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HEALTH TECHNOLOGY ASSESSMENT AND EVIDENCE-BASED POLICY MAKING: QUEENSLAND DEPARTMENT OF HEALTH EXPERIENCE

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Background: Evidence-based policy making is increasingly used for better resource allocation. Queensland Department of Health has developed a new model to introduce innovative health technologies through a health technology assessment (HTA) program.
Structure: A state-wide committee and several sub-committees at health service district level were established to oversee the HTA program and to monitor the uptake of technologies. The committees are supported by a multidisciplinary secretariat comprising staff with key HTA skills.
Process: The process starts with HTA applications, which are then shortlisted according to prespecified criteria. A due diligence process adopting a rapid evidence assessment approach is used to evaluate the applications. Based on the assessment, recommendations are made using a deliberative decision-making process guided by well-recognized tools. With positive recommendation, a technology is piloted in constrained local setting before its system-wide diffusion.
Outcome: The HTA program has assisted health administrators in prioritizing their health technology agendas. It has gained trust and wide support from policy makers and is increasingly used to support funding allocations, indicating the increasing awareness of and confidence in the program.
Conclusions: The HTA program is a valuable process to assist evidence-based policy development and to guide better resource allocation.

Keywords: Evidence-based practice, Health technology, Health impact assessment, Policy making

Health technology is a term encompassing devices and pharmaceuticals, prosthesis, surgical and medical procedures, and the system of care within which health is protected and maintained. The International Network of Agencies for Health Technology Assessment (INAHTA) defines health technology assessment (HTA) as a multidisciplinary field of policy analysis which studies the medical, social, ethical, and economic implications of development, diffusion, and use of health technology (http://www.inahta.org/HTA/). Faced with rapidly escalating healthcare costs with new health technologies being a significant contributor, healthcare policy makers worldwide are turning to HTA as a guide for resource allocation (1).

In Australia, different national bodies have been well established conducting various HTA activities mainly for the purpose of policy decision on public funding. The Pharmaceutical Benefit Advisory Committee (PBAC), an independent statutory body, makes recommendations and gives advice to the Australian Government about which drugs and medicinal preparations should be made available as pharmaceutical benefits. The Medical Services Advisory Committee (MSAC) provides advice for Minister to inform Australian Government decisions about public funding for new, and in some cases existing, medical devices and/or procedures (http://www.health.gov.au/hta). The Health Policy Advisory Committee on Technology (HealthPACT), on the other hand, oversees the horizon scanning program to provide advance notice on and the potential impact of significant new and emerging technologies to health departments in Australia and New Zealand without direct involvement of funding decision (http://www.horizonscanning.gov.au/). Despite these national bodies, the state department of health needs a robust prioritizing system to introduce new health technologies into local hospitals. The HTA activities, however, vary substantially in different state with Victoria has the longest operating HTA program (2).

Queensland Department of Health is the primary healthcare agency providing public health services for over 4.5 million people in the State of Queensland. In the absence of an HTA program before 2009, new technologies in Queensland public hospitals were introduced through a business case process or replaced through the Health Technology and Equipment Replacement program. With a large capital build program and a new purchasing framework under Activity Based Funding, Queensland Department of Health needed a mechanism to

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fund, monitor and evaluate innovative technologies. In this context, the Queensland Policy and Advisory Committee for new Technology (QPACT) was established in 2009 to oversee the New Technology Funding Evaluation Program. The program aims to address the following principles: maximize patient outcomes and resources, ensure that health interventions are safe, clinically effective and, where possible, cost-effective, avoid duplication, and ensure that clinical care and service delivery are considered as part of HTA.

STRUCTURE

QPACT is made up of eminent physicians and clinicians from high technology areas with a keen interest in health technology and research, a senior officer from Policy and Planning branch, the Health Service Executives and a member from the similar national technology assessment body. The program followed a round-based grant system to ensure managed introduction of new technologies. The technologies considered need to be new to Queensland public health system. QPACT commissions HTAs, manages field evaluation and piloting of new technologies, and undertakes horizon scanning of emerging technologies.

