate but were not yet			
			implemented			
Levin [32], 2011	Canada, Ontario	Coverage	Consideration of policy decisions	In 9 cases decisions were consistent	Major	4
10 HTAs	public health care		based upon CED studies.	with HTA recommendations, awaiting		
	system		Compared decisions with results	results for the other HTA		
			of studies	(Appendix C)		

 Table 7: Publications on HTA programs and larger numbers of technologies



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Table 7 (continu	Table 7 (continued)								
Author,	Country/setting	Type of	Approach used	Indication of	Extent of influence	Quality			
Technology		decision		influence		score			
a)Turnkey [30], 2002 10 HTAs Hailey [34, 35] 2004, 2005 25 HTAs	Canada, Alberta health system	Coverage, Capital funding, Program, Guideline, Practice	 a) Qualitative research - interviews with HTA program clients b) Data collected by HTA program using form in part based on INAHTA instrument. 	 a) Eight of 10 products informed policy and resource allocation decisions. b) Feedback from clients, decisions on HTA recommendations, inclusion of HTA material in documentation (Appendix C) 	a)Some input to decisions b) Of 25 HTAs, 3 had major influence, 16 input to decisions, 3 some consideration, 3 minimal TO REV	a) 2 b) 5			
McGregor [36], 2012 20 technologies	Canada, University Health Centre (five teaching hospitals) within the Québec healthcare system. Local in-hospital HTA unit	Coverage, Capita fundingl, Formulary, Referral, Practice, Research	Evaluation of the extent to which reports have influenced hospital policy decision making and spending. Feedback from individuals responsible for technologies in question	Of 63 policy recommendations, 45 were accepted and incorporated into Health Centre policy. 1 was partially incorporated, 17 were not incorporated into policy. (Appendix C)	Major influence on the majority of decisions, some consideration for others	4			
Poulin [37], 2012 Surgical technologies 53 completed applications for support	Canada, Department of Surgery & Surgical Services, Calgary Health Region	Capital funding, Program, Practice, Research	Retrospective analysis on outcomes of a local HTA program over 5 years Local HTA committee decisions categorised	12 applications approved, 3 approved for a single case on an urgent basis, 21 approved for a restricted number of cases with outcomes review, 14 for research use only, 3 referred to additional review bodies. (Appendix C)	Some input to decisions	4			



Table 7 (contin	Table 7 (continued)									
Author,	Country/setting	Type of	Approach used	Indication of	Extent of	Quality				
Technology		decision		influence	influence	score				
Bodeau- Livinec [38], 2006 13 technologies	France, Hospital network, Paris	Capital funding, Practice, Research	a) Qualitative – semi structured interviews with persons affected by HTA recommendations b) Review of decisions following 13 HTAs	7 Major influence, usually through funding being approved or witheld 3 difficult to distinguish between HTA impact and that of experience gained during supplementary studies 1 Minimal impact , decision contrary to recommendation 2 uncertain due to influence of major external factors (Appendix C)	1 Minimal 7 Major 5 Uncertain	5				
Gibis [39], 2002 22 technologies	Germany, National – committee responsible for ambulatory health care (legally binding directives)	Coverage, Practice	Considered whether HTA recommendations were accepted by the committee	The committee decisions were consistent with HTA recommendations (Appendix C)	Major	2				



Table 7 (continued)						
Author,	Country/	Type of decision	Approach used	Indication of	Extent of	Qualit
Technology	setting			influence	influence	У
						score
Norezam [40], 2013 Overall output from HTA agency "Aware and use" responses for management of diabetes mellitus, management of thalassaemia, CT for head injury, US in primary & antenatal care, moderately elevated blood pressure	Malaysia, Public hospitals	Coverage Capital funding Practice Research	Survey of persons in public hospitals, health departments, research institutes and Ministry of Health.	% participant responses: Recommendations/ conclusions accepted : 83% Showed technology met program requirements: 79% Material incorporated into policy documents: 69% Used as reference material: 78% Linked to change in policy: 75% (Appendix C)	Some input to decisions	3
Kolasa [37], 2011 151 drug therapies	Poland, National health system	Coverage Formulary	Reimbursement lists reviewed to assess to what extent policy- makers had used the information coming from the HTAs	34 drugs appraised and reimbursed (4 negative and 30 positive HTA recommendations) 117 appraised and not reimbursed (58 positive and 59 negative recommendations) [Appendix C]	Some input to decisions	3



Table 7 (continued)						
Author,	Country/setting	Type of decision	Approach used	Indication of	Extent of	Quality
Technology				influence	influence	score
Rochaix [42], 2009 Large numbers of drugs	France, National	Coverage Capital funding	Review of Ministry & sickness fund decisions following HTA recommendations	 > 95 % of positive HTA opinions on reimbursement status of a new technology were followed by decisions to reimburse. Negative opinions on new technologies were followed in almost all cases 1999 - 2001, examined 4,490 medicines, concluded 835 showed insufficient benefit, reimbursement rates for those were reduced 2003 - 06 Agency proposed delisting 370, 322 were delisted, Minister decided to retain 48 drugs for cerebral insufficiency in the elderly population. 	Major	3
Bennie [43, 2011 Medicines that the Scottish Medicines Consortium (SMS) had not recommended for use	Scotland – National Health Service	Practice	Analysis of effect of advice from the SMS on use of medicines. Volume of prescribing measured by each medicine's gross ingredient cost to the prescribing budget	Data were available for 8 of 10 medicines not recommended for use. Use increased for 5 medicines, stabilized for 2 and decreased for 1. (Data show that use of one medicine categorized as 'stabilized' had increased) (Appendix C)	Minimal	4



