MINISTRY OF HEALTH
SINGAPORE

A PRIMER ON APPROPRIATE AND VALUE-BASED CARE (AVBC) IN SINGAPORE

AVBC
Appropriate and Value-Based Care

Driving Value and Transforming Care for Patients, Together

Contents

Executive Summary

Overarching Goal

Singapore has long stood as a global exemplar for healthcare. Building on these foundations, the Appropriate and Value-Based Care (AVBC) movement seeks to embed sustainability and value at the core of our healthcare ecosystem. By prioritising outcomes that matter most to patients and the system's long-term viability, AVBC aspires to position Singapore as a leader in delivering appropriate, patient-centred, and value-based care.

Key Challenges

Amidst global healthcare challenges, Singapore grapples with an ageing population, a rising burden of chronic diseases, and escalating healthcare costs. These challenges are compounded by inefficiencies, variations in clinical practice, and growing demand for high-cost technologies. To ensure the sustainability and resilience of our healthcare system, a renewed and intensified push for appropriate, value-based care is imperative. This new approach focuses on optimising patient-centred and clinical outcomes, and resource utilisation.

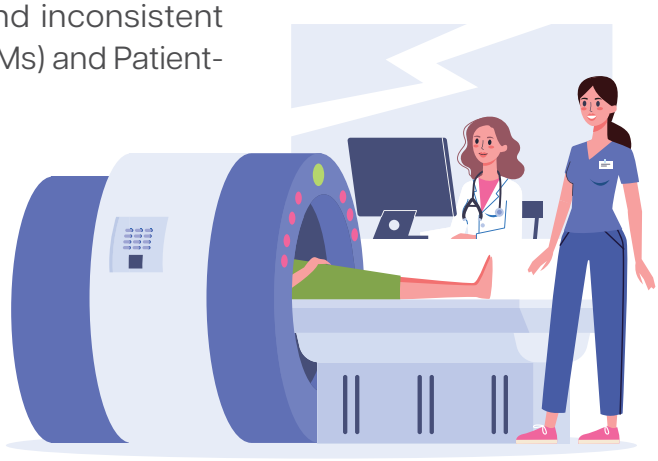
Key Elements of Change (FOCUS)

(F)inancing Value-Based Models

Transitioning to value-based financing aligns payments with patient outcomes and interventions that are cost-effective and sustainable, fostering accountability and collaboration among healthcare providers. Value-based financing models must cascade to Clusters within the Regional Health System ("Clusters"), hospitals, and departments. This will incentivise quality improvement, efficiency, and patient-centred care.

(O)utcome Measurements (Clinical and Patient-Centred) Prioritisation

To align care delivery with both clinical effectiveness and outcomes that matter to patients, the rigorous measurement of clinical outcomes (e.g., recovery rates) and patient-centred outcomes (e.g., quality of life and care experience) is critical. Current efforts remain fragmented, with underdeveloped and inconsistent adoption of Patient-Reported Outcome Measures (PROMs) and Patient-Reported Experience Measures (PREMs). Standardised metrics for collection, sharing, and analysis of the above data in robust reporting systems will foster patient-centred care, benchmarking, and evidence-based decision-making.



(C)ost-Effective Interventions Uptake

Successful AVBC also means the timely adoption of clinically- and cost-effective health technologies. While

national-level assessments through the Agency for Care Effectiveness (ACE) are robust, Clusters and hospitals must also enhance their capabilities to pilot and evaluate new technologies within their purview. Policies must gatekeep higher-cost technologies, strengthen disinvestment in low-value options, and ensure equitable deployment of innovations that optimise health outcomes and resource utilisation.

(U)nwarranted Clinical Variation and Waste Reduction

Addressing unwarranted variation and inefficiencies is key to improving outcomes and optimising resources. Expanding evidence-based care pathways beyond the 18 conditions currently addressed under the National Value-Driven Care Programme will tackle variation across medical and surgical disciplines. Pathways must reflect real-life patient journeys, from prevention, diagnosis, acute interventions, to chronic and end-to-end care. They should be supported by tools such as internal reporting systems, provider education, and decision-support mechanisms.

(S)kills Enhancement for AVBC Through Education and Training

Building capacity for AVBC requires integrating its principles into medical education and professional development. Healthcare providers must be equipped with skills in data analytics, interdisciplinary collaboration, and cost-effective resource management. Proficiency in AVBC principles should be established as a core competency, ensuring that future healthcare professionals can deliver outcome-driven, patient-centred care.

(C)ulture Shift Towards AVBC

For sustained transformation, AVBC principles must be embedded into healthcare organisations' missions, policies, and operations. Leadership must champion these principles, fostering a culture that prioritises outcomes, efficiency, and continuous improvement.

Our Call to Action

Singapore's healthcare system stands at a critical inflection point, faced with the dual pressures of increasing demand and finite resources. The confluence of an ageing population, rising prevalence of chronic diseases, and escalating healthcare costs presents an undeniable and immediate challenge. These pressures risk overwhelming our system, diminishing its ability to deliver the care that Singaporeans have come to expect.

AVBC represents a promising way forward: a system designed to prioritise outcomes, optimise resource efficiency, and ensure that every healthcare dollar spent contributes to meaningful health improvements. By aligning care delivery with what truly matters—clinically and from the patient's perspective—AVBC provides a strategic, practical, and philosophical approach to address the growing challenges in healthcare. In turn, AVBC can transform today's challenges into opportunities for innovation and meaningful progression.

1 Singapore's Value Journey Thus Far

INTRODUCTION

Singapore's healthcare journey is grounded in its long-standing commitment to promoting good health, reducing illness, and ensuring access to efficient and affordable healthcare. Today, Singapore's healthcare system is globally recognised as one of the best, excelling in key indicators such as infant and maternal mortality rates, life expectancy, and disability-adjusted life years, while keeping care accessible to Singaporeans.

Healthcare utilisation and costs have been on a relentless upward trajectory worldwide. In OECD countries, healthcare spending as a percentage of GDP grew from an average of 8.8% in 2019 to 9.2% in 2022. This is projected to rise to 10.2% of GDP by 2030 and 11.2% of GDP by 2040. It is anticipated that healthcare spending will continue to outpace economic growth in the future. Future-proofing health systems has become an urgent priority in the face of escalating demand and rising costs. Simply allocating more resources to the healthcare system will not offer a realistic and sustainable solution.

In Singapore, demographic shifts over the past few decades have shaped the rising demand for healthcare. An ageing population and the attendant rise in chronic conditions invariably contribute to increased utilisation of health services, longer hospital stays, and growing demand from Singaporeans for expanded health services and technologies. These trends are driving up costs, straining manpower and resources, and threatening the sustainability of healthcare delivery.

RISING GOVERNMENT HEALTHCARE EXPENDITURE

Between 2014 and 2019, Current Government Healthcare Expenditure (GHE) grew at a Compound Annual Growth Rate (CAGR) of 9.9% (Figure 1.1). Over the same period, Singapore's economy recorded an annual growth rate of 5% and national wage growth of 4%. If healthcare expenditure grows along the current trajectory, our GHE could exceed S$27 billion in 2030, compared to S$15.8 billion in 2021.

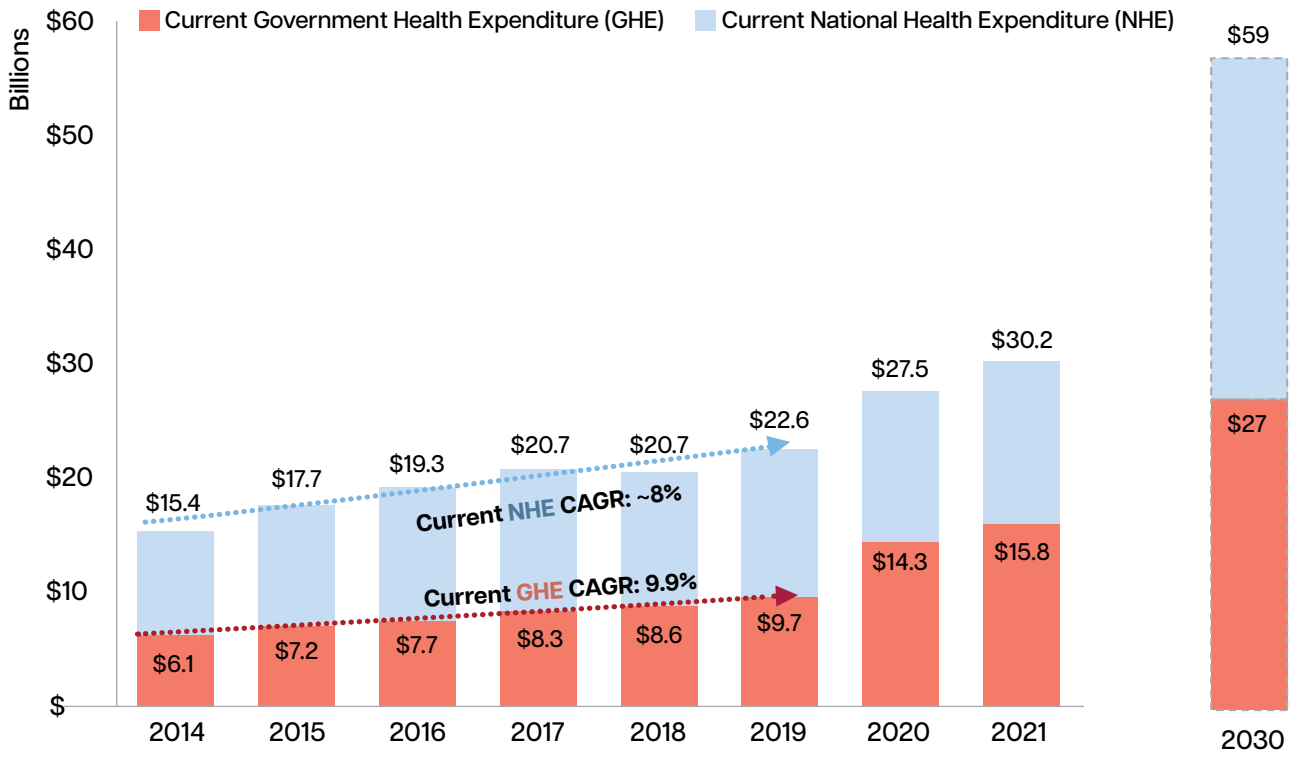


Figure 1.1 Current Government Health Expenditure (GHE) and Current National Health Expenditure (NHE) from 2014 to 2021. Current NHE is defined as the total health expenditure in a country excluding government development expenditure. Source: 2014-2021 NHE AND GHE (HF), 2030 projection (MOH Workplan Seminar 2024).

Impact of Population Ageing and the Rising Burden of Multimorbidities

In 2024, 19.9% of Singaporeans were aged 65 and older. By 2030, this proportion is projected to increase to 23.8% of the population. Based on available data from 2016 and 2017, the prevalence of Singaporeans aged 60 years old and above with two or more chronic non-communicable conditions ranged between 37% to 51.5%. In contrast, only 19.8% reported three or more conditions in 2009. These conditions—such as hypertension, diabetes, musculoskeletal conditions, and respiratory conditions—align with findings from the 2021 Singapore Global Burden of Disease Study, in which chronic non-communicable diseases accounted for 81.7% of Singapore's disease burden.

Managing multimorbidity requires more complex and integrated care than treating individual conditions separately, leading to significantly higher overall healthcare costs. The per capita cost of multimorbidity in Singapore is estimated to be S$15,000 annually, compared to S$5,600 for those with only one condition.[1] Furthermore, the projected cost of treatment arising from increased incidence rates of these conditions and related complications is estimated to rise to S$2.5 billion by 2035, considering an ageing population and longer life expectancy.[2]

[1] Picco L, Achilla E, Abdin E, Chong SA, Vaingankar JA, McCrone P, Chua HC, Heng D, Magadi H, Ng LL, Prince M, Subramaniam M. Economic burden of multimorbidity among older adults: impact on healthcare and societal costs. BMC Health Serv Res. 2016 May 10;16:173. doi: 10.1186/s12913-016-1421-7. PMID: 27160080; PMCID: PMC4862090.

[2] Extracted from Disease Prioritisation 17 July 2024 EXCO presentation

Impact of Population Ageing and the Demand for Healthcare Manpower

Population ageing is associated with higher demand for healthcare resources. Increased healthcare demand not only places a growing burden on financial resources but also on the demand for healthcare staff, particularly for elderly care and other labour-intensive areas of healthcare. This demand applies to both formal and informal care as the ageing population increases. Singapore's old-age support ratio has been declining rapidly. In 1995, 10.5 working adults supported one elderly Singaporean aged 65 years and above. This ratio decreased to 7.4 adults supporting one elderly Singaporean in 2010. It is projected to fall further to 2.7 adults per elderly Singaporean in 2030 (Figure 1.2). Healthcare will have to compete with other critical sectors nationally for manpower to ensure that healthcare remains accessible and achieves desired outcomes.

