Commentary

Health Technology Disinvestment in Singapore

Boon Peng Lim, [1]*BPharm*, Bee Hoon Heng, [2,3]*MBBS, MSc (Public Health)*, Hwei Yee Tai, [3,4,5]*MBBS, MMed (Anaes)*, Linus Tham, [3,6]*BComp (Hons)*, Hong Choon Chua, [3,7]*MBBS, MMed (Psych)*

Abstract

Healthcare decision-makers are constantly challenged by growing healthcare needs in tandem with rising healthcare costs. Disinvesting in technologies and practices that are "low in value" is one strategy to re-allocate limited resources to the most effective, safe and cost-effective technologies. We put forward a health technology reassessment framework and examined the opportunities and challenges on technology disinvestment in Singapore and deliberated on possible solutions. We coordinated and supported a disinvestment programme in 2 hospitals, 1 specialist centre and 9 primary care institutions in the public healthcare sector. The key processes were identifying, prioritising and assessing low-value health technologies and practices, disseminating and implementing disinvestment recommendations, and post-implementation evaluation. Through case studies, we explored the barriers and enablers to the success of the programme. One of the barriers to disinvestment included difficulty in demonstrating a lack of benefit of in-use technologies from published studies. Differing viewpoint and priority might preclude a healthcare leader's support in such initiatives and that posed an unsurmountable hurdle. On the other hand, engaging the stakeholder throughout the evidence review process and striking a balance between rigour and timeliness of review were likely to assure success. Lastly, monitoring the impact on resources and patient outcomes can be diverse and methods need to be developed. Understanding barriers and enablers in health technology disinvestment can translate into improved opportunities for eliminating and minimising resource wastage.

Ann Acad Med Singapore 2018;47:338-44

Key words: Cost containment, Healthcare budget, Low-value, Value-based care

Introduction

Globally, there is increasing demand and spending on healthcare. The diffusion of an ever-growing number of drugs, diagnostic tests, medical devices, and procedural interventions poses strain on today's healthcare environment.[1] Health technology assessment (HTA)—the systematic assessment of health technologies regarding effectiveness and safety—has been widely employed to inform decision and to optimise the value of every healthcare dollar.[2] HTA focuses primarily on managing the entry of health technologies. Yet after a technology has entered the system, there seems no standardised process to keep track of its use or to manage its exit.[3] As a result, most in-use technologies may not have been re-evaluated since their entry into the healthcare system.[4] Under such circumstances, many technologies that are no longer effective or have become obsolete remain in the system rather than being replaced by more effective, safe and cost-

[1]Pharmacy and Therapeutics Office, Group Health Informatics, National Healthcare Group, Singapore
[2]Health Services and Outcomes Research, National Healthcare Group, Singapore
[3]Clinical Board, National Healthcare Group, Singapore
[4]Department of Anaesthesia, Tan Tock Seng Hospital, Singapore
[5]Lee Kong Chian School of Medicine, Singapore
[6]Group Corporate Development and Operations, National Healthcare Group, Singapore
[7]Institute of Mental Health, Singapore
Address for Correspondence: Mr Lim Boon Peng, Pharmacy and Therapeutics Office, Group Health Informatics, National Healthcare Group, 3 Fusionopolis Link, #03-08 Nexus@one-north, Singapore 138543.
Email: Boon_Peng_Lim@nhg.com.sg

effective alternatives.[5] Managing technologies throughout their lifespan means ensuring that they continue to achieve optimal value for money.

Health technology reassessment (HTR) is a structured, evidence-based assessment of a technology currently used in the healthcare system, to inform optimal use of that technology in comparison to its alternatives.[6] It serves to inform decisions regarding technologies and practices that are of little or no value to the patient and consequently should not be provided routinely. Disinvestment relates to the processes of (partially or completely) withdrawing health resources from any existing healthcare practices, procedures, technologies or pharmaceuticals that are deemed to deliver little or no health gain for their cost.[3] Reducing spending on low-value health technologies and practices channels resources to more effective and cost-effective care. This can achieve larger improvements in outcome while containing the increasing pressure on healthcare budgets. There are ongoing development and spread of disinvestment initiatives over the past decade.[7] The United Kingdom National Institute for Health and Care Excellence (NICE), started their programme in 2005 and is widely recognised for their "do-not-do" list.[8] In the United State, the Choosing Wisely campaign initiated in 2012[9] has since spread to Canada[10] and Australia.[11] Other recent efforts include the Spanish guidance on disinvestment[12] and the Dutch list of low-value technologies and practices.[13]