Adopting a hub-and-spoke model, several spoke subcommittees at health service district level were set up to monitor the uptake of technologies which are new to that district, to support the prioritization of funding for new technologies and to encourage communication across the state regarding the diffusion of technologies.

QPACT and district advisory committees are supported by a multidisciplinary secretariat which is part of the Clinical Access and Redesign Unit within Queensland Department of Health. The secretariat comprises staff with key HTA skills including epidemiology, health economics, business management, policy, planning, and clinical knowledge. The secretariat provides evidence based assessments and advice to the Executive Management Team or other divisions within the Department on health technologies.

SEQUENCE OF EVENTS

The HTA process has largely been informed by the experience of both international and national assessment agencies which have been operating for over 10 years (2;3). During the period between September 2009 and June 2012, the program adopted a yearly funding model, with two rounds of application per year, in which the capital costs of the new technologies and associated project management costs were covered by the central HTA funding. As a result of government reform in 2012, the model has been modified to one round per year however a very similar structure was adopted. The flow chart in Figure 1 demonstrates the sequence of events during the process. It started with an Expression of Interest (EOI), which was generally initiated by clinicians. The EOIs were then shortlisted by QPACT according to a set of inclusion criteria: a technology must be approved for use in Australia for the proposed indication by the Therapeutical Good Administration, new to Queensland public healthcare system and addresses one of government's priorities in healthcare. Pharmaceuticals and information technology are, in general, excluded. Table 1 presents a few example technologies not meeting the criteria.

Short-listed EOIs then proceeded to full HTA applications by the applicants. Following this, the secretariat undertook evaluation of the HTA applications through due diligence, a process of meticulous evaluation on the technologies' safety, effectiveness, and applicability to the Queensland public health system. A rapid evidence assessment approach was adopted during the evaluation, covering areas including the burden of the disease and the clinical need, the clinical benefits, the economic evaluation, the feasibility of adoption, and the societal and ethical consideration of adopting the technology. During this process, relevant literature was critically assessed as guided by the National Health and Medical Research Council (NHMRC) dimensions of evidence, which determine the strength of evidence, the size of effect and the relevance of evidence (4). In addition, a range of stakeholders were consulted to examine the feasibility issues such as system compatibility, accessibility, training required, budgetary impact and regulatory status.

Based on the reports prepared by the secretariat, QPACT made recommendations using a deliberative decision-making approach, with careful and rational discussion on all required aspects of the technology during the evaluation. The decision-making framework, adopted from the Ontario decision-making framework (5), was consistent with the five areas covered by the due diligence and used to help reach evidence-based recommendations. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) (6) and NHMRC (7) tools for grade recommendations were applied to guide the decision-making process to ensure its consistency and transparency. Depending on the underlying published evidence on safety, effectiveness and cost effectiveness, the recommendations are generally classified into three categories: (i) fund for piloting if the evidence is overall considered positive toward a new technology; (ii) fund for field evaluation if uncertainties remain for a promising technology, sometimes focusing on the potential risks of adopting a technology; (iii) do not fund where there is lack of evidence or evidence favors current best practice.

With a positive recommendation from QPACT, the recommendation was presented to the Executive Management Team for final funding approval. Upon approval, the technology was implemented into one (or two) site(s) to be piloted for a period of time until "proof of concept" was achieved. Alternatively, a more resource-extensive field evaluation could be initiated by insufficient evidence on safety, effectiveness, cost-effectiveness or feasibility issues for a promising technology by collecting primary data on the clinical, organizational, economic and patient-relevant outcomes in the "real-world" to allow future policy