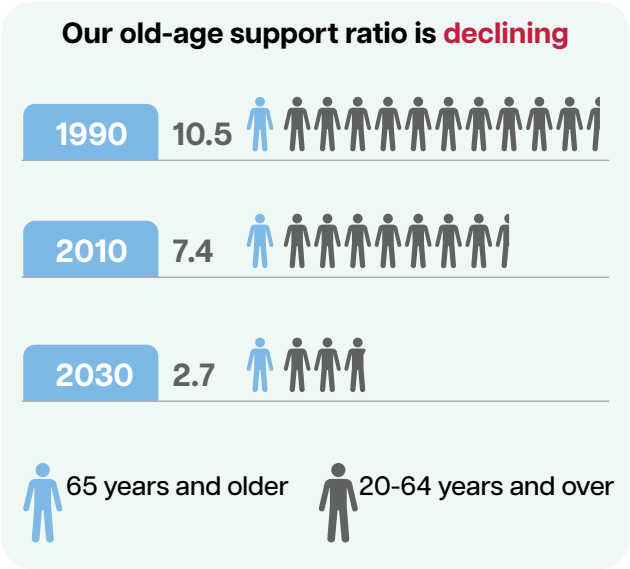


Figure 1.2 Singapore's old-age support ratio in 1990, 2010, and 2030 (projected). Source: Department of Statistics Singapore 2023.

Increased Avoidable Excess Healthcare Spending

Globally, it is estimated that 20% of all healthcare spending makes no or minimal contribution to health outcomes. Excess spending can be attributed to administrative complexity, operational redundancy, overtreatment or low-value care, and failures in care delivery or coordination. In OECD countries, 10% of patients experience avoidable harm at the point of care. More than 10% of healthcare spending is used to address medical errors or hospital-acquired infections. Over 30% of deliveries are done via Caesarean Sections, of which only 15% are medically indicated.

In Singapore, possible drivers for excess healthcare spending arise from unnecessary healthcare utilisation, suboptimal care delivery, or the occurrence of adverse events during treatment. In 2022, unnecessary specialist outpatient clinic visits, hospital admissions, or prolonged hospital lengths of stay contributed to a conservative estimate of S$200 million in excess spending. An additional S$77 million was spent addressing avoidable hospital-acquired complications and other related adverse events.[3]

High-Cost Health Technologies

Rapid advancements in medical technology have introduced expensive treatments to the healthcare system, leading to substantial increases in healthcare costs over the past decade (Figure 1.3). These include the introduction of cell, tissue, and gene therapy products (CTGTPs), AI-driven diagnostics, digital health technologies, and precision medicine. For example, gene therapy for lymphoma led to a hundred-fold increase in treatment cost, while another gene therapy for spinal muscular atrophy in children comes with a price tag of S$2.4 million per treatment.

[3] Extracted from SPD Cost Containment deck 2nd March 2024 "Quantifying opportunities–Does good quality of care reduce cost?"

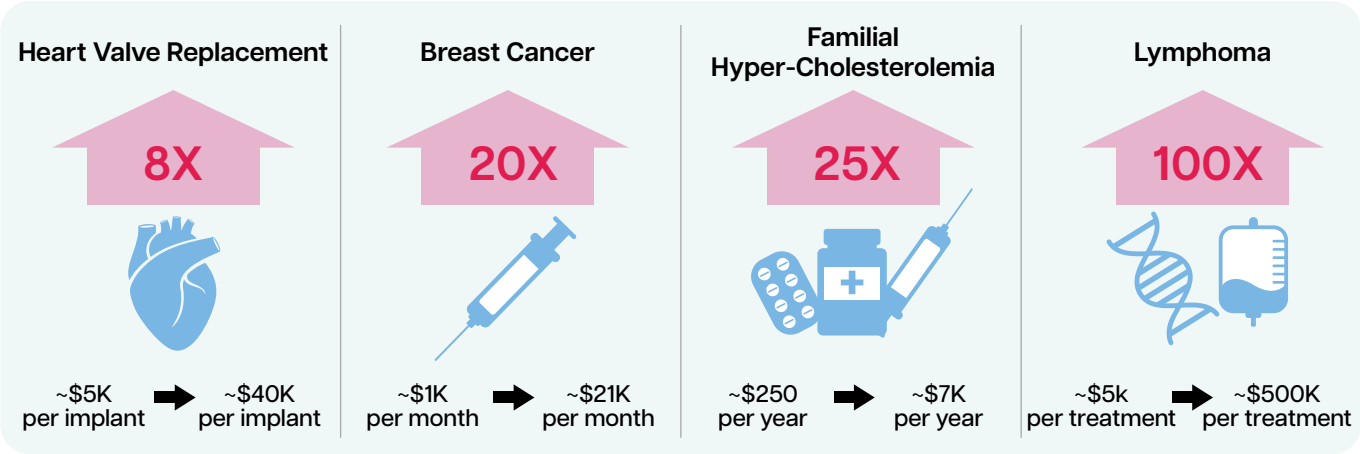


Figure 1.3 Costs of managing various conditions with new health technologies

Consequently, spending on health technologies in public healthcare institutions (PHIs) has been increasing. If left unchecked, PHI drug spending is projected to reach S$3.4 billion by 2030 from S$578 million in 2018, an annual growth rate above 13%. Through existing concerted value-driven efforts, early successes have been observed in blunting the growth trajectory of drug spending below the target growth rate (Figure 1.4). Nonetheless, we need to remain vigilant and judicious in the introduction and adoption of health technologies. Careful consideration should be exercised when developing policies and strategies to avoid the risk of shifting drug spending beyond its current trajectory and exceeding targets.

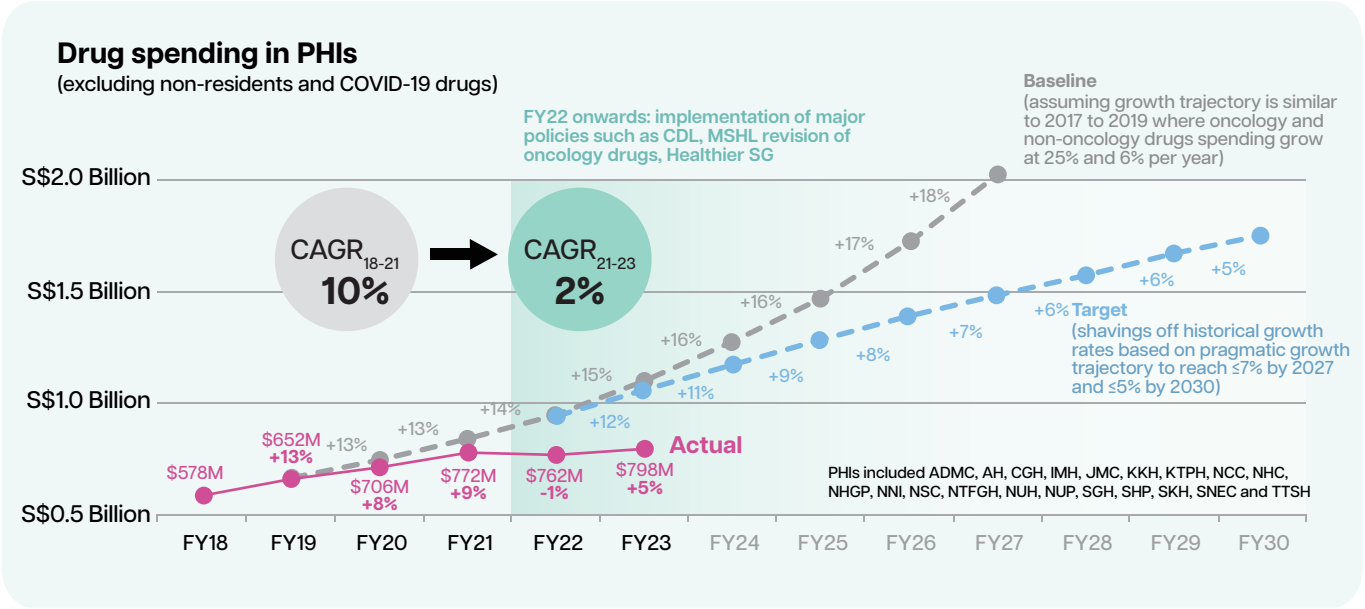


Figure 1.4 Projected versus Target versus Actual Drug Spending in PHI. **Source:** Drug utilisation data from PHIs

The implications are clear. In the coming decades, the demand for healthcare in its current form will continue to outpace economic and population growth. Ensuring the delivery of quality care amidst these challenges requires a deliberate strategic shift from reactive, volume-driven care to proactive, value-driven approaches.

SINGAPORE'S VALUE JOURNEY

Singapore's foundations in value-based care can be traced to the late 1990s, with various foundational workstreams introduced to moderate growth in health expenditure while maintaining access to and quality of care. Health Technology Assessments (HTA) at a national level were first introduced in 1995 to guide subsidy and policy decisions on emerging health technologies. Clinical Practice Guidelines were published since 1999 to reduce variations in clinical decision-making by providing standardised best practice recommendations.

The Agency for Care Effectiveness (ACE) was established in 2015 as the national HTA and clinical guidelines agency. Its four-fold mandate covers (i) the systematic evaluation of health technologies such as drugs, vaccines, gene therapy, and medical technologies using established HTA methods; (ii) development and publication of evidence-based ACE clinical guidances (ACGs) to inform specific areas of clinical practice; (iii) continuing professional education on evidence for clinical decision-making through professional engagements; and (iv) creation of training and education materials for healthcare consumers to improve health literacy and facilitate shared decision-making between healthcare professionals and patients.

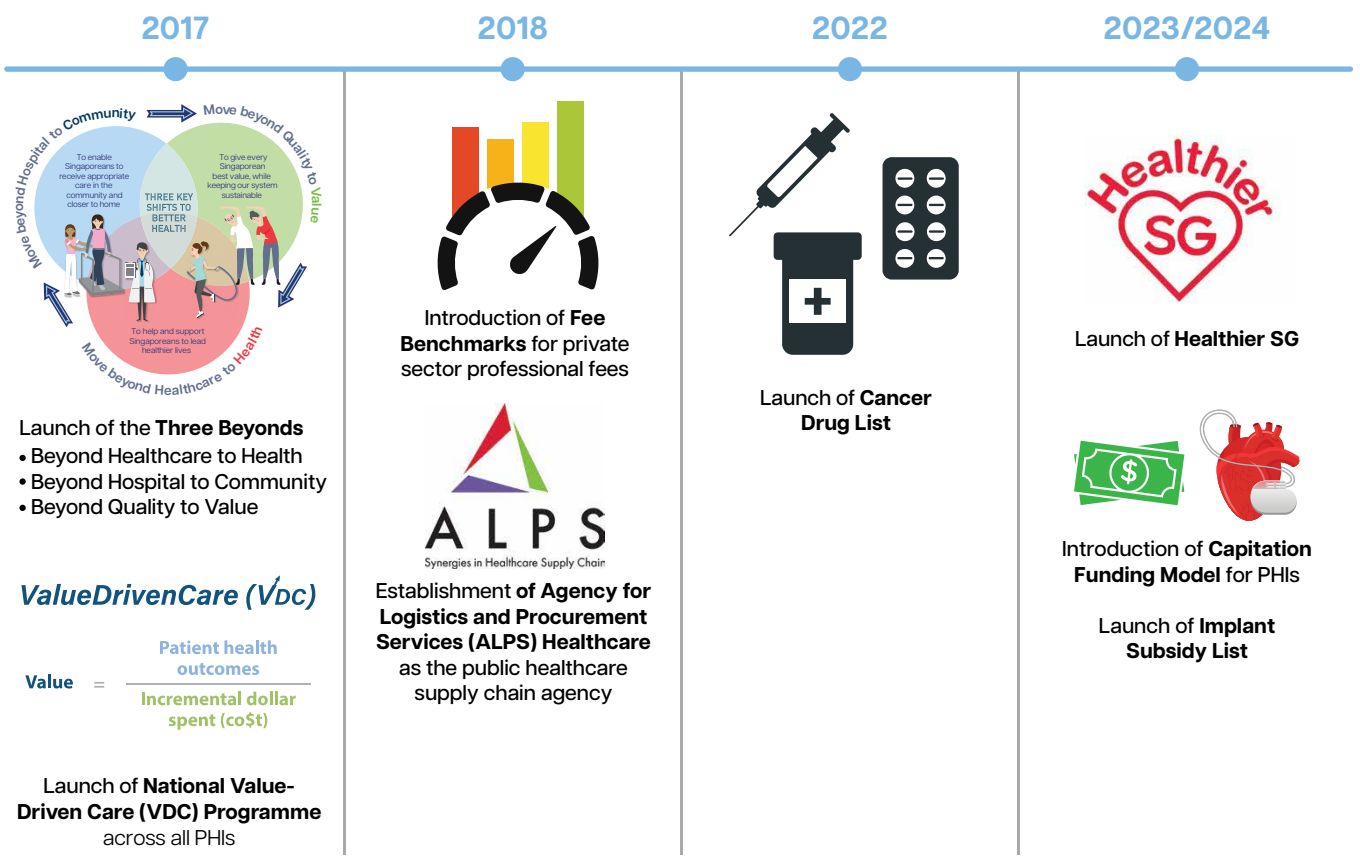


Figure 1.5 Major milestones of Singapore's value journey

The Three Beyonds

In 2017, the Ministry of Health launched its "*Three Beyonds*" strategy: *Beyond Healthcare to Health, Beyond Hospital to Community, Beyond Quality to Value*. This strategy outlined efforts to transform healthcare delivery whilst remaining true to its core mission of delivering quality and accessible care for Singaporeans. The inclusion of the third 'Beyond'—Beyond Quality to Value — elevated healthcare sustainability as a national priority while advocating a value-based ethos as a strategic path forward, not only for the Ministry but also for the public healthcare sector. The advent of value-based care as a national priority has catalysed the establishment of various workstreams and organisations aimed at strengthening our healthcare system's ability to create more value for patients.