The success of any health policy requires an understanding of the possible barriers and devising strategies to overcome them. That said, the current discussion on disinvestment centred on its conceptual framework but we need more insights on the actualisation and success factors to integrate disinvestment into our healthcare systems.[14,15] The experience with disinvestment actualisation is currently contained within 11 healthcare systems of which 10 are in Western nations.[16] Founded on the principle of an individual's responsibility and affordability, Singapore has a unique healthcare model where financing is highly dependent on individuals while spending on healthcare has been consistently maintained at 4% of its gross domestic product (GDP).[17,18] The larger out-of-pocket share in healthcare financing distinguishes itself from the other healthcare financing systems i.e. tax-based universal healthcare system (for example, in the United Kingdom) and insurance-based system (for example, in the United States). Yet common to all, the rising cost of healthcare and new technologies warrant disinvesting in low-value care and services to increase healthcare efficiency and control costs without compromising outcomes. In this paper, we detailed an inaugural disinvestment programme in Singapore and addressed the challenges and potential solutions in key disinvestment processes. Through case studies, we highlighted what worked or worked against it, so as to provide insights on delivering successful disinvestment initiatives.

Materials and Methods

The disinvestment programme involved 2 hospitals, 1 specialist centre and 9 primary care institutions which come under a regional health system common cluster in the public healthcare sector. The 4 key processes were: identifying disinvestment opportunities, establishing prioritisation processes, assessing evidence on low-value health technologies and practices followed by implementing and evaluating disinvestment (Fig. 1). This was undertaken by the health technology assessment team nested in the public healthcare cluster. The objectives of the disinvestment programme were: a) to create awareness of opportunities to disinvest health technology that deliver no or low health gain for its cost; b) to optimise patient care by ensuring effective, safe and cost-effective use of health technology; and c) to contribute towards a sustainable healthcare through the efficient use of resources.

An integral part of pioneer disinvestment programmes is usually a list of low-value technologies and practices. Leveraging the databases by international HTA agencies,[8-10,13] we systematically reviewed the lists of low-value technologies and practices and identified 500 of them for consideration. After excluding those which were irrelevant to our local context, 314 candidate technologies and practices were listed for stakeholder engagement.

Given that the potential gains from disinvestment could vary widely across technologies and resources to support these initiatives were limited, prioritisation of low-value technologies and practices for assessment was warranted. The prioritisation panel—comprising key opinion leaders and senior clinicians—was charged with prioritising topics for HTR. The prioritisation panel worked with key stakeholders, such as members of the Medical Board in each institution, to deliberate based on the following criteria: a) clinical impact: we considered opinions about the potential to influence clinical practice and the perceived issue with effectiveness, safety, and cost-effectiveness of alternatives; b) clinical use: we considered if there was variation in its application among clinicians and outcomes among patients; c) financial impact: we considered the usage volume and potential benefits in terms of eliminating wastage; and d) timeliness of evidence review: we considered the decision-makers' requests on the time factor.

Besides the identified candidates, we also gathered inputs from stakeholders on potential technologies and practices which required reassessment. Disinvestment decisions should be driven by evidence on the effectiveness, safety and cost-effectiveness. Once the technologies and practices