Table 7 (continued)						
Author,	Country/setting	Type of decision	Approach used	Indication of	Extent of	Quality
Technology				influence	influence	score
Dietrich [44],	UK - ambulatory care	Practice	Secondary analysis from	For 97 % of the drugs, the	Minimal	3
2009	of the NHS in England		the prescription costs	publication of NICE's 14 negative and		
	and Wales		analysis statistics and	restricting technology appraisals		
34 drugs with			comparison with NICE	between 2000 and 2004, did not		
negative			recommendations	reduce the number of prescription		
technology				Items dispensed or net ingredient		
appraisai				Nuc		
ions or						
positive ones						
with major						
restrictions						
Hailey [45],	Canada, Alberta health	Coverage	Interviews and written	Decisions by health ministry	14 Major	4
2000	system	Capital funding	feedback with	consistent with HTA advice. Two	4 Some	
20 rapid HTAs		Referral	requestors of HTA or	HTAs had no apparent influence.	consideration	
		Practice	persons who might be	(Appendix C)	2. Minimal	
			influenced by the			
			findings			
Hailey [46],	Australia, Brazil,	Coverage 9	Survey of INAHTA	All the HTAs were considered to	8: Major	4
2009	Canada, Spain, USA –	Capital funding 1	members on rapid HTAs	have had some influence. Most	7: Some	
45	health ministries or	Formulary 1	that they had prepared	common indications were	consideration	
15 technologies	departments	Referral 2	during 2006.	consideration by the decision maker,		
technologies		Guideline 3		(both n = 10) and acceptance of		
		Dractice 3		recommendations or conclusions (n		
		Research 2				
				(Appendix C)		



Table 7 (continued)						
Author,	Country/setting	Type of	Approach used	Indication of	Extent of	Quality
Technology		decision		influence	influence	score
Oortwijn [47], 2008	Netherlands, various	Program	Case studies using	Authors comment that "it is too	Minimal	3
HTA research	primary studies	Practice	"payback	early to fully assess impact of the		
programs in detection	supported by the Dutch		framework".	Dutch HTA program"	Some	
of cancer metastases,	HTA program			Details might provide a baseline for	consideration	
mental & behavioural				future appraisal of payback		
disorders, care of				Two examples of changes in		
chronically ill, clinical				practice		
genetics, infectious				One example of informing policy		
diseases, PET,				for a local insurer		
treatment of fertility						
disorders						

Table 7 (continued	d)					
Author,	Country/setting	Type of decision	Approach used	Indication of	Extent of	Quality
Technology				influence	influence	score
Hanney [48], 2007 9 primary studies, 4 secondary studies, 3 NICE technology assessment reviews (TARs)	UK – NHS England & Wales	Coverage Guideline Practice Research	Review of first 10 years of NHS HTA Programme, included questionnaire survey of lead investigators and 16 case studies. Analysis using payback framework	Concluded programme had a perceived impact on policy and to some extent on practice. 73% of survey respondents claimed projects had impacted on policy and 56% on behaviour (96% for TARs) 11 of 16 case studies thought to have made some impact on policy (Appendix C)	Major	4
Rosén [49], 2014 26 reports from 2006-10	Sweden - National and regional (counties)	Program Guideline Practice Research	Measured the extent to which HTA reports had affected decisions, guidelines, research or clinical practice. Used documentation, before-after surveys and time series register data.	Decisions and actions of national and local government bodies, and of professional organizations. Changes in use of technologies and services. HTA reports had a high impact on clinical guidelines, and a moderate or high impact on comprehensive decisions, initiation of research and changes in clinical practice. Impact was low in three cases. (Appendix C)	Major	4

Table 7 (continue	Table 7 (continued)						
Author,	Country/setting	Type of decision	Approach used	Indication of	Extent of	Quality	
Technology				influence	influence	score	
Pichon-Riviere	19 Latin American &	Coverage	Survey of decision makers and	Decision makers reported	Some	3	
[50], 2012	Caribbean (LAC)	Capital funding	researchers on HTA	using HTAs from other	considerati		
	countries, 55%	Guideline	transferability experiences	jurisdictions to guide	on		
Use of HTAs	responses were	Practice		decisions in the majority of			
from other	from Argentina	Research		the situations:			
jurisdictions				52.6 % HTAs from outside LAC			
				(e.g., Europe), 23.1 % from			
				other LAC countries,			
				24.3 %HTAs from their own			
				countries.			
				63 % of researchers reported			
				using HTAs from other			
				jurisdictions; information			
				regarding safety and			
				effectiveness was considered			
				more applicable than that on			
				social aspects, or economic			
				evaluation			

Discussion

Health care decisions influenced by HTA

Matters related to routine clinical practice and to funding for technologies or services were the most common types of decision influenced by HTAs. There were also several decisions related to future research on use of health technologies. Most of the HTAs included in the review were informing national or regional governments. There were also a number that addressed issues in hospitals.