National Value-Driven Care (VDC) Programme

As a key driver of healthcare costs, acute hospitals were an early focus of value-based initiatives. In 2015, the National University Hospital (NUH) first employed value-based methodologies and, within 2 years, had demonstrated improvements in outcomes and costs for the initial 14 conditions. This led to the adoption of this methodology at a national level.

In 2017, the Ministry introduced the National Value-Driven Care (VDC) programme, leveraging existing hospital-based, value-based programmes to create a shared platform to better understand clinical performance variations across acute public hospitals. This platform uses standardised and transparent benchmarking of clinical quality performance and costs to encourage discourse on best practices among clinicians, tackle performance variations, and drive improvements in performance and cost.

To date, 19 medical and surgical conditions have been subjected to the VDC methodology. Collective improvements in clinical performance have led to 22,493 bed days saved, arising from 5,404 cases with shorter lengths of hospital stays, 651 readmissions, and 547 complications averted. In addition, there were 512 deaths, 774 blood transfusions, and 1,755 re-operations averted.

Cumulative improvement in CQI scores improved care for 6,370 cases

1	2	3	4	5	6	7
Inpatient Mortality Averted	**Blood Transfusions Averted**	**Re-operations Averted**	**Shorter Length of Stay**	**Re-admissions Averted**	**Other Complications Averted**	**Total Bed Days Saved**
512 more lives saved	**774** cases averted	**1,755** cases averted	**5,404** cases discharged earlier than LOS targets	**651** cases re-admissions averted	**547** more cases without complications	**22,493** days = ~S$22M saved *assuming 80% BOR, S$1,000 per bed day

*Cumulative from year 2017 to 2023, based on VDC 16 conditions: AMI (Stemi), CAP (Adult, Geriatric & Paeds), CHF, Ischaemic Stroke, CABG, Caesarean Section, Colorectal Resection, Haemorrhoidectomy, Hernia Repair (Adults & Paeds), Hysterectomy, Laparoscopic Cholecystectomy, Spinal Fusion, Total Hip Replacement, Total Knee Replacement, Tonsillectomy (Adults & Paeds), Breast Cancer Surgery (Mastectomy)

The Regional Health System comprises of three Clusters: the National University Health System, the National Healthcare Group, and the Singapore Health Services. Each Cluster has expanded on its foundational VDC programmes. The National University Health System (NUHS) has deployed the VDC framework in more than 80 projects, across all its institutions, from primary to quaternary care. This Cluster-wide approach has allowed benchmarking between institutions and sharing of best practices. Coupled with this, NUHS is focused on reducing unnecessary diagnostic tests, optimising medication use, and ensuring patient centricity through the use of Patient Reported Outcome Measures (PROMs) and Patient Reported Experience Measures (PREMs). Furthermore, in combination with the Yong Loo Lin School of Medicine (YLLSOM), NUHS has introduced teaching modules on the fundamentals of AVBC principles to Singapore's future clinicians. The National Healthcare Group (NHG) has employed a horizontal, population-health approach to its VDC conditions such as Diabetes and Mental Health care delivery, developed a systematic approach in the collection of PROMs where data is shared across institutions via the EMR to aid point of care conversations, and started a value-based payment and incentive pilot with the Voluntary Welfare Organisations (VWOs). Singapore Health Services (SHS) has expanded its implementation of the VDC methodology to encompass 44 more conditions, including dental care. By adopting the 'One SingHealth' approach, SHS has effectively driven cross-setting VDC programmes. Additionally, SHS has broadened the scope of their VDC efforts to emphasise a value-based approach through the 'Choosing Wisely' initiative.

MOH Fee Benchmarks

Since 2018, MOH has progressively published fee benchmarks for doctors and hospital fees in the private sector. These benchmarks inform the reasonable range of fees that patients and insurers could expect to pay for routine and typical cases, and serve as a reference for doctors and hospitals in setting their fees. To date, the Ministry has published approximately 2,180 surgeon fee benchmarks and 550 anaesthetist fee benchmarks for procedures on the Table of Surgical Procedures (TOSP), 29 hospital fee benchmarks, and doctors' inpatient attendance fee benchmarks.

Enhancing Efficiency Through Centralised Procurement and Logistics

Established in 2018, the Agency for Logistics and Procurement Services (ALPS) supports the Ministry's value enterprise by consolidating resources and functions across Clusters. In addition to its core mission of ensuring resilient supply chains, ALPS aims to achieve better value through collective procurement of drugs, medical and non-medical supplies, and equipment across the public health sector.

Establishing the Cancer Drug List for MediShield Life and MediSave Claims

In 2022, Singapore took a significant step towards improving cancer care accessibility by making treatments under the Cancer Drug List (CDL) recommended for subsidy claimable under MediShield Life (MSHL) and MediSave. HTA was employed to evaluate and select treatments for inclusion in the CDL. The CDL also impacts private sector healthcare providers and insurers, shaping their prescribing patterns and reimbursement practices. This ensures alignment with AVBC principles by promoting evidence-based, cost-effective treatments across both public and private sectors.

Strengthening Population Health via Capitation Funding

The Ministry has progressively moved towards a population health approach, leveraging the geographical reach of Clusters. Healthier SG was launched in 2023, with Clusters assuming responsibility for the health of Singaporeans within their geographical jurisdictions and placing greater emphasis on preventive care. By keeping the population healthy or providing proactive health management, demands on the healthcare system can potentially be moderated.

To support Healthier SG, capitation funding was introduced in 2023. This funding model provides a fixed budget per individual within a Cluster's jurisdiction and is intended to promote efficient resource use by healthcare providers, including focusing on upstream preventive care. Capitation funding, together with existing funding models such as bundled payments—where providers are funded per expected care episode instead of detailed line expenditures and workload—further promotes clinical and fiscal prudence when deploying health services.

Establishing the Surgical Implant Subsidy List

Implemented in 2023, the Ministry and ACE launched the Implant Subsidy List to enhance the affordability and accessibility of clinically effective and cost-effective surgical implants for patients. Implants on the list are eligible for higher government subsidies without a dollar cap. This promotes the selection of implants that provide the best value for patients and encourages manufacturers to offer competitive pricing.

CRITICAL INFLECTION POINT FOR A NATIONAL VALUE-BASED CARE MOVEMENT: APPROPRIATE AND VALUE-BASED CARE (AVBC)

Singapore has reached a pivotal juncture to maximise the benefits of a unified, national value-based care movement. This opportunity stems from a convergence of factors, particularly stakeholder alignment and the momentum for change.

Key stakeholders, including policymakers and PHIs, now recognise the need for value-based care. This alignment fosters coordinated implementation and shared accountability across the healthcare ecosystem, ensuring support and collaboration for national initiatives.

The groundwork laid through the Three Beyonds and various national initiatives has demonstrated varying levels of success in improving outcomes, operational efficiency, and cost savings. These early wins have built confidence among stakeholders and showcased the tangible benefits of value-based care, paving the way for scaling efforts nationally to achieve transformative and sustainable change.

Together, stakeholder alignment and existing momentum present a unique and timely opportunity for the Ministry to promote a holistic approach through Appropriate and Value-Based Care. It is therefore imperative to articulate the Ministry's vision for Appropriate and Value-Based Care, its core principles, and what it hopes to achieve in the next five years.

2 Definition, Core Principles, and Key Elements of Change

Appropriate and Value-Based Care (AVBC) is envisioned as a national movement that aspires to redefine how healthcare is delivered in Singapore. AVBC prioritises the delivery of evidence-based practices while avoiding over-, under-, and misuse of healthcare interventions. Its overarching goal is to enhance patient-relevant health outcomes while ensuring that Singapore's public healthcare system remains resilient and sustainable.

AVBC is more than just a national strategy or initiative. It serves as both a default guiding philosophy in the provision of care across all levels of the healthcare system, and as a practical framework. This framework can be applied when formulating national policies, designing and evaluating point-of-care services or programmes, or assessing health technologies. Where applicable, AVBC principles should inform decision-making at the national, local, and front-line services to assess whether results are likely to justify the efforts and resources invested.

CORE PRINCIPLES OF AVBC

The desired outcomes for AVBC can be described in the five core principles of AVBC (Figure 2.1), namely:

Figure 2.1 Five core principles of AVBC

Care is evidence-based: Care decisions are based on the best available, scientifically validated data. Standardised care decisions reduce variability in clinical outcomes.

Care is patient-centred: Care is designed with the patient's treatment goals in mind. Patient-centredness promotes patient activation through access to timely information and/or shared decision-making.

Care is right-sited: Care is delivered in the most appropriate setting, balancing patient needs and cost-efficiency.

Care is integrated and coordinated: Care is delivered in an organised manner that avoids duplication or overlaps in care.

Care is cost-effective and sustainable: Data is collected and analysed for the objective assessment of cost-effectiveness. Resource management decision-making is primarily guided by the desired value it generates (i.e., desired clinical and cost outcomes).

KEY ELEMENTS OF CHANGE

Achieving a culture of AVBC across the healthcare ecosystem requires a concerted and sustained effort involving the Ministry, healthcare institutions, and professionals. This journey begins with a shared understanding of AVBC's definition, core principles, and desired outcomes. To achieve this end state, several key elements of change have been identified.

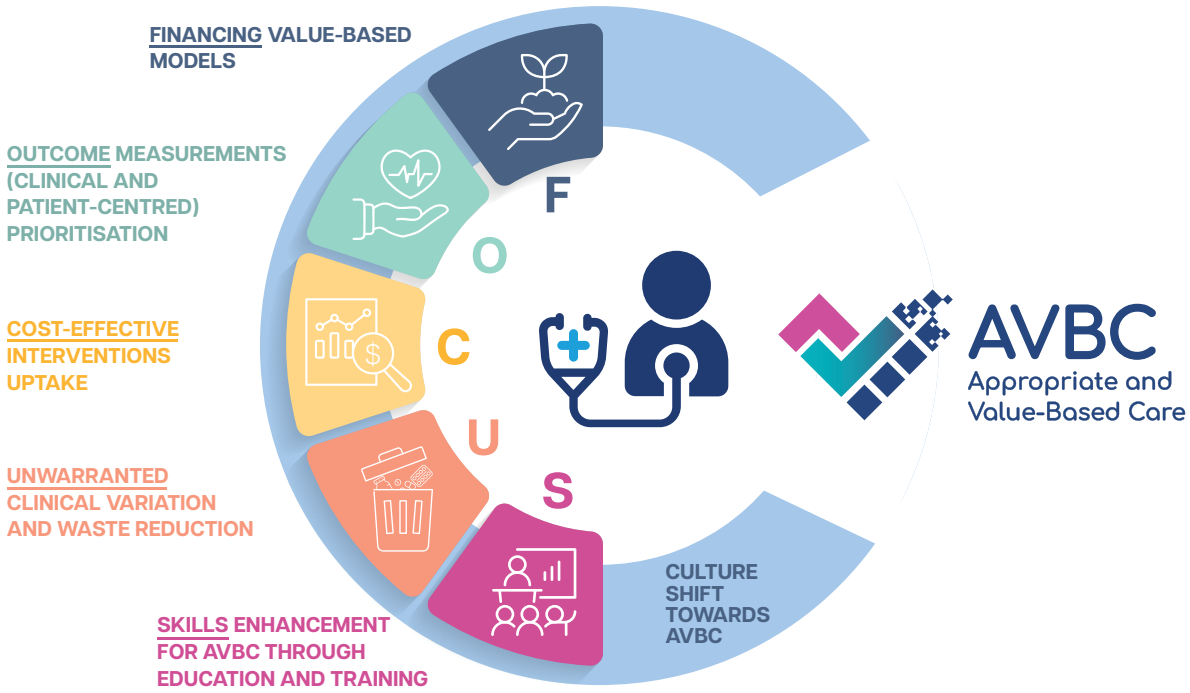


Figure 2.2 Key Elements of Change

(F)inancing Value-Based Models

Value-based financing systems are instrumental in transitioning healthcare from a volume-driven to outcome-focused system. Value-based financing aligns payment with patient outcomes, encouraging providers to deliver high-quality, cost-effective care. By tying reimbursement to outcomes that matter to patients, these models encourage collaboration among different healthcare providers and specialties. Value-based financing models can also drive innovation and continuous improvement in healthcare delivery and administrative processes. As providers are rewarded for achieving better outcomes at lower costs, they are motivated to find new, more efficient ways of delivering care. Currently, the move towards capitation funding for Clusters is a step towards a value-based financing system.