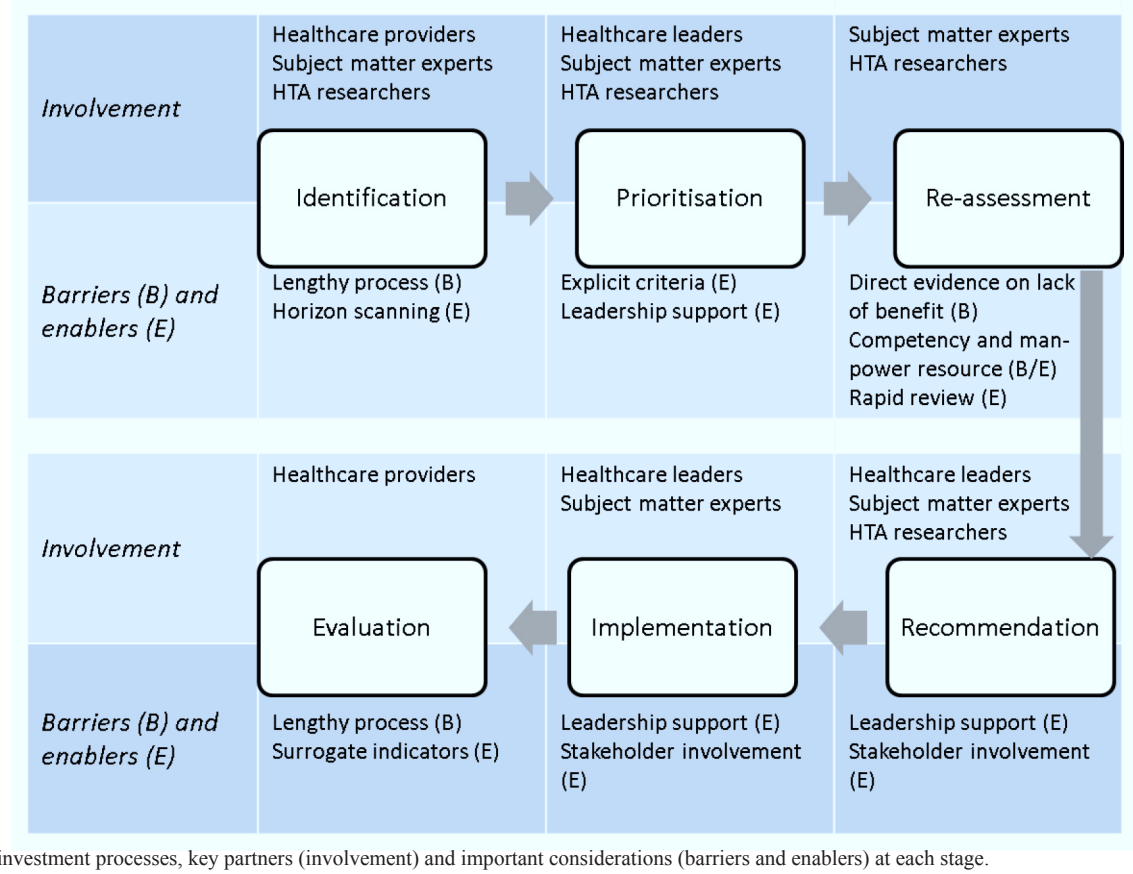

Fig. 1. Disinvestment processes, key partners (involvement) and important considerations (barriers and enablers) at each stage.

for reassessment had been identified and prioritised, we appraised the evidence to inform decisions and formulated recommendations to guide their appropriate use. This was supported by 2 full-time equivalent HTA researchers. However, reassessment needed to balance depth and rigour with timeliness. Broadly, our approach was to perform a literature search for practice guidelines and HTA reports from HTA resources, international health technology agencies and major international professional association. This was followed by a focused internet search to identify literature beyond the targeted HTA and professional bodies. We searched for published systematic reviews and subsequently carried out an update search to identify clinical studies published during the period that had elapsed since the search date on the most comprehensive review identified. In other instances, we carried out the systematic reviews, meta-analyses and cost-effectiveness analyses to support decision-making. Subject matter experts and clinicians were involved in the early stage to shape the research question and the scope of the evidence review. Subsequently, we worked collaboratively on the results of the review and formulated evidence-based disinvestment recommendations. We presented the recommendations to the institution's Medical Board for deliberation and endorsement. Thereafter, the relevant stakeholders proceeded to disseminate and implement the changes. The pre- and post-implementation evaluations varied but we generally took into consideration outcomes and savings.

Results

From the 314 candidate technologies and practices listed for stakeholder engagement, 9 underwent HTR. Here, we present 3 of them as case studies and share insights on the barriers and enablers of disinvestment (Table 1).