The most frequent way in which decisions were influenced was through acceptance of recommendations on resource allocation. These included coverage for services and pharmaceuticals, and capital funding for technologies in hospital and other settings. Both positive and negative recommendations were influential. Many of these related to relatively short- term targets (policy and administrative decisions). Some also covered subsequent administrative action and program planning issues.

Opinions on the influence of HTAs for 63% of the studies covered by the review were that they had had a major influence or some input to decisions. In 19% of studies HTA influence had varied for different technologies. Minimal influence was reported in only 7% of studies.

Methods used to assess HTA influence

Gerhardus and Dintsios [2] refer to use of interviews with decision-makers, document analysis, surveys and use of administrative data as methods in the evaluation of HTA influence. A similar mix of approaches was used by the studies included in this review, but there was also appraisal of the effects of primary studies. Some of these had influenced practice patterns and the evaluation of surgical instruments reported by Burns et al.[22] influenced purchasing decisions.

Approaches using review of decisions seemed useful, with some HTA programs in close contact with decision makers, giving opportunity for realistic appraisals, though these were not always reported in much detail.

Some studies noted uncertainties in determining the influence of HTA because of possible effects from other factors, a point noted in a previous review [3]. The study on the CEDIT assessments cited input from stakeholders in individual hospitals, consequences of staff restrictions and prior introduction of the technology in two "uncertain" cases [38]. In the Scottish study on use of medicines additional factors that may have contributed to the pattern of use included delay between the UK launch of the product and initial SMC advice, and the influence of pharmaceutical industry marketing strategy [43]. Variation in advice issued by national bodies to NHS boards and clinicians and lack of engagement of clinical experts in early stages of the SMC were mentioned as further influences.

The quality of the reviewed publications varied, with just over 50% having scores of 5 or 4 in the assessment process used for this review.

Outcomes related to use of health technologies

Several HTA reports addressed issues related to practice patterns, and so related to a further area of influence, delivery of health care [1]. There was little indication of influence of HTA on



the health status of patients, though this was captured to some extent by the Rosén review of SBU assessments [49]. Two studies reported use of HTA associated with CED for consideration of policy decisions at regional or national level [32, 7]. A CED approach was also used in a local HTA program where many surgical technologies were given restricted approval, with full approval contingent on satisfying conditions such as clinical outcomes review or training protocol development [37].

There were several reports on HTA and screening services, where assessments had a strong influence on decisions by governments regarding implementation of population screening programs. The HTAs were less successful in influencing practice patterns for prostate cancer screening and use of ultrasound in pregnancy, where increases in opportunistic screening were contrary to recommendations accepted by governments.

In the reviewed publications, only that by McGregor [36] included estimates of savings achieved through use of HTA. For a group of hospitals in Montréal, estimated annual savings were more than a million dollars over an eight year period.

Availability of data on HTA influence

The literature covering the points addressed by this review is still quite limited. Areas in which influence assessments have been undertaken reflect those in which most HTAs have been performed. There are few recent studies that have considered the influence of HTA in any detail, and little on longer term effects on clinical practice and health outcomes.

There are challenges in determining appropriate timescales at which HTA influence can be measured, and the level at which influence can be assessed. There is a progression of possible influence from the decision maker level with increased knowledge and awareness, to decision maker level change in policy, to changes in healthcare delivery, up to changes in patient outcomes. With each increase in level, the control over which the HTA producers can exert an influence decreases and the number of factors influencing decisions on a health technology increases. Changes to health care and improved health will be dependent on actions of many individuals and organizations. There is an inherent difficulty in determining how third parties actually use the specialised HTA information that is available to them.

However, the publications covered by this review have much useful information related to HTA influence including approaches that might be more widely applied. Some of them had been produced as components of HTA program management. While inevitably there is variation in the influence that HTA reports or programs might have, most of the examples considered here are 'good news stories'. Of the 43 reviewed publications, 31 reported clearly successful HTA influence, eight included mixed outcomes and four provided examples where there was no apparent influence.

Review limitations

This systematic review had several limitations. There were restrictions on dates for the literature search and on the approach taken to assessment of study quality to take account of time and resources available. On the other hand, the quality appraisal approach used did touch on some things that typically are not often considered in a formal fashion

The information presented is largely confined to summaries of details in the selected publications. There was not sufficient time to scan and follow up reference lists of included



publications or to carry out any citation searching. For example, an overview by Raftery and Powell of the UK Health Technology Assessment programme gives some indications of HTA influence that could be followed up [51].

There was input from the project team in the development and use of various documents but it was not possible to trial each stage of the review. There was a trade-off between validating approaches and time available for the project.