Desired Outcome: Financing systems must support and incentivise clinical and patient-centred outcomes over traditional volume-driven outcomes. This should not only operate at the national level, such as through capitated budgets or bundled payments, but also cascade to the Cluster level where funding disbursement incentivises value-based care, ensuring accountability for outcomes. At the healthcare institution or even departmental levels, quality-based remunerations can encourage efficiency, collaboration, and quality improvement.

(O)utcome Measurements (Clinical and Patient-Centred) Prioritisation

Achieving AVBC necessitates the rigorous and systematic measurement of both clinical outcomes (such as recovery or complication rates) and patient-centred outcomes (encompassing quality of life, care experience, and functional improvements). This dual focus ensures that care delivery aligns with clinical effectiveness and patients' priorities. Currently, our healthcare system remains predominantly focused on healthcare service utilisation data, with limited or fragmented efforts to track clinical and patient-centred outcomes. Patient-centred metrics such as Patient-Reported Outcome Measures (PROMs) and Patient-Reported Experience Measures (PREMs) are generally underdeveloped and inconsistently implemented.

Systematic measurement of these outcomes enables healthcare providers to align care delivery with what matters most to patients while identifying areas for improvement. Furthermore, robust outcome data enables benchmarking, fosters transparency, and supports evidence-based decision-making. This holistic approach ensures that care is not only clinically effective but also meaningful and impactful from the patient's perspective, thereby driving value generation and sustainability of the healthcare system.

Desired Outcome: Healthcare providers must take deliberate steps towards identifying and implementing the appropriate clinical and patient-centred metrics. Providers must systematically measure, collect, and analyse such data, integrating this into their routine care delivery process. Internal reporting systems should be established to promote accountability and drive improvements, enabling a shift from volume-based care to a truly value-based healthcare system.

(C)ost-Effective Interventions Uptake

The sustainable use of health technologies is key to achieving AVBC, in particular their integration into clinical practice. Currently, assessments of health technologies for funding decisions are conducted nationally via the Agency for Care Effectiveness (ACE). In contrast, HTA capabilities at the Clusters or PHIs are less mature and limited to the evaluation of new health technologies within their own jurisdictions. Nonetheless, leveraging this dual approach can accelerate the uptake of clinically- and cost-effective interventions, maximising the value of healthcare.

Desired Outcome: To more aggressively pursue the use of interventions that are most clinically- and cost-effective, as evaluated at the national and hospital level. Clusters or PHIs can develop their own processes for assessing new technologies and prospectively measuring their appropriateness, effectiveness, and cost-effectiveness. At both national and local levels, policies and evaluation frameworks need to be refined to gatekeep the entry and use of high-cost technologies. Additionally, healthcare providers' procurement and prescribing practices should take into consideration the cost and subsidy status of health technologies. Strengthening early awareness and reassessment processes is also crucial, to prevent entrenchment of ineffective technologies and to facilitate disinvestment of low-value technologies.

(U)nwarranted Clinical Variation and Waste Reduction

Reducing clinical variation and waste is pivotal to achieving AVBC, as unwarranted variability often results in suboptimal outcomes and unnecessary costs. By standardising evidence-based best practices and care pathways tailored to the local context, healthcare systems can ensure consistent care delivery while eliminating redundant or low-value interventions. This approach not only enhances patient safety and outcomes but also optimises resource utilisation, enabling reinvestment in high-impact areas. Currently, efforts to address clinical variations via the National Value-Driven Care (VDC) Programme are limited to 18 conditions, presenting an opportunity to tackle other high volume, high-cost interventions in several medical and surgical disciplines. Moreover, care pathways should encompass all stages of the care journey, not just acute episodic care. A systematic approach to identifying, addressing, and monitoring clinical variation via methodologies such as VDC will foster greater accountability, facilitate best practice learning, and drive continuous improvement in care quality.

Desired Outcome: Reducing clinical variation and waste requires the development and implementation of evidence-based guidelines and standardised care pathways in any of the medical and surgical specialties available. These pathways should reflect real-life patient care journeys at an episodic intervention level (e.g., acute surgical/medical interventions), in chronic care that requires multi-disciplinary teams to allow for continuous integrated care within a healthcare provider, and at an end-to-end patient journey that includes the seamless transition from diagnosis in primary care, to care in acute care settings, management in the community, and even support for end-of-life care. Internal reporting systems should be established to identify deviations and inefficiencies. These should be coupled with targeted interventions such as professional education, process redesign, and decision support tools to eliminate low-value practices.

(S)kills Enhancement for AVBC Through Education and Training

Building capacity in value-based care requires a workforce well-versed in its principles, practices, and tools. Strengthening education and training equips healthcare professionals with the knowledge and skills to deliver patient-centred, outcome-driven care. Healthcare professional education and postgraduate training should incorporate AVBC principles, promote interdisciplinary collaboration, emphasise cost-effectiveness, and encourage the use of data for decision-making. Additionally, fostering a shared understanding of value-based care among stakeholders—including clinicians, administrators, and policymakers—ensures cohesive and aligned efforts towards its implementation.

Desired Outcome: A new generation of healthcare providers practising AVBC principles as foundational to their work, on par with the clinical knowledge they acquired during their education and postgraduate training. AVBC principles, such as prioritising patient-centred outcomes, aligning care with value-driven metrics, utilising data analytics, and managing healthcare resources efficiently, should be treated as core competencies similar to clinical expertise, through integration into medical education and professional development programmes.

(C)ulture Shift Towards AVBC

Embedding value-based care in the culture and behaviour of healthcare organisations is essential for sustained transformation. This involves fostering a mindset that prioritises patient outcomes, efficiency, and continuous improvement. Leadership must champion value-based principles, integrating them into organisational goals, policies, and practices.

Desired Outcome: Healthcare leadership must ensure that AVBC principles are embedded into the mission, policies, and operational strategies of their respective organisations, with leadership actively championing these principles. This should be achieved through organisational integration such as implementing measures that promote value-based practices, developing training programmes, establishing recognition systems, and performance-based incentives tied to measurable outcomes. Leadership should also promote AVBC self-assessments that incorporate key indicators such as patient-centred care, integrated care delivery, and appropriate care setting allocation to evaluate all relevant programmes and projects. This approach will enable providers to make informed decisions regarding the continuation or discontinuation of current clinical practices and new programmes, based on their alignment with AVBC principles and demonstrated value. Leadership must foster a culture of accountability and shared commitment to AVBC principles across all levels of the organisation, ensuring that staff, clinicians, and administrators internalise these values in their daily work. At the national level, there should be coordinated campaigns and platforms that foster knowledge sharing, inspire trust and motivation, and showcase the benefits of AVBC while enabling collaboration across the Ministry, healthcare providers, and patients.

3 Improving Clinical Outcomes by Tackling Unwarranted Variations

Persistent unwarranted variations in clinical care, costs, and patient outcomes highlight missed opportunities to optimise health outcomes, allocate resources effectively, and enhance patient-centred care. For patients, it manifests as uneven adherence to scientific evidence and inconsistent outcomes. For health systems, these translate into avoidable costs and inefficiencies, creating further strain on limited resources.

Tackling these variations is not merely an operational imperative but a strategic one. Central to this effort is the adoption of tools or methodologies that demonstrate patterns of variations and provide actionable insights for improvement. These include adopting standardised clinical care pathways and benchmarking clinical and cost outcomes. This allows for care to be consistent, outcome-focused, and patient-centred for all involved in the delivery of care.

PROMOTING BEST PRACTICES AND REDUCING CLINICAL WASTE THROUGH THE VDC METHODOLOGY

The Ministry's set of 19 VDC conditions under its National VDC Programme comprises a mix of acute surgical and medical interventions. These conditions and their attendant interventions represent high volume, high impact conditions from the national perspective. VDC employs standardised clinical quality indicators and harmonised cost line items incurred during a patient's care experience to define the "value" of a particular intervention.

(I) Extending the Current VDC Programme

The current form of the National VDC programme represents the initial step in realising the full potential of AVBC. Extending the scope of VDC beyond these conditions to tackle high utilisation interventions in other medical and surgical disciplines is critical to embedding the AVBC mindset across the healthcare profession in different care settings and across different specialties. Where possible, all Singapore-recognised clinical specialities and subspecialties should establish at least one centrepiece VDC programme that addresses persistent areas of variation within its domain. Conditions prioritised for future inclusion in the VDC programme should be based on disease burden, high utilisation, and high opportunity for improvement (High Opportunity Index).

This extension of the VDC programme can occur at various levels. The National VDC Programme will continue to deploy VDC methodology in areas of national priority. Alternatively, Clusters, hospitals, or even specialty-led organisations like the Academy of Medicine can take the lead

in developing VDC initiatives tailored to their own unique needs and context. Collectively, this two-pronged approach will allow for more widespread adoption of AVBC across a broad range of disciplines and catalyse the adoption of AVBC principles in the delivery of everyday care and decision-making.

(II) Expanding the Current VDC Programme

The journey towards fully integrating VDC methodology with care delivery requires an evolution from focusing on discrete episodes of care to encompassing comprehensive patient journey pathways. This expansion reflects the growing recognition that while the current VDC methodology has been instrumental in identifying unwarranted variations in outcomes and cost, it falls short of addressing the complexities of chronic or multifaced conditions. This progression can be illustrated from the current Model 1 to two other models to encompass an "end-to-end" approach to care delivery.

Model 1: VDC for Acute Surgical/Medical Interventions

Focus: Targeted, discrete episodes of care related to a single acute intervention.
Accountability: The Surgeon/Physician in Charge

In this current model, the **primary physician or surgeon** assumes accountability for delivering optimal outcomes. As the lead decision-maker, they are responsible for coordinating care during the acute episode, implementing standardised protocols, and ensuring evidence-based practices to achieve value.

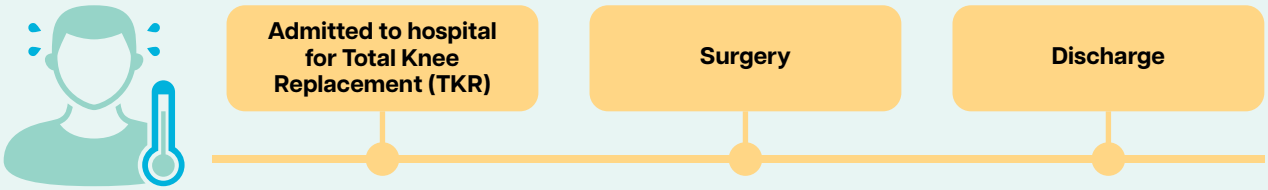


Figure 3.1 Illustration of VDC for acute surgical/medical interventions

Who is Accountable:
- Lead physician or surgeon overseeing the procedure or treatment
- Supporting clinical team (nurses, anaesthetists, pharmacists) under the physician's guidance

Rationale for Accountability:
- The acute intervention is short, well-defined, and highly dependent on the expertise and precision of the physician/surgeon.
- Clinical and procedural decisions directly impact patient outcomes, recovery times, and costs.

Illustration: In a total knee replacement, the surgeon is accountable for performing the procedure safely, minimising complications, and ensuring adherence to post-operative rehabilitation protocols. The surgeon leads outcome tracking such as functional scores and complication rates, optimising cost-efficiency in the operating room and post-operative care.