Case Studies

Routine Monitoring of Statin Therapy

The routine monitoring of liver function test (LFT) and creatine kinase (CK) levels is a common practice during treatment with statins. However, liver and skeletal muscle adverse events are rare at standard doses and routine LFT and CK monitoring are not recommended in asymptomatic patients.[19,20] Through evidence review, we advocated to replace such practices with measurement of alanine transaminase (ALT) or aminotransferase (AST) at initiation and within 3 to 6 months of starting treatment and at 12 months.[21-23] Besides disseminating the new recommendations to clinicians, a change in the laboratory order panel for statin monitoring was implemented in the

Table 1. Examples of Health Technology Reassessment and the Key Learning Points

Health Technology Reassessment	Disinvestment Process	Key Learning Points
Routine monitoring of statin therapy	Omit routine creatine kinase test as part of statin monitoring in asymptomatic patients	Leadership support and stakeholder engagement enhances acceptance
	Monitor aspartate/alanine aminotransferase instead of liver function test	Rapid review of existing guidelines ensures timeliness
		Electronic ordering system reinforces implementation
		Monitoring resource savings demonstrates impact
Routine sodium valproate level monitoring in bipolar disorder	Omit routine sodium valproate level monitoring when used as a mood stabiliser	Leadership support and stakeholder engagement enhances acceptance
		Rapid review of existing guidelines overcomes manpower constraint
		Electronic ordering system reinforces implementation
		Direct evidence to support disinvestment may be lacking
Routine neuroimaging in first-episode psychosis	Selective use of neuroimaging in the evaluation of first-episode psychosis	Direct evidence to support disinvestment may be lacking
		Inference of published findings and alternative sources is warranted

9 primary care institutions. The ALT, AST and CK levels were removed from the order template for lipid monitoring and this allowed the clinicians to order the test(s) only when necessary. Collectively, there were 101,700 patients receiving statin therapy in these institutions. We monitored the ordering of these tests before and after implementation. By the end of the monitoring period (i.e. 10 months post-implementation), the tests ordered were reduced by more than 50%. We calculated the cost of performing each tests and this translated into savings of S$120,000 per month. Given that this was the first successfully implemented project, it was showcased to others to gain greater conviction on disinvestment. The key success factors in this initiative included strong leadership support and detailed pre- and post-implementation monitoring to drive future disinvestment efforts.

Routine Sodium Valproate Level Monitoring in Bipolar Disorder

Unlike in the treatment of epilepsy, the utility of serum valproate level in bipolar disorder is of limited benefit given that there is no clear dose-response relationship.[24] Despite a review of the evidence on routine serum valproate measurement in the treatment of bipolar disorder, clinical studies did not directly demonstrate ineffectiveness of serum valproate level monitoring when used as a mood stabiliser. In theory, this meant subjecting patients to monitoring and comparing the desired outcome. However, it might still not be possible to distil the effectiveness of monitoring valproate levels against the efficacy of the continuum of therapy employed. Nevertheless, we established recommendations for monitoring of valproate level in patients with bipolar disorder. Serum valproate level may be useful during initiation and titration phase or when clinically indicated (e.g. assessment of compliance, effectiveness and toxicity). Here, we combined education with information technology to change the clinician's practice. The electronic drug ordering system previously incorporated a reminder for annual valproate level monitoring. Since routine valproate level monitoring was no longer a recommended practice, this reminder was removed from the drug order. Following that, there was a sharp decline from an average of 205 to 103 tests per month (50% reduction). That translated into S$2300 saved from unnecessary tests every month, from the laboratory's perspective. Making use of information technology, especially the electronic drug ordering system, was a powerful way to spread disinvestment initiatives and attain desired results.