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Appendix A. Literature search strategy

PubMed via	a NLM 30 June 2014 t of HTA	
	Search terms	Items found
HTA		
1.	"Technology Assessment, Biomedical"[Mesh] OR HTA[Title] OR technology assessment*[Title]	9631
2.	technology assessment*[Title/Abstract] OR health technolog*[Title/Abstract] OR knowledge synthes*[Title/Abstract] OR research eviden*[Title/Abstract] OR ((evidence-based[Title/Abstract] OR evidencebased[Title/Abstract] OR evidence- informed[Title/abstract]) AND (guide-line*[Title/Abstract] OR guideline*[Title/Abstract]))	21360
3.	2 NOT (medline[SB] OR oldmedline[SB])	3147
4.	1 OR 3 ¹	12633
Impact		•
5.	impact*[Title/Abstract] OR influence*[Title/Abstract] OR utilis*[Title/Abstract] OR utiliz*[Title/Abstract] OR useful*[Title/Abstract] OR use of finding*[Title/Abstract] OR end-use*[Title/Abstract] OR implement*[Title/Abstract] OR knowledge translation*[Title/Abstract] OR knowledge transfer*[Title/Abstract] OR knowledge generation*[Title/Abstract] OR appropriate*[Title/Abstract] OR pay- back[Title/Abstract] OR disseminat*[Title/Abstract] OR assess*[Title/Abstract]	4235734
Health poli	icy/decision	
6.	"Policy Making"[Majr] OR "Health Policy"[Majr] OR "Decision Making"[Majr] OR "Health Priorities"[Mesh] OR "Health Plan Implementation"[Mesh] OR "Health Services Administration"[Mesh] OR decision-mak*[Title] OR policy decision*[Title]	2210197
7.	decision-mak*[Title/Abstract] OR health care decision*[Title/Abstract] OR health care polic*[Title/Abstract] OR health polic*[Title/Abstract] OR health practic*[Title/Abstract] OR clinical decision*[Title/Abstract] OR clinical intervent*[Title/Abstract] OR clinical practic*[Title/Abstract] OR professional practic*[Title/Abstract] OR policy mak*[Title/Abstract] OR policy decision*[Title/Abstract] OR policy question*[Title/Abstract] OR reimbursement decision*[Title/Abstract]	221986
8.	7 NOT (medline[SB] OR oldmedline[SB])	27968
9.	6 OR 8	2236306
Combined s	sets	
10.	4 AND 5 AND 9	2976
11.	10 AND Publication date from 2000/01/01 to 2014/12/31	2092

The search result, usually found at the end of the documentation, forms the list of abstracts

^{3.} The Mesh-terms and text words, in each block separately, were combined with a Boolean OR.



^{1.} Mesh-terms were searched separated from the text words.

^{2.} The text words were combined with a NOT (medline[SB] OR oldmedline[SB]).

[MeSH] = Term from the Medline controlled vocabulary, including terms found below this term in the MeSH hierarchy [MeSH:NoExp] = Does not include terms found below this term in the MeSH hierarchy [MAJR] = MeSH Major Topic [TIAB] = Title or abstract [TI] = Title [AU] = Author [TW] = Text Word Systematic[SB] = Filter for retrieving systematic reviews * = Truncation " " = Citation Marks; searches for an exact phrase

There were challenges in building the search-strategy which was dealing with not only "HTAterms" but also those such as systematic review. SBU uses PubMed as the interface to Medline and records in process. As PubMed does not offer proximity search it was decided not to include terms such as "systematic review" in the PubMed search. Embase was included in the protocol and the two databases complemented each other.

The strategy consisted of three blocks of search-terms:

- index terms & free text terms for HTA
- index terms & free text terms for impact
- index terms & free text terms for health policy/decision

Test-searches in PubMed yielded a retrieval which was too extensive in relation to the subject area. Therefore a revised search strategy was conducted in three steps for two search blocks: index terms & free text terms for HTA; index terms & free text terms for health policy/decision

In each block:

- 1. Mesh-terms were searched separated from the text words.
- 2. The text words were combined with a NOT (medline[SB] OR oldmedline[SB]).

3. The Mesh-terms and text words, in each block separately, were combined with a Boolean OR.

Some relevant studies would not be identified by this method but the risk of missing them would be minimized by conducting searches in several databases and by checking reference lists.

Combining the search string (medline[SB] OR oldmedline[SB]) with the Boolean NOT and the text words result in a retrieval of those records which lack Mesh-terms (in process records not yet indexed and records which never are going to get any Mesh-terms).

This search was then combined with the search-result from Embase and the other databases into an EndNote-library.