Model 2: VDC with Multidisciplinary Team Intervention

Focus: Conditions requiring team-based care from multiple specialists in an acute care setting.
Accountability: The Hospital Multidisciplinary Team (MDT)

In this model, accountability lies with the **multidisciplinary team (MDT)** responsible for coordinating and delivering integrated care. The MDT works collaboratively, ensuring each specialist contributes to the shared goal of optimising patient outcomes while managing costs.

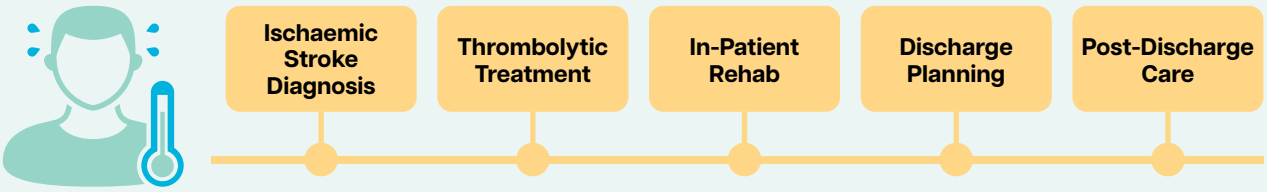


Figure 3.2 Illustration of VDC with multidisciplinary team intervention

Who is Accountable:
- Hospital-based MDT, typically led by a team coordinator or lead physician
- Lead physician and supporting staff (nurses, case managers)

Rationale for Accountability:
- Acute conditions require seamless collaboration between disciplines to achieve comprehensive, patient-centred outcomes.
- Teams share responsibility for performance metrics such as survival, recovery rates, and quality of life.

Illustration: For stroke care, the MDT includes emergency medicine physicians, neurologists, radiologists, and rehabilitation specialists. The team is collectively accountable for outcomes like survival rates, reduced complications, functional status, and patient satisfaction. Cost efficiency is ensured by reducing redundancies, optimising resource use, and coordinating timely interventions.

Model 3: End-to-End VDC Across the Patient Journey

Focus: Integrated care across the full patient journey, from diagnosis at primary care through acute care, rehabilitation, and community care. End-of-life care can also be covered.
Accountability: Clusters and related Institutions across the Care Continuum

In this comprehensive model, accountability is shared by the **healthcare providers within each Cluster**, spanning primary care, secondary/tertiary care, and community-based services. Integrated governance structures ensure continuity, efficiency, and quality of care across the patient's journey.

Who is Accountable:
- Clusters or integrated networks that include hospitals, primary care providers, community health teams, and rehabilitation centres
- Clinical leads for specific conditions who oversee care transitions and outcome measurement across settings
- Care coordinators and case managers who ensure seamless transitions across care levels

Rationale for Accountability:
- Managing long-term conditions requires coordination across multiple care settings, including prevention, acute intervention, and ongoing management.
- Accountability must span beyond a single provider to include all institutions involved in the patient's care continuum.

Illustration: For chronic heart failure (CHF), accountability is shared among primary care providers (early detection and disease management), tertiary hospitals (intervention for decompensation episodes, complications) and community health teams (maintenance management, lifestyle support, and monitoring). The Clusters ensure integrated care pathways, track long-term outcomes, and optimise costs across the patient's lifetime.

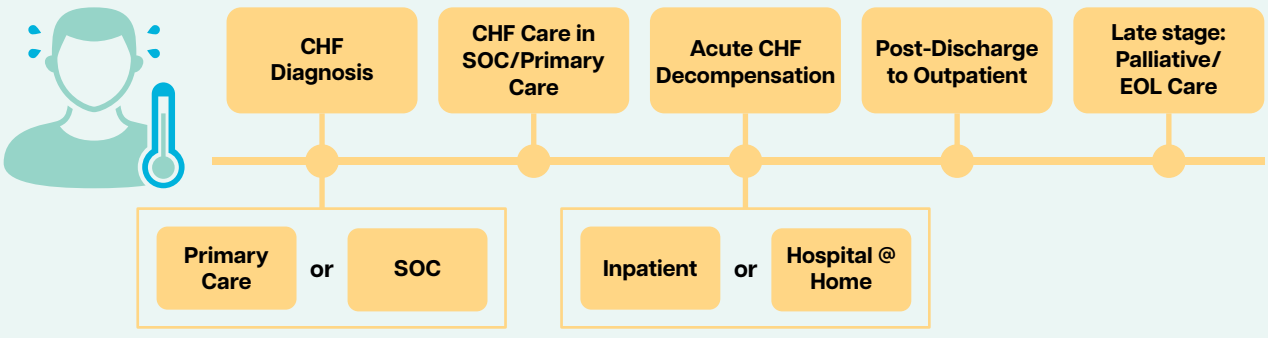


Figure 3.3 Illustration of end-to-end VDC across the patient journey

RATIONALISING AND ALIGNING VALUE-DRIVEN CARE MODELS

These three models described—focused on acute surgical/medical interventions, multidisciplinary team-based care, and end-to-end patient journey care—are designed to be mutually exclusive in their conceptual framework, each addressing distinct healthcare scenarios and levels of complexity (Table 3.1). However, in practice, various permutations or hybrid approaches of these models can be developed to suit the organisation's current capabilities, evolving needs, and future goals. For example, integrating elements of multidisciplinary team care with end-to-end management may be necessary in complex cases like stroke rehabilitation or chronic disease management. Accountability for outcomes will correspondingly lie with the appropriate entity—whether it is the lead clinician, a multidisciplinary hospital team, or a broader healthcare Cluster—ensuring that responsibilities are aligned with the model's scope and the resources mobilised to deliver care.

Table 3.1: Summary of Accountability Across the Models

Model	Scope	Focus	Accountable Party
Model 1: Acute Intervention	Short-term, single episode	Specific medical/surgical event in an acute care setting	Surgeon/Physician in Charge
Model 2: Multidisciplinary Teams	Shorter to medium-term, team-based	Integrated care for complex cases in an acute care setting	Hospital Multidisciplinary Team
Model 3: End-to-End Care	Long-term, comprehensive	Full care continuum across various care settings	Clusters and related Institutions

4 Accelerate the Uptake of Cost-Effective Interventions

Due to rapid medical advancements, a deliberate and structured approach is essential for integrating new health technologies into clinical practice. This involves balancing clinical effectiveness, patient safety, and cost-efficiency while ensuring the use of specific advanced technologies aligns with national healthcare priorities and institutional capabilities.

A comprehensive health technology lifecycle approach supports this integration by embedding AVBC principles at every stage—from early horizon scanning to full adoption and eventual reassessment (Figure 4.1). This structured approach ensures that health technologies are adopted responsibly by enabling healthcare institutions to make evidence-based decisions, optimising patient outcomes while ensuring sustainable resource use.

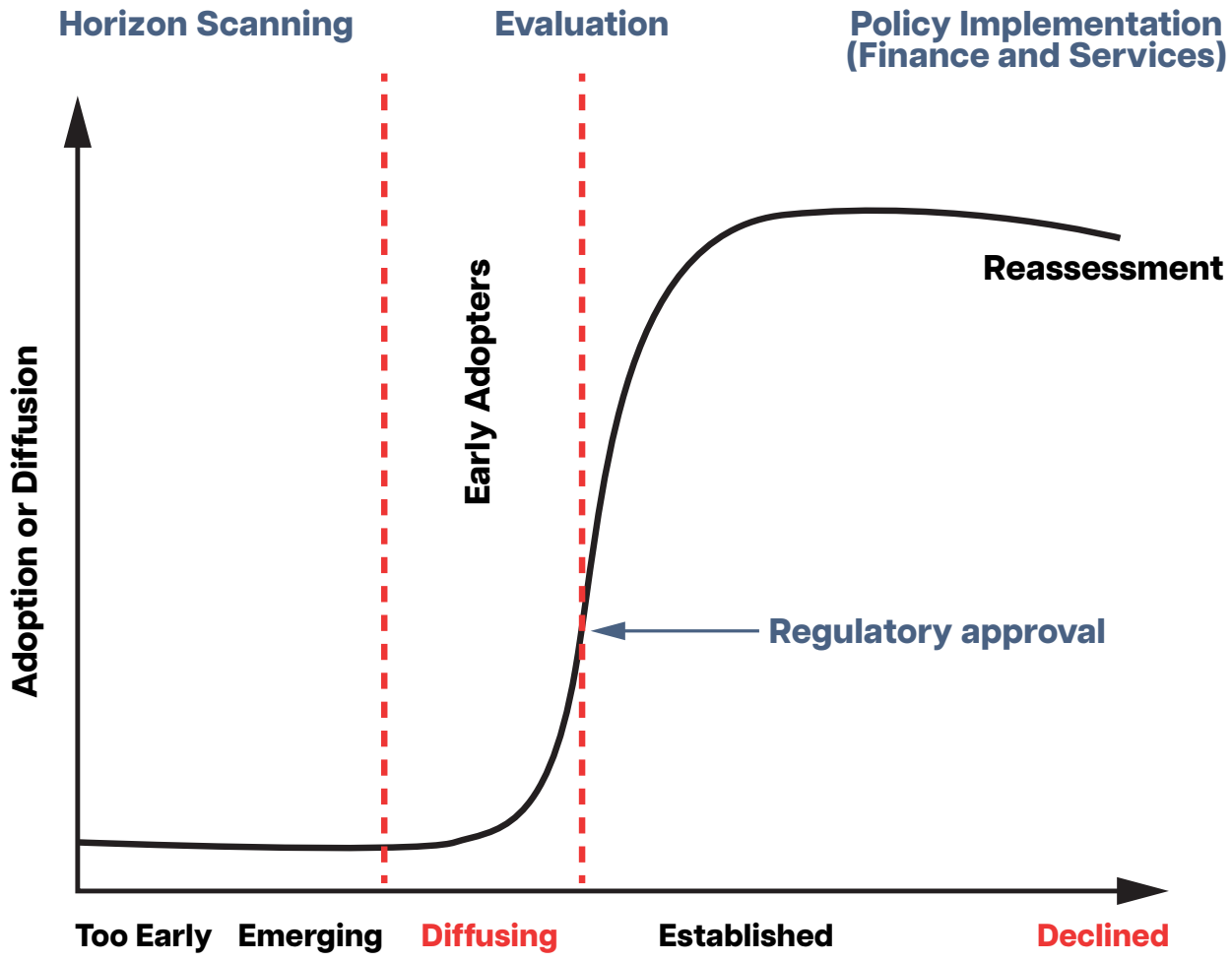


Figure 4.1 Stages of a health technology lifecycle

HORIZON SCANNING

Horizon scanning (HS) involves the systematic identification of emerging technologies and trends that could significantly impact healthcare delivery. This early awareness enables healthcare stakeholders to anticipate advancements and proactively plan for technologies with high potential for improving clinical care and system efficiency.

ACE's HS process[4] provides early insights into technologies that may require substantial planning, resources, or training. ACE's HS reports also flag technologies deemed low value to prevent unnecessary integration and adoption in the PHIs. Clusters must use these reports to guide procurement and service planning. PHIs should avoid subsidising flagged low-value technologies before formal funding decisions are made.

EARLY ADOPTION

Early adoption applies to health technologies with preliminary evidence of safety, clinical effectiveness, and cost-effectiveness, and may require additional regulatory, ethical, and economic considerations before integration into clinical settings. These technologies are primarily suited to clinical research environments, where their use can be closely monitored. In some instances, these may be used on a name-patient basis if the benefits for an individual patient are deemed to outweigh the risks.

A critical safeguard to early adoption is the Constrained Use Framework (CUF). The CUF applies specific conditions on new health technologies or procedures before they are introduced into mainstream clinical care. The requirements include informed patient consent, collection of clinical data for safety and efficacy monitoring, and review of cost data for subsequent cost-effectiveness analysis. At the end of the stipulated timeframe (e.g., three years), the health technology or procedure will be assessed to determine its potential to be mainstreamed. Additional conditions may also be imposed via the Healthcare Services Act (HCSA) for greater regulatory oversight of private healthcare institutions. Potentially, a more proactive approach is needed to identify novel technologies for inclusion under CUF.

Another initiative to gatekeep the entrance of new and existing high-cost technologies into the PHIs is the High-Cost Technology Framework (HCTF). Under this existing framework, HCTF requires proposals to also project operating expenditure (OPEX), though this is currently not taken into consideration for decision-making. Inadvertently, there could be novel technologies with capital expenditure (CAPEX) lower than S$1.5 million (e.g., due to rental model) but with high budget

[4] ACE's HS scope encompasses a broad range of health technologies, including but not limited to medical devices, diagnostics, digital health technologies, medical services, and procedures. 'New and emerging health technologies' refer to those in the early stages of their product lifecycle, prior to widespread diffusion in the local healthcare system. In the Singaporean context, this may include technologies not yet registered with the Health Sciences Authority (HSA) or those not yet widely adopted locally.

impact (e.g., robot assisted surgery) which would still require MOH's review before being used by PHIs. There is scope to review the cost thresholds and include OPEX considerations to prevent underestimating cost and workload assumptions that bypassed HCTF evaluation.