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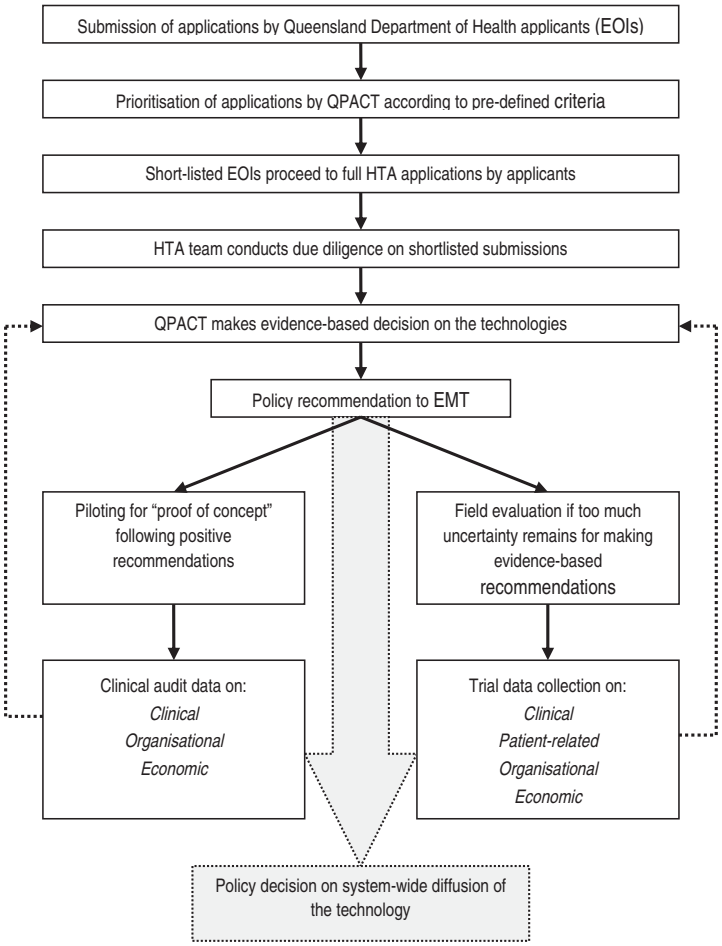
Table 1. Example of Technologies Not Meeting QPACT Pre-specified Criteria

Technology (indication)	Reason for exclusion
Percutaneous Pulmonary Valve Prostheses (compromised / previously removed pulmonary valve)	Not yet approved to use in Australia by the Therapeutic Goods Administration
Penumbra system (acute ischemic stroke secondary to thromboembolism)	Not new to Queensland Department of Health (being used in other facilities)
Digital Tomo-synthesis (detect pulmonary nodules)	This is part of a research project with a high proportion of funds requested being proposed to research positions
Orthopaedic Podiatry Triage Clinic (non-urgent foot and ankle conditions)	Although a new clinical practice, it does not have a new technology component included in the clinic
Vascular Assist (diabetic foot assessment, DVT screening)	Does not meet the minimum funding threshold criteria
Ordering and Receipting Blood System (management of blood supply)	Primarily information technology which is not integral to the implementation of the new health technology

Note. Pre-specified exclusion criteria include: prostheses or medical devices not approved for use in Australia by Therapeutic Goods Administration; technologies being funded as part of clinical trials; information technology, unless it is integral to the implementation of the new health technology; the minimum funding threshold for the technology is AU$100,000; pharmaceuticals.



EMT=Executive Management Team; EOI=Expression of Interest; HTA=Health Technology Assessment; QPACT=Queensland Policy Advisory Committee for New Technology.

Figure 1. Process of the health technology assessment program.