Appendix B. Data collection form

SR on publications that have reported the influence of HTA

Ref ID #	1 st author:			Language:	
Journal or publisher:			Year	r published:	
	STUDY I	DETAILS	S		
Country:	Setting:				
Study design or approach	•				
Method used to assess HT	A influence:				
Technology(ies) assessed	(please numbe	r if more	than	one)	
Comparator(s):					
Time since publication of	HTA report:				
Type of HTA	Full []		Rap	id []	
Type(s) of decision inform	ned by the	Coverage []			
НТА		Capital funding []			
		Formulary []			
		Referral for treatment []			
		Program operation []			
	Guideli	ne foi	mulation []		
	Influenc	ce on	routine clinical practice []		
		Indicati	ons fo	or further research []	
		Other [specify]			



Appendix B

Area of influence	Interaction with decision – maker [] Implementation of a decision [] Health technology – related outcomes []
Main indications of HTA	1. No apparent impact []
influence	2. HTA considered by decision-maker []
	3. HTA recommendations/ conclusions accepted []
	4. HTA demonstrated that technology met specific program requirements []
	5. HTA material incorporated into policy or administrative documents []
	6. HTA information used as reference material []
	7. HTA linked to changes in practice []
	8. Other [specify]
Details of influence indications	
Opinion on influence of	Minimal []
НТА	Some consideration of the HTA []
	Some input to decisions []
	Major influence on decisions []
Other (non-HTA) influences on outcomes	

STUDY OUTCOMES



Appendix B

INDICATIONS OF STUDY QUALITY

	YES	NO
Were the findings of the HTA report(s) summarized?		
Was the decision - making process influenced by the HTA described or referenced?		
Was the approach used to assess HTA influence described?		
Were outcomes or influence reported ?		
Were non – HTA influences considered ?		

ADDITIONAL INFORMATION AND COMMENTS



Appendix C. Studies covering large numbers of health technologies

Mad: Austria [30]

25 assessments on 33 different interventions undertaken (plus 9 updates)

1.Percutaneous pulmonary valve	13.New minimally invasive methods in the
implantation for right ventricular outflow	treatment of stress urinary incontinence
tract dysfunction in patients with	14.LDL Apheresis
congenital heart defects	15.Selective Cell Apheresis in Inflammatory
2.Combination radionuclide therapy or	Bowel Disease
single therapy with Y90 and Lu177 in	16.Rheopheresis in patients with age-
inoperable tumours	related macular degeneration, sudden
3.Stent-grafting of the ascending aorta	hearing loss or tinnitus, diabetes
4.Cardiac contractility modulation for heart	17.Optical Coherence Tomography
failure	18.Intraoperative radiotherapy for primary
5. Percutaneous aortic valve replacement	breast cancer
6.Endobronchial valve implantation for	19.Drug coated balloon catheter
emphysema	20.Selective IgG Apheresis for ABO
7.Mitral valve repair using a mitral clip	incompatible kidney transplantation
8.Kyphoplasty and vertebroplasty for	21.Image guided radiotherapy using cone-
osteoporotic vertebral compression	beam computed tomography
fractures	22. Pumpless extracorporeal lung assist
9. Chemony clolysis and intradiscal	(PECLA)
electrotherapy/IDET	23. Retroluminal transobturatoric reposition
10.Percutaneous nucleotomy and	sling for treatment of stress urinary
percutaneous laser disk decompression	incontinence in men
11.Injection therapies and radiofrequency	24. High intensity focused ultrasound for
for the treatment of chronic back pain	the treatment of prostate cancer
12.Artificial spinal disc for cervical and	25.Laser angioplasty of coronary arteries
lumbar spine	

Indications

HTAs recommended coverage with limitations for 11 interventions and not recommended for 22. Ministry of Health decided on acceptance or preliminary acceptance of coverage in 7 cases, rejection in 18 cases and changed the status to 'subject to approval' in 7 cases

Other influences

When only a few (and sometimes young) patients.

When a 'market' assumed to expand very fast without clear-cut indication and has to be kept under control with the instrument of limited approval.

Low frequency use of a technology in a peripheral clinical setting and the according need to regulate quality assurance.



Levin: Canada [32]

Comparator(s):	Influence indications
1.Bare metal stents	1.Funded 30% conversion
	from bare metal to DES (cf
	90% in USA)
2.Open surgery	2.Improve access to EVAAR
	for high risk but not fund for
	low surgical risk
3.Multidisciplinary care ^a	3.Funding of cost effective
	strategies only
4.Coronary angiography	4.Recommended cautious
	adoption until issues re
	sensitivity addressed
5.CT scan	5.Open-ended access to PET
	insured
6.Conventional staging	6.Open-ended access to PET
	insured
7.Sentinel lymph node biopsy	7.Not insured
8. CT scan	
	8.Awaiting results
	9 Not insured
9. Conventional imaging	10 Open-ended access
10. Not specified	approved for GvH but
	continue to evaluate for T-cell
	Comparator(s):1.Bare metal stents2.Open surgery3.Multidisciplinary care a4.Coronary angiography5.CT scan6.Conventional staging7.Sentinel lymph node biopsy8.CT scan9.Conventional imaging10.Not specified

a) behaviour modification; insulin infusion pumps in management of type 2 diabetes; bariatric surgery in the treatment of morbidly obese individuals with type 2 diabetes



McGregor: Canada [36]