Where HTA, including cost-effectiveness analysis, is required, such technologies could be put forward for evaluation by MOH. However, as a matter of cost discipline, PHIs should first conduct their own cost-effectiveness evaluations before presenting proposals to MOH under the HCTF.

HEALTH TECHNOLOGY REGULATION

Regulatory approval, overseen by the Health Sciences Authority (HSA), is essential before any technology can be marketed or used in patient care. The HSA's comprehensive regulatory framework, which spans from pre-market evaluation to post-market surveillance, ensures that technologies meet stringent safety, quality, and efficacy standards. This approach effectively balances innovation whilst safeguarding public health.

INTRODUCTION AND APPROPRIATE USE IN HEALTHCARE INSTITUTIONS

The integration of health technologies into routine clinical practice must be appropriate following regulatory approval. Ensuring appropriate use includes minimising overuse, underuse, or misuse. Initiatives to promote appropriate and cost-effective adoption include the HCTF, establishing governance committees, and creating institutional drug formularies or implant lists aligned with national subsidy recommendations. Additional measures involve developing guidelines and clinical protocols around the selection of health technologies, decision-support tools, and utilisation monitoring reviews. These reviews leverage registries, electronic health records, and dispensing data to capture the technology's impact on clinical outcomes and healthcare efficiency. Patient education about health technologies is also important so that they are clearly informed about the benefits and risks of the technology, ensuring its proper utilisation.

Governance and Oversight Committees in PHIs

Pharmacy and Therapeutics (P&T) committees in PHIs play a vital role in determining and managing institutional formularies and ensuring appropriate use of drugs. They conduct evidence-based reviews for formulary listing decisions. In some institutions, P&T committees collaborate with clinical departments or expert advisory groups to develop clinical pathways and restrictions, ensuring drugs are used for appropriate indications or populations. At the national level, the National

Pharmacy & Therapeutics (NPT) Committee advocates and promotes the use of evidence-based, safe, and cost-effective medicines in PHIs. This has achieved promising results, for example, the utilisation rate of generics and biosimilars exceeded 80% resulting in S$31 million of savings to patients and the healthcare system in 2022 (Annex 4.1).

In 2014, MOH recommended PHIs to establish Medical Device Committees (MDCs) to drive appropriate utilisation of medical devices and implants. A recent landscape study showed varied maturity levels across PHIs' MDCs, suggesting areas for further standardisation and improved adoption practices for cost-effective implants on the Implant Subsidy List (ISL).

HEALTH TECHNOLOGY ASSESSMENT (HTA)

Health Technology Assessment (HTA) is an established scientific research methodology to inform policy and clinical decision-making on the relative value of new health technologies, such as drugs, devices, and medical services, compared to existing standards of care. HTA uses analytical frameworks, drawing on clinical, epidemiological, and health economic information to determine how best to allocate limited healthcare resources.

ACE conducts HTA to inform value-based pricing (VBP) negotiations and funding decisions by MOH advisory committees. Recommendations for MOH's financing support are made in line with a specific decision-making framework that considers four core criteria based on the available evidence: (a) clinical need of patients and nature of the condition; (b) clinical effectiveness and safety of the technology; (c) cost-effectiveness; and (d) estimated annual cost and the number of patients likely to benefit from the technology. When conducted upstream in parallel with regulatory evaluations, HTA can help prevent the entrenchment of low-value health technologies into routine clinical care. Additionally, ACE partners with ALPS to drive strategic procurement of clinically effective and cost-effective health technologies. ACE's negotiated prices are contractually locked in with the companies, preventing them from bidding for higher prices when submitting tenders to ALPS for national contracting of drugs and medical devices for the PHIs.

Subsidy recommendations, the MOH advisory committees' rationale for their decision, and a summary of the key clinical and economic evidence are published in technology guidances on ACE's website, enhancing transparency of decision-making and guiding appropriate prescribing behaviours. Plain English Summaries support patients and the public to increase health literacy and promote informed and appropriate use of health technologies. Inherently, HTA and health technology funding decision-making encompass and demonstrate the five core AVBC principles (Annex 4.2).

HTA evaluation framework and methods must evolve continually in tandem with medical

advancements to ensure that evaluations are relevant to decision makers and reflect local clinical practice and patient needs. For instance, given the rapid iterations and nature of digital health technologies (DHT), existing HTA evaluation frameworks applied for MOH's funding consideration will need adaptation. This includes assessing DHT-specific evaluation domains (e.g., data privacy, user acceptability, good data practices for AI-enabled DHT), setting evidence standards considering the general lack of high-quality evidence, and incorporating DHT-specific considerations into cost-effectiveness and budget impact analyses. ACE is currently developing a DHT evaluation framework in consultation with other established HTA agencies.

REASSESSMENT AND DISINVESTMENT

While HTA has primarily been used to govern the introduction and funding decisions for new health technologies, processes for monitoring their ongoing use and managing de-adoption remain less structured and standardised. Consequently, many technologies in use have not been reassessed since their initial adoption, potentially allowing ineffective or low value technologies to persist rather than being replaced by safer, more effective, and cost-effective alternatives.

To address this, governance and oversight committees within PHIs are encouraged to establish robust processes for continuous monitoring and reassessment. This involves regularly evaluating health technologies based on updated clinical and economic evidence, comparative effectiveness, and budgetary impact data.

When a technology is identified as offering minimal patient benefit, these evaluations should inform decisions about its phased withdrawal from routine use—a process known as disinvestment. Managed exit strategies should ensure continuity of patient care while enabling the healthcare system to reallocate resources towards more clinically- and cost-effective interventions.

By institutionalising reassessment and disinvestment practices, PHIs can improve healthcare outcomes, optimise resource allocation, and mitigate the escalating pressure on healthcare budgets. This approach aligns with the principles of AVBC, ensuring that innovative health technologies deliver maximum value while supporting sustainable, patient-centred care.

5 Propelling AVBC—Shift to Value-Based Financing Models, Developing Capabilities, and Cultural Transformation

TRANSITIONING TO VALUE-BASED FINANCING MODELS

The shift from traditional volume-based financing models, which rewards the quantity of services provided, to value-based models, which incentivise quality, outcomes, and cost-efficiency, has emerged as one of the fundamental enablers to address rising healthcare demand. However, the relationship between AVBC and value-based financing is symbiotic. AVBC principles drive the adoption of practices that align with value-based incentives, while the shift to value-based financing creates a financial and operational environment that promotes and embeds AVBC.

Starting with the public healthcare sector at the macro level, MOH has introduced capitation funding for PHIs. This initiative was implemented alongside Healthier SG to promote value-based resource allocation. Similarly, healthcare financing coverage (i.e., subsidies, Medisave, and MediShield Life) will be directed more towards treatments that are assessed to be both clinically- and cost-effective. Additionally, specific measures aimed at managing costs through a value-based approach are being targeted at the public sector, key growth areas, and the private sector. The subsequent sections outline the approaches which are being explored and/or implemented to drive these changes systematically.

(I) Meso level: Clusters and Healthcare Institutions

The Clusters play a crucial role in moderating cost growth to maintain sustainable healthcare expenditure over time. Moderating the growth of real unit cost (RUCG) and age-specific utilisation (ASU) must be undertaken at the system level. Clusters are also working to optimise staffing ratios to moderate growth in healthcare manpower demand and to conduct cost benchmarking to identify ways to reduce waste and inefficiencies. Additionally, MOH will continue collaborating with ALPS to harmonise procurement requirements across Clusters, achieving cost savings through national procurement levers.

Regarding healthcare infrastructure, ongoing scrutiny is essential to prevent unnecessary building specifications, promote standardisation in design and processes where possible, and ensure efficient material usage. These measures will aid in controlling construction costs, which have risen significantly since the COVID-19 pandemic.

(II) Micro Level: Programmatic or Condition-Based

Care delivery transformation will spawn pilot programmes designed to improve patient care, with a focus on specific medical conditions and patient groups. To optimise resource allocation, robust evaluation frameworks for these initiatives are essential. These frameworks will assess cost-effectiveness, informing decisions to scale up, maintain, or discontinue programmes. This approach ensures resources are directed towards the most effective interventions.

CULTIVATING AN AVBC-CENTRIC HEALTHCARE CULTURE

Developing a sustainable healthcare system that prioritises AVBC requires more than just policy shifts. It calls for a culture that embraces value-conscious thinking and a workforce equipped with the right skills and tools.

We have identified several key strategies to build a culture of value across all levels of the healthcare workforce—from students and academia to medical, pharmacy and allied health professionals, nursing staff, and policymakers. By investing in comprehensive training, establishing supportive frameworks, and recognising excellence in AVBC adoption, we aim to develop a strong, value-driven healthcare environment that benefits both patients and providers.

To achieve these goals, we outline three core areas of focus:

(I) Empower the Workforce Through Training and Education

The integration of AVBC principles into Singapore's healthcare education and training curricula for professionals is a pivotal step towards fostering a culture of patient-centred, value-based healthcare. We will start by achieving a foundational level of competency in AVBC principles among relevant stakeholders. Once this foundation is set, we will introduce higher levels of competency to ensure a gradual and sustainable integration of AVBC concepts into healthcare education. The implementation strategy adopts a phased approach (see Annex 5.1 for details).

(II) Enhance Programme Design and Assessment

Incorporating AVBC principles in programme design and assessment ensures that healthcare programmes focus on delivering patient-centric, appropriate care while maximising value through effective resource use.

Introduce AVBC Design (AVBC-D) Toolkit - MOH will develop an AVBC Design (AVBC-D) Toolkit aimed at equipping programme owners across MOH, Cluster headquarters, and healthcare institutions with the tools to incorporate AVBC principles in the design and development of healthcare programmes. The AVBC-D Toolkit features (a) a brief introduction to AVBC, (b) a self-assessment checklist, and (c) additional resources such as measurement examples. It will serve as a general resource for all programme owners to conduct thorough and regular self-

evaluations. Programme owners can use the user-friendly self-assessment checklist to evaluate if their programmes are aligned with the five core AVBC principles (outlined in Annex 5.2). Its simplicity and practicality aim to encourage widespread adoption so that AVBC principles can be consistently applied across all healthcare programmes' lifecycles.

Enhance MOH Programme Evaluation - MOH will also take the lead in ensuring MOH/SFRC-approved programmes incorporate AVBC principles. Programme owners must indicate and explain how their programmes meet AVBC principles, before they can receive SFRC or MOH funding. Hence, the enhanced SFRC budget application template and Programme Evaluation Framework[5] will include a section on AVBC principles and self-assessment checklist under the AVBC-D toolkit, for programme owners to complete. This enhancement will extend the current evaluation scope beyond traditional cost-benefit analysis to also consider how well healthcare programmes address patients' specific needs, treatment goals, and overall care integration. Programmes will aim to meet MOH standards and AVBC best practices, fostering a more comprehensive and patient-centred healthcare ecosystem.

(III) Incentivise Adoption Through Rewards and Recognition

To encourage and sustain AVBC adoption, we will introduce rewards and recognition programmes that celebrate contributions towards AVBC. By acknowledging the efforts of healthcare professionals and administrators, these initiatives reinforce the importance of AVBC and motivate continuous improvement across the healthcare family.

Through these proposed enablers, we aim to build the capabilities, mindset, and frameworks necessary for a healthcare system that consistently delivers high-quality, patient-centred care while optimising resources for sustainability. Refer to Annex 5.3 for more elaborations on the proposed ideas.

[5] The current MOH Programme Evaluation Framework (PEF) is a comprehensive programme planning tool that aids programme owners in developing a clear theory of change and a thorough evaluation plan. This approach helps refine implementation strategies and informs resource allocation decisions. MOH PEF requirements vary based on programme scale. New programmes with a total requested budget exceeding S$20 million, or a full scaled-up cost surpassing S$100 million, must undergo a rigorous and comprehensive evaluation as per MOH PEF guidelines. All other programmes are subject to less intensive PEF requirements, unless MOH specifies otherwise. The type of programme is defined as activities or interventions designed to change the health of the population by delivering one or a set of health outcomes, including any health or psychosocial outcomes, health-related behaviours, knowledge, attitudes, or perceptions. The PEF does not apply to projects that use non-human subjects, clinical trials, drug and medical therapeutic assessments, medical technology evaluations; legislation, licensing, and regulation; marketing campaigns; contingency-basis projects, or funding such as those for mainstream subventions and Pre-Ops and Ramp-Up (PORUs).