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Table 2. Example of Technologies Assessed by QPACT

Technology (indication)	Funding year	QPACT recommendation	Notes
Positive recommendation			
Greenlight Laser Therapy (benign prostatic hyperplasia)	2009–10	Piloting (Jul 2011 – Sep 2012)	Cost minimisation analysis based on the piloting data indicates potential value for money once Greenlight laser is established. As a result, Greenlight laser was recommended for *system-wide diffusion*.
InReach Electromagnetic Navigation Bronchoscopy (small peripheral lung lesions detection)	2010–11	Field evaluation (May 2011 – Jul 2012)	Due to limited number of eligible patients, it is recommended that it should be *restricted to one site*. A collaborative evaluation is planned across different states.
GeneXpert MTB/RIF (simultaneous detection of M. tuberculosis complex and resistance to rifampicin from sputum samples)	2011–12	Field evaluation (Mar 2012 – Mar 2014)	Field evaluation is finished, final report pending.
CVX-300 Excimer Laser System (removal of chronically implanted pacemaker and defibrillator leads)	2011–12	Piloting (Apr 2012 – May 2013)	Results from piloting have shown that the technology results in shorter procedure time and is a more efficient method of removing old leads. However due to the significant demand on staff training, it should be currently restricted to *one site only*.
Negative recommendation			
Percutaneous Microwave Ablation (lung or liver cancers)	2010–11	Not fund	Scarce clinical evidence to support the technology. More clinical trial is required.
Hansen Robotic Navigation System (guided ablation in patients with complex arrhythmia)	2010–11	Not fund	Very limited comparative evidence of marginal benefits for Hansen.
MitraClip (high risk patients with moderate to severe mitral regurgitation)	2011–12	Not fund	There is currently insufficient evidence on the benefits of MitraClip for high surgical risk patients.
Full HTA			
Epilepsy surgery (refractory epilepsy management within a comprehensive epilepsy service model)	2010–11	Full HTA (Sep 2010 – Jun 2011)	Based on the full HTA, positive recommendation from QPACT on setting up the service in Queensland Department of Health. Business case has been developed.
Obesity management service (clinically severe obesity)	2011–12	Full HTA (Jan 2011 – Nov 2011)	Bariatric surgery, as part of the service, is effective and cost-effective approach for certain high risk patient groups. Business case has been developed.

decision making (8). Field evaluation can take a variety of forms such as pragmatic trials, randomized controlled trials, or observational studies. The secretariat, in collaboration with the respective study group, initiated the preparation of the study and monitors the progress of the study. If positive outcomes were generated in local settings through the program, policy decision on the system-wide diffusion and appropriate funding of the technology could be made.

A few examples of the technologies that were assessed by QPACT, with either positive or negative recommendations, are listed in Table 2.

OUTCOMES

Since the inception of the HTA program in September 2009 (until June 2014), a total of 108 EOIs for new technologies have been submitted to QPACT for evaluation. Among them, thirty-five were short-listed and proceeded to full HTA applications. After the due diligence process, seventeen new technologies were recommended for funding for piloting, seven not recommended for funding and nine undergoing field evaluations due to the uncertainties surrounding the available evidence. In addition, two technologies as part of new model of care were evaluated through full HTA and received positive recommendations from QPACT, however the final funding approval from the Executive Management Team is pending. To date, eighty health technologies were either not short-listed or not recommended for funding by QPACT.

For the funded technologies, data are being collected on the usage, clinical, patient-related, economics, and system outcomes, as outlined in standardized Memorandums of Understanding agreed by the QPACT, the respective Hospital and

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Health Service and the clinical team. The evaluation was just finished for a couple of technologies and the final decisions are made. During the evaluation process, any issues related to the training, adoption, usage of the technology into the local health system were recorded and communicated back to the secretariat to help refine the program.

In addition, a wide range of dissemination methods including newsletters, presentations, posters, flyers, as well as the HTA Web site were used to raise the awareness on the HTA program and on the evidence-based practice amongst medical practitioners. Furthermore, an annual training day, with national and/or international experts in the field as guest speakers, was dedicated to educate target audience and further promote the role of the HTA program. So far feedback from the participants of the training day has indicated their positive experiences.

Through the implementation of QPACT recommended technologies, the importance of organizational feasibility of adopting a new health technology was highlighted. This was used to refine the due diligence process to enable more detailed assessment on the system impact upon adopting new technologies with increased consultation with different stakeholders. Consequently, a greater collaboration from various departments was fostered through the program.