1. Device to prevent	20. Matrix coils for	36.The Impella ventricular
needlestick injury	cerebro-vascular aneurysms	assist device
2.Update of 1.	21. Update of 20	37.Subthalamic DBS for
3.Anti-viral treatment for	22. Expansion of stem	Parkinsons disease
chronic Hepatitis C	cells transplant programme	38.Percutaneous RF
4. Mitoxantrone treatment	(3 separate	ablation for hepatic
for MS	recommendations)	carcinoma
5.Update of 4.	23. Probiotics for prevention	39.Allogenic acellular
6. Glycoprotein 11b/111a	of C Diff diarrhoea	Dermal matrix for breast
inhibitors during PCI (2	24.Update of 23. Probiotics	reconstruction (2 separate
separate recommendations)	for C Diff diarrhoea	recommendations)
7.Use of low-molecular-	25.Update of 23.	40.Collatamp-G for infection
weight heparin for DVT	Lactobacillus probiotics for	prophylaxis in colorectal
8.Colorectal stents	C Diff	surgery
9.Video-capsule endoscopy	26.Negative pressure	41.Collatamp-G for infection
10.Eprex for haemodialysis	wound therapy	prophylaxis in cardiac
patients	27.Update of 26.	surgery
11.Drotrecogin alfa for	28.Neuro-monitoring during	42. Transcatheter Aortic
severe sepsis	spinal surgery	Valve Implantation (3
12.Update of 11	29. Microdialysis to monitor	separate recommendations)
13.Drug eluting stents	traumatic brain injury	43.RFA for Barrett's
14.ICD for primary		oesophagus
prevention of sudden death	30.Botox for anal fissures	44.Ultrafiltration for
15.Oesophageal stents for	and sphincter achalasia	decompensated heart
malignant strictures	31.Testing for HER2 breast	failure
16.Bi-ventricular pacing for	cancer	45.Apico-aortic conduit for
severe heart failure	32. Pulsatile perfusion for	degenerative AS
17.Carmustine implants for	kidney preservation	46.Fiducial markers in
malignant glioma	33.Wait times at MUHC 3	radiotherapy for prostate
18.Update	Fracture management (4	cancer
19.Gastric banding	separate recommendations)	47.Verify NOW. To detect
procedure for morbid	34.Wait times at MUHC	clopidogrel resistance
obesity	Diagnostic imaging	48.Drug eluting stents.
	35. Coblation tonsillectomy	Current indications for use.

McGregor et al. estimated that 19 of the accepted reports had resulted in conservation of hospital resources. The extent of these savings, however, could only be estimated in 15 reports. In these, the estimated overall savings totalled \$9,840,270. Over the eight years of full functioning of the Technology Assessment Unit, the average annual quantifiable savings have been \$1,140,958



Poulin: Canada [37]

A local HTA program was developed to systematically integrate research evidence with local operational management information and to make recommendations for subsequent decision by the departmental executive committee about whether and under what conditions the technology would be used.

The HTA committee decisions were categorised to: Approved, Conditionally approved for use, Only in research trials, Approved as research project, Referred elsewhere.

Decisions based on the local HTA program recommendations were rarely "yes" or "no." Rather, many technologies were given restricted approval with full approval contingent on satisfying certain conditions such as clinical outcomes review, training protocol development, or funding. Thus, innovation could be supported while ensuring safety and effectiveness.

Gibis: Germany [39]

Indications

Reports form the basis for decisions by the sickness committee, which ensures their impact. All 22 HTA reports had an impact on decision-making. Other influences

Possible influence of comments received from interested groups which are included, in part, in the HTA



Bodeau-Livinec: France [38]

- 1. Endovascular ultrasound coronary arteries
- 2. Endovascular ultrasound pulmonary arteries
- 3. US duodenoscopy
- 4. Cochlear implants
- 5. Outpatient diagnosis of sleep apnea
- 6. Mechanical ventricular assistance systems
- 7. Electronic video enteroscope
- 8. Thoravision system
- 9. Laser transmyocardial revascularization
- 10. Implantable phrenic stimulation
- 11. E/m extensible bone prostheses
- 12. CDET cameras for scintigraphy
- 13. Contrast medium injector for MRI

Indications

- 1. No apparent impact 7
- 2. HTA considered by decision-maker 1-3
- 3. HTA recommendations/ conclusions accepted 4, 6, 8 12
- 8. Other : Uncertain: 5, 13

Other influences

Input from stakeholders in individual hospitals Consequences of staff restrictions and prior introduction of the technology mentioned for the two "uncertain" cases Additional

The semi-structured interviews indicated widespread interest for the HTA recommendations and wide use of these. CEDIT had a good image within hospitals, the main criticism was time lag between request for HTA and recommendations.