6 In the Horizon: Relevance of AVBC to Private Healthcare Providers, Payers, and Patients

Thus far, the document has focused on the AVBC roadmap for the implementation and implications largely in the context of MOH and the public healthcare Clusters. This is intentional as we need a starting point for dialogue and to refine the framework based on small scale initiatives/pilots to begin with.

However, it cannot be overemphasised that the ambition to cultivate and achieve AVBC can only be fully actualised if all healthcare-related stakeholders are sold on the vision, and this needs to eventually include the private healthcare sector[6], insurance companies, and patients.

RELEVANCE OF AVBC TO PRIVATE HEALTHCARE PROVIDERS

Private healthcare in Singapore delivers high quality care and is generally perceived as being more efficient in terms of shorter waiting times for appointments and procedures compared to public healthcare. It offers more personalised attention and comfortable environments and is a draw for medical tourists, contributing to Singapore's reputation as a medical hub. However, the alignment of cost to the quality of services provided by the private sector is often questioned. For example, the provision of low-value care such as over-investigations, over-diagnosis, and over-treatment can occur in both public and private institutions, although the pressure may be greater in the private sector due to factors such as patients' preferences and expectations, and higher overhead costs.

There are currently no plans to introduce regulatory frameworks to require private healthcare providers to adopt AVBC. However, as elucidated in previous chapters, it is widely acknowledged that AVBC implementation is necessary for overall healthcare outcomes improvement and sustainability. The principles and many of the approaches are applicable to the private sector such as:

- The **use of clinical data and high-quality evidence** to guide treatment decisions (e.g., clinical guidelines). This is relevant as it can reduce unnecessary procedures and therefore potential harm to patients;
- AVBC's **patient-centred** approach involves transparent communication about the various treatment options, costs, and expectations, which leads to better patient experiences and clinical outcomes. This is relevant to private healthcare as it enhances providers' reputations;
- Adopting AVBC practices incentivises providers to achieve better outcomes at **fair pricing**, which is a fine balance between the needs of the patients (e.g., no undue financial burden), the broader healthcare system (sustainability), and private providers (profitability). Fair pricing is relevant as it can improve market competitiveness.

[6] Private healthcare institutions referred to here include (but are not limited to) private hospitals/clinics/medical centres, general practitioner clinics, dental practices, mental health facilities, long-term care facilities, imaging and laboratory facilities, ambulatory surgical centres, rehabilitation centres, home healthcare services, and telemedicine providers.

RELEVANCE OF AVBC TO PRIVATE PAYERS (INSURANCE PROVIDERS)

A review of private insurance financing could better incentivise cost-effective decision-making by providers, payers, and patients. Simultaneously, there is an increasing need to bolster financial governance, particularly in developing stringent claim rules for MediSave and MediShield Life. To enhance enforcement, consideration should be given to implementing financial levers in conjunction with legislative requirements.

The growing adoption of AVBC practices in the private healthcare sector is poised to foster a more cost-effective and value-driven healthcare system. It is hoped that this shift will contribute significantly to a more sustainable and efficient healthcare ecosystem for Singapore.

RELEVANCE OF AVBC TO PATIENTS AND CARERS

AVBC represents a shift towards healthcare that emphasises outcomes meaningful to patients while minimising unnecessary interventions. AVBC tailors care to individual needs, enhances patient and carer engagement, and provides cost-effective solutions that ultimately benefit patients, carers, and families.

Improved Health Outcomes and Personalised Care

AVBC prioritises value over volume, incentivising providers to deliver effective, patient-centred care. Personalising treatment to individual needs improves satisfaction, adherence, and outcomes. For example, AVBC initiatives at a Swedish university hospital showed improved accessibility and follow-up care tailored to patient needs, leading to higher satisfaction and fewer unnecessary treatments. Carers also experience reduced emotional and physical burdens when they can support a more personalised care approach, where carer engagement was linked to reduced re-hospitalisations.

Enhanced Patient and Carer Engagement

A core principle of AVBC is engaging patients and carers actively in decision-making. Moving beyond traditional, directive models of care, AVBC promotes shared decision-making, where patient preferences and insights from carers inform care planning. Patients are encouraged to articulate their health goals, and carers' insights help ensure care is feasible within the patient's daily life. This collaboration builds trust, strengthens adherence, and fosters a collaborative healthcare environment with a direct impact on outcomes.

Challenges and Strategies for Improvement

A significant challenge for patients and carers is understanding complex health outcomes including their role in shared decision-making and in providing patient-reported outcomes and experiences. ACE collaborates with patient organisations to provide accessible educational resources, including Plain English Summaries and decision aids, that empower patients to make informed choices. ACE's Consumer Panel also provides valuable insights to enhance the relevance of these resources.

CONCLUSION:
Making AVBC a reality

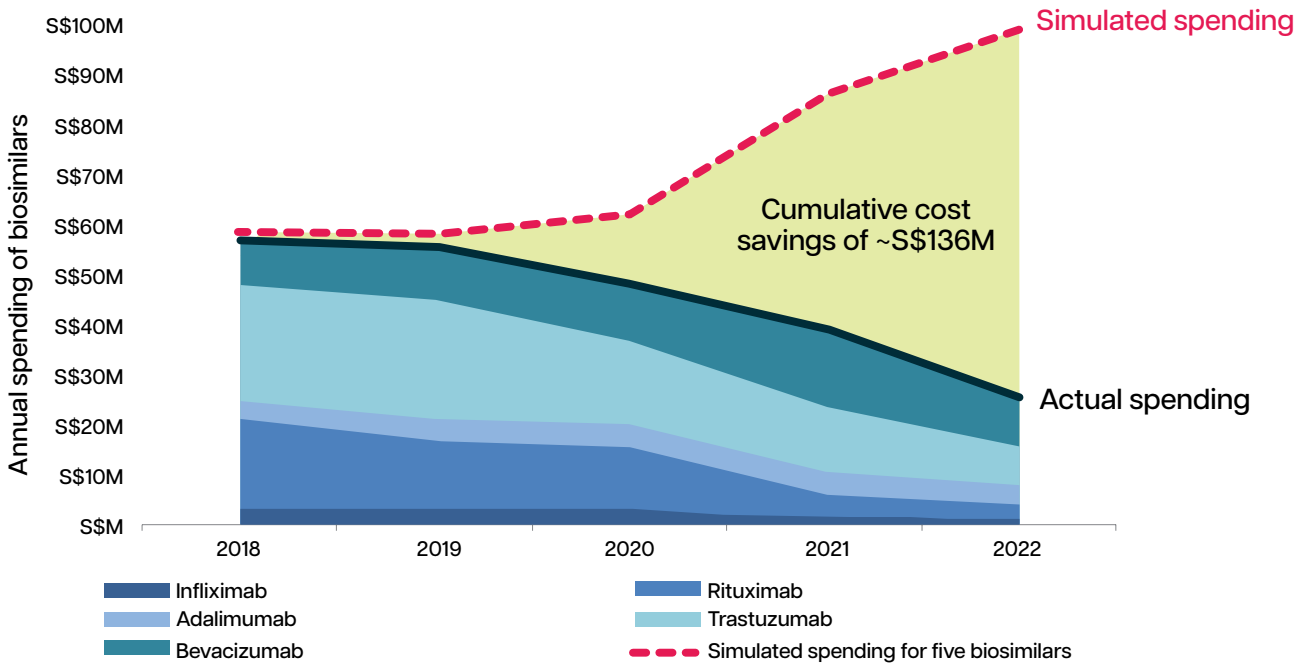
Realising the full potential of AVBC demands a coordinated, system-wide effort involving all healthcare stakeholders, including payers, providers, practitioners, patients, and industry partners. Each has a critical role in shaping a healthcare ecosystem that prioritises good quality outcomes, efficient resource utilisation, and patient-centred care.

By fostering a shared commitment to AVBC across these diverse stakeholder groups, Singapore can establish a cohesive and sustainable healthcare framework that delivers better health outcomes for its population. This collective effort will ensure that healthcare resources are utilised optimally, advancing the national agenda of delivering appropriate and value-driven care to all.

Annex 4.1 Optimising Biosimilars—A Value Demonstration Case Study

A retrospective cross-sectional study including five monoclonal antibodies (infliximab, adalimumab, trastuzumab, rituximab, and bevacizumab) with biosimilars listed for subsidy between 2018 and 2022, showed that value-driven healthcare strategies implemented in the PHIs have contributed to high adoption rates of biosimilars and improved affordable access through lower treatment costs. Overall, there was an upward trend in biosimilar utilisation while spending reduced substantially post-subsidy listing, with the adoption rate of most biosimilars exceeding 95% within one year of listing. Drugs with more than one approved biosimilar brand at the time of subsidy listing reported substantial price reductions of over 80%. Adoption of the five biosimilars achieved significant cumulative savings of ~S$136 million for the healthcare system. Swift adoption of biosimilars following its entry will continue to be one of the key initiatives to maximise the value of biosimilars and keep healthcare costs affordable.

Actual vs simulated spending trend for the five monoclonal antibodies (Mabs) in PHIs from 2018 - 2022



Tan SH, Goh LGH, Ong BSK, et al. Impact of Value-Driven Healthcare Strategies for Biosimilar Adoption: The Singapore Story. PharmacoEconomics – Open. 2024; 8: 679–88.

Annex 4.2 Application of AVBC Core Principles on Evaluation of Health Technologies

A medical device recommended for subsidy: Continuous glucose monitoring systems for children and adults with type 1 diabetes mellitus (T1DM)[7]

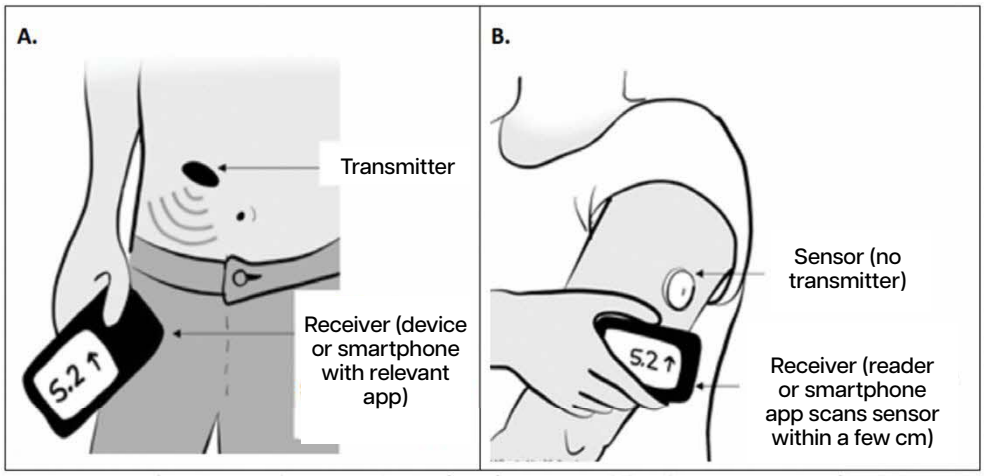


Fig 1: Types of continuous glucose monitoring (CGM) systems and their key components:
A) real-time CGM (rtCGM) and B) intermittently scanned CGM (isCGM)

Care is...	Evidence of AVBC Core Principle
Evidence-based	CGM systems, including real-time (rtCGM) and intermittently scanned (isCGM), were found to be generally safe compared to self-monitoring of blood glucose (SMBG), with low rates of sensor-related skin reactions. In children with T1DM, rtCGM was more effective than SMBG in reducing HbA1c levels, increasing time in target range (TIR), and reducing time above range (TAR) at six months follow-up. isCGM was comparable to SMBG for most outcomes but more effective in reducing TAR and associated with greater treatment satisfaction. For adults with T1DM, both rtCGM and isCGM improved key clinical outcomes compared to SMBG. rtCGM significantly reduced HbA1c, severe hypoglycaemia episodes, and increased TIR while reducing time below range (TBR) and TAR. isCGM showed similar improvements but did not reduce severe hypoglycaemia episodes.
Patient-centred	The Committee recognised the significant impact of hypoglycaemia on patients' quality of life and anxiety levels. Traditional SMBG methods have notable limitations, including pain, infection risk, and scarring from frequent finger pricks, as well as the inability to detect impending hypo/hyperglycaemia. Patient testimonials revealed improved diabetes management, better understanding of the effects of food and physical activity on glucose levels, and reduced reliance on finger-prick tests. The Committee also considered patient concerns, such as skin irritation from sensors, accuracy at extreme glucose levels, and the cost of devices.
Right-sited	Right-siting considerations were less applicable since both SMBG and CGM can be performed/used by patients in non-healthcare settings.
Integrated and coordinated	Effective CGM use requires support from a multidisciplinary specialist diabetes care team and should be offered only where there is a clear expectation of clinical benefit. Individuals must be willing to commit to using CGM at least 70% of the time, in addition to other glucose management programmes including attendance of structured education programmes and regular follow-ups and monitoring.
Cost-effective and sustainable	The Committee agreed that rtCGM and CGM systems are likely to be cost-effective compared with SMBG for adults with T1DM, based on published cost-effectiveness analyses, with incremental cost-effectiveness ratios (ICERs) ranging from £24,436 per quality-adjusted life year (QALY) gained for rtCGM and £4,706 to £10,157 per QALY gained for isCGM. Value-based pricing led to significant reductions of ~30% in CGM prices. Additionally, a risk-sharing arrangement was established, ensuring further cost reductions if the total expenditure on the recommended CGM exceeded a predetermined threshold. With more consistent and real-time monitoring using CGM, downstream costs, such as those associated with hypoglycaemic hospitalisations, could potentially be avoided.