Routine Neuroimaging in First-Episode Psychosis

In the largest local mental health institution, we worked closely with the psychiatrists and members of the Medical Board to inform clinicians on the appropriateness to perform structural neuroimaging in first-episode psychosis routinely. We conducted a systematic review with an aim to guide the appropriate use of neuroimaging in first-episode psychosis. This posed the biggest challenge given that the lack of benefit of not performing such investigation could not be quantified and was not apparent in the findings of published studies. Nevertheless, from studies which reported on the diagnostic yield and existing clinical practice guidelines,[25,26] we recommended the selective use of structural neuroimaging in first-episode psychosis. The decision to order such investigations needs to be

individualised with due consideration of medical history, clinical presentation and examination. To substantiate this, we came up with a recommended list of patient profile which warrants its use based on evidence and consensus agreement. After endorsement by the Medical Board, senior clinicians presented the evidence and disseminated the recommendations to other clinicians. Though there may be apprehension and concerns about missing a diagnosis of an organic cause of psychosis, early stakeholder involvement and leadership support were instrumental in its implementation. In the initial months, there were only slight changes in the number of magnetic resonance imaging (MRI) or computerised tomography (CT) scans ordered for patients presenting with first-episode psychosis at the emergency department. After reinforcing the recommendation at various platforms, the numbers of MRI and CT scans performed slowly declined, with a resultant savings of S$10,000 per month. This is an example where clinical studies may not directly demonstrate ineffectiveness and may present a hurdle to change in clinician's practice.

Barriers and Enablers

Barriers and enablers to the success of disinvestment were identified throughout our programme. We adopted a transparent prioritisation process which was well received by the stakeholders. We devised prioritisation criteria and improved the subjectivity of the decisions through the application of weights to the criteria. At the same time, the prioritisation structure made provision for local needs within boundary, for instance, openness to alternative views and other more pressing needs perceived by the stakeholders.

Another challenge is the mechanism for candidate technology identification.[4,27] At inauguration, the resource for this programme was limited; we worked around this issue by identifying low-value health technologies and practices via surveying existing lists. However, this may not fully capture or reflect local practices though it has served well in this inaugural programme. There should be a systematic and coordinated process to identify obsolete technologies and practices. This may include ongoing discussions with subject matter experts to identify candidate technologies and practices. A viable platform to initiate such discussions will be to coincide disinvestment discussions with the adoption of a new technology in the same class. A constant review of the hospital or institution formulary highlighting the existence of multiple technologies for the same indication can also create disinvestment opportunities (though limited to pharmaceuticals).

Unlike HTA, HTR needs to generate evidence on the lack of benefits of established technologies. In the course of our work, we came across areas with substantial difficulty in demonstrating acceptable proof of inferiority. Conceptually, it is not difficult if the objective is to discourage use. However, in reality it is often restricted by data availability and interpretation. This may not be realised in published randomised controlled trials or even with clinical studies. For instance, we were unable to locate studies which prove that routine versus selective neuroimaging test during first-episode psychosis translates into differential yield in identifying organic causes. At times, there may be inconsistent findings on efficacy which can make it difficult to justify or discredit the continual use of certain technologies. The principles of HTA remain valid but adaptation is needed to better support the evidence review and harness findings relevant for decision-making. In addition, to ensure timelines of decision-making, we adopted evidence review methods that strike an appropriate balance between rigour and speed. These include non-traditional search strategy such as searching for existing guidelines which are up-to-date.

Once perceived as the biggest barrier to disinvestment—clinician inertia and entrenchment in long-standing practices[20]—can be overcome by evidence-based recommendations. Stakeholder engagement is crucial. They were involved in every stage from identification and prioritisation of potential technologies and practices to assessment and implementation of the changes. By collaborating closely with subject matter experts and clinicians throughout the evidence review process, we addressed the issue concisely and harnessed information to better inform decision-makers. Subsequent in the process, they can influence and enhance the acceptance of decisions to de-adopt or eliminate low-value technologies and practices. However, this has to happen in tandem with support from institution leaders.[28] Supported by evidence and endorsement from institution leaders (e.g. the Medical Board), disinvestment recommendations were more readily adopted by healthcare providers. We customised the dissemination and implementation strategy to the target group (i.e. healthcare providers impacted by the resulting decision) and enhanced it through information technology. With a coordinated and evidence-based approach, healthcare leaders, stakeholders and HTA researchers can effect a change in long-standing practices among clinicians.