Norezam: Malaysia [40]

Decisions informed by the HTA (Survey mean responses, 5 point scale)

Informed policy and resource allocation decisions in the requesting organization: 3.92

Informed policy and resource allocation decisions in other jurisdiction: 3.74 Provide future reference: 4.09

Provide opportunities for future research 4.07

Request HTA Section to update information in the future: 4.19

Provide input to improve current health technology and development of new technology: 4.11

Promote change to practitioners' behaviour and patient care: 4.11 Additional

Responses re awareness and use of specific HTA reports

	Aware	Aware and Use
Management of Diabetes Mellitus and Screening for	53.2%	29.6%
Microalbumin in Diabetics		
Management of Thalassaemia	52.4%	20.6%
CT Scan for Head Injury GCS Less than 5	50.8%	15.9%
Ultrasound in Primary & Antenated Care	43.7%	26.2%
Moderately Elevated Blood Pressure	42.9%	22.2%

HTA Impact related to the organization and its products

Impact of HTA products was evaluated based upon current use and future potential of the products to the respondents or stakeholders (five point scale):

Current Potential

HTA products required for evidence to make decision about program funding,	3.95
continuation, and elements of program	
HTA products required for evidence to	4.13
make decision about changes to clinical	
practice guidelines	
HTA products required for evidence to	4.08
make decision about patient care	
HTA products are required for scientific	4.11
evidence in assisting health care managers	
and clinician	
HTA products raised awareness among	3.98
doctors and health practitioners	

Findings were based on 126 usable survey responses (Hospitals 76, District Health Offices 36, State Health Departments 9, Ministry 3, Research Institute 2).



Kosala: Poland [41]

Also 29 drugs reimbursed that were not appraised (all included on reimbursement lists prior to the issue of the first HTA recommendations)

Authors suggest that the opinions of the members of the Drug Management Team within the Ministry of Health, and price negotiations with manufacturers, could help explain some inconsistencies between recommendations and decisions.

Bennie: Scotland [43]

Other influences

*Limited use relative to alternative treatments

*Variation in advice issued by national bodies to NHS boards and clinicians

*Lack of engagement of relevant clinical experts in early stages of the Scottish **Medicines Consortium** Additional

Paper also includes information on use prior to SMC advice for a further 10 medicines that were subsequently recommended for use. For these, additional factors that may have contributed to the pattern of use included delay between UK launch of medicine and initial SMC advice; and influence of pharmaceutical industry marketing strategy.



Hailey: Canada [45]

Body stereotactic radiosurgery Cryosurgery for prostate cancer (other agency's report)	13.	Extracorporeal life support for children and adults
Brachytherapy for prostate cancer Radiosurgery in malignant melanoma Cord blood transplantation (adult)	14. 15.	Electrical stimulation to promote healing of fractures Bladder ultrasound scanning for the
Vagus nerve stimulation for refractory epilepsy		urine volume
Lung volume reduction surgery Telephone nurse triage services	16.	Human growth hormone for Turner's syndrome
Air plethysmography for venous evaluation	17.	Graduated compression stockings to prevent and treat venous insufficiency
Stem cell transplantation	18.	Vaginoplasty in male-female
Scanning laser ophthalmoscope for diagnosis and monitoring of glaucoma		transsexuals and criteria for sex reassignment surgery
Intrathecal baclofen using an	19.	Phalloplasty
implantable infusion pump	20.	Ihrombolytic therapy in the emergency room
	Body stereotactic radiosurgery Cryosurgery for prostate cancer (other agency's report) Brachytherapy for prostate cancer Radiosurgery in malignant melanoma Cord blood transplantation (adult) Vagus nerve stimulation for refractory epilepsy Lung volume reduction surgery Telephone nurse triage services Air plethysmography for venous evaluation Stem cell transplantation Scanning laser ophthalmoscope for diagnosis and monitoring of glaucoma Intrathecal baclofen using an implantable infusion pump	Body stereotactic radiosurgery Cryosurgery for prostate cancer (other agency's report)13.Brachytherapy for prostate cancer Radiosurgery in malignant melanoma Cord blood transplantation (adult)14.Vagus nerve stimulation for refractory epilepsy Lung volume reduction surgery Telephone nurse triage services Air plethysmography for venous evaluation16.Stem cell transplantation Scanning laser ophthalmoscope for diagnosis and monitoring of glaucoma Intrathecal baclofen using an implantable infusion pump19.

Influence indications

- 1) Support for treatment denied
- 2) Support for treatment denied
- 3) Informed decisions on support for referral of patients
- 4) Support denied
- 5) Useful background information (individual died prior to decision)
- 6) Informed decision by minister\
- 7) Considered in negotiations with health authorities; awaiting further evidence before supporting
- 8) Input to discussion by RHA prior to further local analysis
- 9) Decision not to support technology
- 10) Influenced position in interprovincial negotiations
- 11) No fee for service established
- 12) No provincial program implemented
- 13) No influence on decision taken
- 14) Informed decision on payment
- 15) Informed decision to purchase equipment
- 16) Input to agreement with RHAs on funding
- 17) Regarded as valuable background information; no immediate influence on decision
- 18) Informed policy on criteria for support by ministry
- 19) Informed policy on criteria for support by ministry
- 20) Unclear if report had influence



Hailey: Australia, Brazil, Canada, Spain, USA [46] (AHTA, DECIT/CGATS, AETMIS, CADTH, IHE, AETS, VATAP)