DISCUSSION

With new technologies creating consumer interest and the demand for their adoption by end-users, the only rational way to control escalating healthcare costs is through the creation of a transparent policy development process that addresses uncertainty in technology investment and engages different stakeholders (9). Within this context, HTA is gaining international momentum in evidence-based policy decision making on the uptake and diffusion of new health technologies. The development of evidence-based recommendation and the subsequent implementation of new technologies, as a replacement for the existing diffusion patterns for technology, are a complex and challenging task and require a comprehensive and interactive approach. The approach should start with the review of the evidence base, with the necessity to generate primary evidence if needed. Following this, policy decision making is primarily determined by the demonstration of improved patient-relevant outcome such as quality of life and safety, system efficiency, cost-effectiveness, and feasibility of adoption. The decisions must be made within the context of the health system in which the technology is to be implemented and the organizational feasibility needs to be carefully assessed by different stakeholders (2). Most importantly, the decision-making process itself must be consistent and transparent (10).

The HTA program in the Queensland Department of Health aims to assist policy decision making for introducing innovative technologies; this decision-making process is guided by well-recognized frameworks to maintain its consistency and transparency. Even though the HTA program is only in its infancy, it has assisted health administrators from different health districts in prioritizing their health technology agendas and has gained wide trust and support from various stakeholders within the system, indicating the increasing awareness of and confidence in the evaluation process. As importantly, of the 108 technology applications received, 80 have not been funded, potentially saving public health system millions of dollars and resulting in a more efficient use of the limited resources. At the same time, a systematic and robust process to generate primary evidence through data collection in a real-world setting, in the form of field evaluation, is being developed and tested. This process allows generating valuable data required in the evidence-based decision-making process for the evaluation of promising technologies for which insufficient data exists (9).

At a time of increasing financial constraint globally, using HTA to assist the introduction of new technologies alone cannot achieve the goal of controlling escalating healthcare costs. Reassessment/disinvestment of existing ineffective or inappropriately applied healthcare practices has thus been used increasingly worldwide as a tool for health systems to ensure quality of care and sustainability of resource allocation (11). In this context, QPACT has put reassessment into its agenda by aiming to develop a registry for existing ineffective or inappropriately used technologies, identified through the new technology evaluation process, that are shown to be less safe and/or effective or providing low or no value for money. Being aware of the numerous challenges faced by disinvestment, QPACT is working toward achieving consensus on disinvestment among its Queensland stakeholders and to develop a framework for disinvestment.

The HTA program in Queensland continues to evolve. Important lessons have been learnt for Queensland Department of Health through the program. Among these, comprehensive assessment on the organizational and economic feasibility of adopting the technology, in addition to the assessment on its effectiveness, has been highlighted as important factors for the success of the program. Subsequently, the implementation of QPACT recommendations is increasingly involving joint efforts among districts, hospitals, planning and financing branch, clinical engineering, and Information Technology to meet the challenges of the process. At the evaluation stage, wide consultation with stakeholders within the local health system is essential to fully understand the operational aspects and to ensure smooth uptake of innovative technologies. The operational impact of adopting new technologies extends far beyond the department where the technology is deployed, including human resources, work flow, care pathways and other ancillary services within the hospital. These should be anticipated as thoroughly as possible during the evaluation to enable appropriate planning and the sustainability of the new clinical pathway. At the same time, reassessment of current technologies should be put on the HTA agenda to ensure the quality of care and the sustainability of the health system.

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The Queensland experience of the managed entry of technologies has been used to inform other jurisdictions and New Zealand through membership of national committee HealthPACT. This approach could potentially be applied in other countries with similar healthcare systems or human and financial resources to assist investment decisions.

CONCLUSION

Evidence-based policy decision on the uptake of innovative health technologies requires a comprehensive approach. The Queensland Department of Health experience has proven that HTA program is a valuable process to assist such policy development and to guide better resource allocation.

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CONFLICTS OF INTEREST

The authors declared no conflicts of interest.

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