Discussion

Disinvestment aims to ensure that healthcare expenditure is linked to patient outcomes. This can contribute towards a sustainable healthcare by ensuring efficient allocation of resources. Though progress has been made, there is a seemingly lack of actual application of the established framework and active participation in Asian healthcare systems. A systematic review of disinvestment captured 26 unique initiatives implemented in 11 countries.[16] By

and large, the Choosing Wisely campaign has been most successful and has since spread to 6 countries. Other healthcare systems heavily involved include Australia (7 initiatives), the United Kingdom (6 initiatives), and New Zealand (3 initiatives). Although this is not a national effort, we explored on how to leverage on the existing experiences drawn from established models and adapted them to drive disinvestment locally. With that, it has provided proof that new initiatives need not start from scratch but can be fast-tracked by using existing lists of low-value technologies, for instance.

The healthcare expenditure in Singapore was 4.9% of GDP in 2014, though considered low among developed countries,[17] is on a rising trend signifying pressure on healthcare funding. Healthcare and healthcare infrastructure spending is expected to continue growing with an ageing population and increasing burden of chronic health conditions. The Ministry of Health, Singapore set up the Agency for Care Effectiveness in 2015 which focuses on new technologies for reimbursement purpose. Currently, there is a limited system in place to support the disinvestment of low-value or inappropriately applied healthcare practices.[29,30] In the absence of a formal setup, HTR can be integrated into other programmes such as clinical practice guidelines, care pathways and quality improvement initiatives. That said, disinvestment should be recognised as an emerging priority and made a national programme.

Our experience may not be sufficient to draw firm conclusions on the success factors of a disinvestment initiative. Our experience did surface to us what was most important in a novel initiative. Looking back at some notable healthcare reforms like computerised prescribing system[31] and academic medical centres,[32] the advances we can make in untested initiatives like this hinged on supportive leaders. The programme would not have proceeded or be successfully implemented without the mandate from institution leaders. We postulated that the underlying reasons for lack of support by institution leaders might stem from a low priority viewpoint and perception of negligible incentives. Hopefully, learning the success in other cases can abate these preconceived ideas.

Lastly, capturing patient outcome and satisfaction from disengaging in low-value care and services remains a key area for development. A structured approach for monitoring of healthcare resources and evaluating patient outcome resultant from disinvestment is most gratifying to healthcare providers and leaders. It can also instill credibility to the programme and encourage uptake and spread. Besides measuring the yield of disinvesting in low-value technologies and practices, which may come in the form of savings from unnecessary tests, we should also evaluate patient outcomes and satisfaction. Monitoring outcomes may sometimes prove difficult where there is a diversity of possible events or seemingly lack of events. Therefore, there ought to be concerted efforts stemming from administrators and healthcare providers in the monitoring process. We should convey to the healthcare providers involved that there is a need to actively seek out any unintended consequences.

Conclusion

What has been achieved to date demonstrated the yield and feasibility of disinvestment in the local healthcare climate and culture. Although the concept of disinvestment has yet to receive attention on a broader scale, it can be developed to effect change in medical practice and to set the stage for healthcare reform in Singapore. The dual-financing system in Singapore is unique and well suited for a disinvestment climate. Moving forward, we should also educate and empower patients to make certain decisions given that their out-of-pocket healthcare expenditure is substantial.

Acknowledgement

The authors gratefully acknowledge the following clinicians for their invaluable support and expertise: Adj A/Prof Daniel Fung, Adj A/Prof Cheng Lee, Adj Asst Prof Alex Su, Asst Prof Sujatha Rao, A/Prof Swapna Verma, Adj Asst Prof Yee Ming Mok, Dr Phern Chern Tor, Dr Yii Jen Lew, Dr Karen Ng, Dr Colin Tan, A/Prof Suat Hoon Tan and A/Prof Thomas Lew. They thank their colleagues for help with data collation and analysis: Ms Pui Yee Chow, Dr Tina Fang, Dr Matthias Paul Toh, Dr Yin Min Thaung, Ms Grace Lim and Mr Alan Pui. They also thank Ms Monica Teng, Dr Ai Leng Khoo and Dr Ying Jiao Zhao for performing the systematic reviews and cost-effectiveness analysis.

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