- 1. Topical benzocaine, dental
- 2. Triptans for acute migraine
- 3. HPV vaccine
- 4. Filler material for the treatment of HIV lipodystrophy
- 5. Excimer laser in refractive surgery (myopia)
- 6. Noninvasive ultrasonic cardiac output monitor
- 7. Scanning laser ophthalmoscopy & polarimetry
- 8. Robotic surgery
- 9. Autologous blood donation
- 10. Hysteroscopic tubal ligation
- 11. Bone marrow transplantation for MS
- 12. Laparoscopic electrosurgery
- 13. Double balloon enteroscopy
- 14. Hip/Knee replacement
- 15. Endometriosis

Indications

- HTA considered by decision-maker: 3-7, 13, 15
- HTA recommendations/ conclusions accepted: 1-2, 8, 12,
- HTA material incorporated into policy or administrative documents: 9-10
- HTA information used as reference material: 11, 14



Hanney: UK [48]

The three NICE TARs included in the analysis covered: 1.Riluzole for the treatment of motor neurone disease 2.Irintecan, oxaliplatin and raltitrexed for the treatment of advanced colorectal cancer 3.Imatinib for first-line treatment of chronic myeloid leukaemia in chronic phase Comparator(s): 1.Placebo

2.conventional 5-fluorouracil based treatment or best standard care (nonchemotherapy-based palliative care)

3. IFN- α , hydroxyurea and bone marrow transplantation Additional

"The review also confirmed that impact on knowledge generation was more easily quantified than that on policy, behaviour or especially health gain. The review of the included studies indicated a higher level of impact on policy than is often assumed to occur."

"The case studies revealed the large diversity in the levels and forms of impacts and the ways in which they arise."

"All the NICE TARs and more than half of the other case studies had some impact on policy making at the national level whether through NICE, the National Screening Committee, the National Service Frameworks, professional bodies or the Department of Health. This underlines the importance of having a customer or 'receptor' body."



Rósen: Sweden [49]

Торіс	Type of influence,	Results
	estimated impact	
Dementia (2008)	Decision/Moderate	SALAR used the report for
		training of municipal caregivers
Fortifying flour with folic	Decisions/High	The NBHW and the National
acid (2007)		Food Agency did not implement
Vaccines to children (2009)	Decisions/Low	Report used by the NBHW and
		served as a basis for WHO policy
Rehabilitation of patients	Decisions/Moderate	Governmental rehabilitation
with chronic pain (2010)		guarantee and several local care
		programmes
Peripheral arterial disease	Guidelines/High	Implemented by the Swedish
(2007)		Society for Vascular Surgery
Patient education in	Guidelines/High	Implemented in national
managing diabetes (2009)		guidelines (NBHW)
Open angle glaucoma	Guidelines/High	Implemented by the Swedish
(2009)		Ophthalmological Society and
		Swedish Glaucoma
		Society
Caries (2008)	Guidelines/High	Implemented in national
		guidelines (NBHW)
Endodontics (2010)	Guidelines/High	Implemented in national
		guidelines (NBHW)
Partially dentate or	Guidelines/High	Implemented in national
edentulous patients (2010)		guidelines (NBHW)
Dietary treatment of	Guidelines/High	Implemented in national
diabetes		guidelines (NBHW)
Self-monitoring of blood	Guidelines/High	Implemented in national
glucose in		guidelines (NBHW)
noninsulin-treated diabetes		
(2009)		
Intensive glucose-lowering	Guidelines/High	Implemented in national
therapy in diabetes		guidelines (NBHW)
(2009)		
Tympanostomy tube	Guidelines/High	Implemented in guidelines by
insertion for otitis media in		protessional associations
children (2008)		



Rosen (continued)

Tania	Turne of influence	Deculto
Горіс	Type of Influence,	Results
Durana is and seature	Changes in any stice (Lich	Turned was several and decays and in
Dyspepsia and gastro-	Change in practice/High	rrend reversal and decrease in
		surgical procedures in Sweden after
(2007)		
Triage methods at	Change in	An additional 18 emergency
emergency	practice/Moderate	departments introduced triage after
departments		publication
(2010)		
Obstructive sleep	Change in	Decrease in surgical procedures in
apnoea syndrome	practice/Moderate	Sweden and Norway after publication
(2007)		
Mothods of oarly	Chango in	15 of 21 county councils offered the
nrenatal diagnosis	nractice/Moderate	combined test to one extent or
(2006)	practice/wouerate	another
Methods for	Change in	Increase in prescription of physical
promoting physical	nractice/Moderate	activity
activity (2010)	practice/woderate	
Mild head injury	Change in practice/High	Number of admissions and bed-days
(2006)		decreased the year after publication
		with more than 4000 bed-days
Treatment of	Change in	Changes in pharmaceutical
insomnia (2010)	practice/Moderate	prescriptions in line with evidence-
		based conclusions in the SBU-report
Methods to prevent	Research/High	Led to an invitation by research
mental ill-health in		councils for grants of 30 million euros
children		
(2010)		
Light therapy for	No adequate	
depression (2007)	documentation/Low	
Drug consumption	No adequate	
among the elderly	documentation/Low	
(2009)		
Antibiotic prophylaxis	No adequate	
for surgical	documentation/Low	
procedures		
(2010)		

NBHW = National Board of Health and Welfare

SALAR = Swedish Association of Local Authorities and Regions