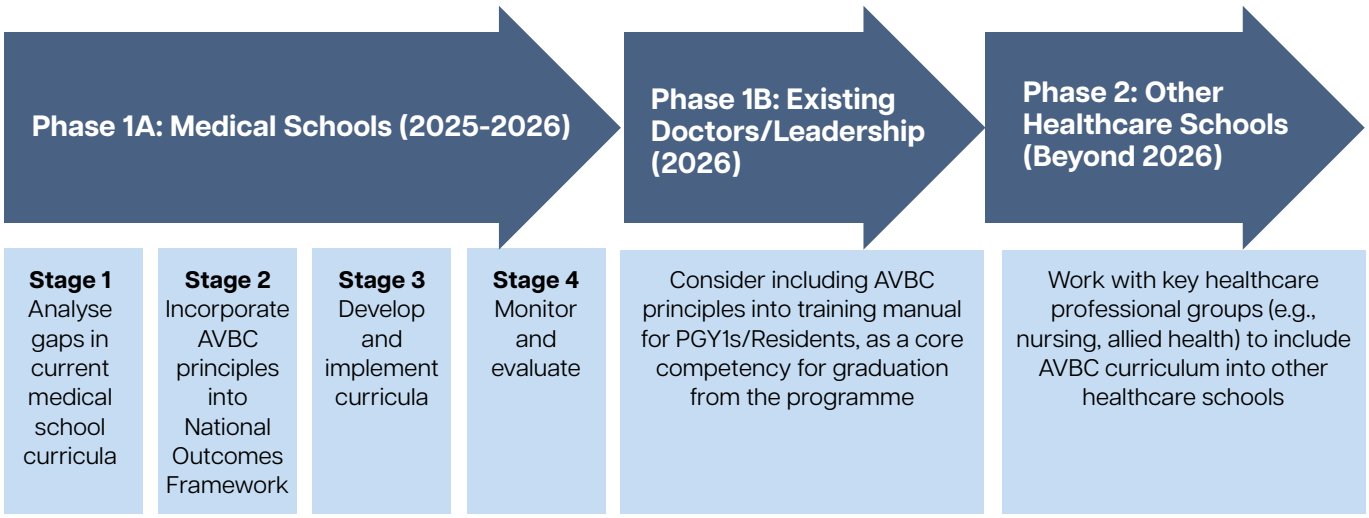
[7] ACE Technology Guidance: Continuous glucose monitoring systems for children and adults with type 1 diabetes mellitus. Published 1 May 2024.

A drug recommended for subsidy: Sodium-glucose co-transporter 2 (SGLT2) inhibitors for treating type 2 diabetes mellitus—Recommended for subsidy.[8]

Care is...	Evidence of AVBC Core Principle
Evidence-based	The Committee reviewed SGLT2 inhibitors (SGLT2i) for diabetes treatment, comparing them with sulfonylureas (SU) and DPP-4 inhibitors. They found no significant differences among SGLT2 inhibitors in efficacy or safety. While empagliflozin showed favourable cardiovascular outcomes in high-risk patients, this was not generalisable to all Singaporean diabetics. SGLT2 inhibitors showed statistically significant, but not clinically superior, HbA1c reductions compared to SU and DPP-4 inhibitors. They offered benefits in weight loss and blood pressure reduction, with lower hypoglycaemia risk but higher genital and urinary infection risks. The Committee deemed all SGLT2 inhibitors clinically comparable, considering them as a class due to their shared mechanism of action. The Committee reviewed that SGLT2 inhibitors with insulin were comparable to DPP-4 inhibitors with insulin in terms of HbA1c improvement. SGLT2 inhibitors showed better weight reduction but increased UTI risk. Hypoglycaemia risk was similar across treatments.
Patient-centred	Patient-relevant and important outcomes, as well as adverse events were considered.
Right-sited	Subsequently subsidy for SGLT2i was extended to Healthier SG clinics (as part of a whitelist of drugs) in 2024 to improve affordable access and encourage management of chronic diseases in the primary care setting.
Integrated and coordinated	Less applicable.
Cost-effective and sustainable	The Committee evaluated SGLT2 inhibitors' cost-effectiveness compared to SU in dual therapy with metformin. At a specific price, the ICER was under S$15,000 per QALY gained, deemed acceptable. SGLT2 inhibitors were more cost-effective than DPP-4 inhibitors and priced lower than sitagliptin. A cost-minimisation approach was used to select the lowest-priced SGLT2 inhibitor for subsidy. Initially, dapagliflozin was most cost-effective. By April 2018, empagliflozin became a reasonable option, while canagliflozin remained least cost-effective. In 2023, revised proposals led to empagliflozin being favoured for its budget impact certainty and potential for SDL listing to benefit more patients. Value-based pricing in 2016 achieved approximately a 40% price reduction for SGLT2i. Dapagliflozin was the first SGLT2i recommended for subsidy listing on the Medication Assistance Fund (MAF) in 2017 as dual therapy, with subsequent expansion of the MAF listing in 2018 to include combination with insulin. In 2018, empagliflozin was also recommended for MAF listing following an acceptable price discount offered by the company. In 2023, the Committee recommended reclassifying empagliflozin from MAF to SDL in view of its favourable clinical and cost-effectiveness, while dapagliflozin will be delisted due to unfavourable cost-effectiveness compared with empagliflozin based on the company's proposal. A real-world retrospective cohort study showed that SGLT2i utilisation volume increased by 600% from 2017 to 2019, post-subsidy. In the first year of initiating SGLT2i (compared to DPP-4 inhibitors), significant reductions in hospitalisations for type 2 diabetes mellitus (by 38%) and heart failure (by 22%) were observed. The total projected healthcare cost savings over 10 years was estimated at S$53 million.

[8] ACE Technology Guidance: Sodium-glucose co-transporter 2 (SGLT2) inhibitors for treating type 2 diabetes mellitus. Updated 2 January 2024.

Annex 5.1 Details on AVBC Education and Training Implementation Phases



Phase 1A (2025 to 2026) – One way to incorporate AVBC principles into medical schools' teaching curricula is through the existing National Outcomes Framework for Medical Graduates. This framework, which delineates core learning outcomes for all medical graduates in Singapore, is regularly updated to reflect the evolving healthcare landscape. By leveraging and enhancing this established framework to incorporate AVBC principles, we can ensure a systematic and comprehensive integration of AVBC principles into medical education. While the current National Outcomes Framework (NOF) already addresses elements related to the five AVBC principles, the proposed revisions aim to consolidate these elements into a more cohesive AVBC section, facilitating a structured introduction to AVBC culture for students.

With the revised NOF, schools can then have the flexibility to determine how best to incorporate AVBC principles into their teaching methods and assessment criteria. Some potential approaches include the development of a standardised online module, leveraging Cluster VBC champions for content creation, and integrating AVBC principles into team-based learning scenarios and clinical examinations.

Monitoring and evaluation will be crucial to ensure the effectiveness of these educational changes. One proposed method is to assess the schools on their integration of AVBC principles into the curriculum using the existing Quality Assurance and Quality Improvement (QA/

QI) framework developed by the Professional Training and Assessment Standards (PTAS) Division under MOH for medical schools. This framework encompasses a comprehensive series of interviews and site visits designed to assess each school's performance across eight domains outlined in the National Standards, of which medical curriculum is one of the domains. Other methods include conducting pre- and post-implementation surveys to assess student knowledge, as well as incorporating AVBC-related questions in graduate exit surveys for long-term tracking.

Phase 1B (2026) - A key strategy under consideration is the incorporation of AVBC principles into the training curricula for Postgraduate Year 1 (PGY1) doctors and Residents. The ultimate objective is to establish proficiency in AVBC principles as a core competency, making it an essential requirement for successful programme completion.

Phase 2 (beyond 2026) - Extending the education and training of AVBC principles to other healthcare professions will be guided by consultations with the four Chief Officers to tailor AVBC implementation to each profession's unique needs and contexts.

Annex 5.2 Proposed AVBC Design (AVBC-D) Toolkit Self-Assessment Checklist

To enhance the programme/project evaluation framework, we will develop an AVBC design (AVBC-D) toolkit to guide programme owners to incorporate AVBC principles in the design and development of their healthcare programmes. Targeted at programme owners within MOH, Cluster headquarters, and individual healthcare institutions, this toolkit will provide a comprehensive evaluation framework for incorporating AVBC principles into healthcare programme design and development. The AVBC-D Toolkit will include:

a. A brief introduction to AVBC, including the five principles;
b. A self-assessment checklist (see Table); and
c. A resource list (e.g., the AVBC monograph and measurement examples).

AVBC-D Toolkit: Self-Assessment Checklist for Programme Owners

Care is...	Examples of Possible Self-Assessment Checklist Questions
Evidence-based	• Is there existing evidence supporting the effectiveness of the intervention? • Does the intervention reference care standards used in other well-established health systems?
Patient-centred	• Did the programme design process incorporate patient input? • Does the intervention include the patient in care planning throughout the care journey? • Does the intervention include the patient in decision-making throughout the care journey? • Does the intervention ensure optimal patient-provider communication? • Does the evaluation plan include patient reported measures? • What are participants' experiences and their perception of the programme's value?
Right-sited	• Does the intervention include clear criteria for entry and discharge? • Does the intervention outline an effective stepdown care process, including referral and follow-up?
Integrated and coordinated	• Are there clear and agreed definitions of roles and responsibilities for working across disciplines and/or settings (e.g., care pathways and protocols, accountability agreements)? • Are there plans to ensure information transfer among settings? • Are there plans to coordinate interventions for complex patients with multimorbidity, who move across disciplines and/or settings?
Cost-effective and sustainable	• What are the main types of costs incurred (in categories) now and to be expected? • Will primary data be collected, or can there be estimates/proxies sourced from secondary sources? • Is the programme cost-effective compared to usual care?

For the evaluation of a programme's cost-effectiveness and sustainability, the AVBC-D Toolkit will direct programme owners to the Health Economic Evaluation (HEE) Guidelines. The HEE Guideline outlines the various types of economic evaluations and provides a step-by-step guide to establish a programme's "value for money". It guides programme owners in the translation of programme outcomes to standardised measures (e.g., cost effectiveness analysis, cost utility analysis, and cost benefit analysis). In addition, the self-assessment checklist questions for "care is cost-effective and sustainable" are aligned with the MOH Programme Evaluation Framework to avoid duplication.

Annex 5.3 Proposed Rewards and Recognition Mechanisms

AVBC Research Opportunities

To foster a deeper engagement with AVBC principles, Clusters can prioritise research funding for studies related to AVBC implementation and outcomes. This initiative aims to attract academically inclined practitioners, encouraging them to delve more deeply into AVBC concepts and practices. By allocating resources to AVBC-focused research, we can generate valuable insights into the effectiveness of various AVBC strategies and their impact on patient outcomes and healthcare efficiency.

AVBC Certification Programme

We recommend exploring the development of a tiered certification system for healthcare institutions to recognise and promote excellence in AVBC implementation. This programme would establish clear criteria for each certification level, reflecting an institution's commitment to and proficiency in AVBC practices. Higher levels of certification would not only bring prestige to the institutions but could also potentially attract more patients, as they would serve as a mark of quality and value-based care. This system would create a tangible incentive for institutions to continually improve their AVBC practices.

AVBC Champions

MOH will collaborate with the Clusters to identify AVBC Champions who will serve as key drivers of AVBC adoption within their respective institutions. This network of AVBC Champions aims to accelerate cultural change and widespread adoption of AVBC principles across the healthcare system. These Champions will advocate for AVBC principles and lead by example. Their responsibilities may include promoting AVBC practices, providing guidance on implementation, participating in AVBC-related workgroups within their institutions, and contributing to the development of best practices. Champions could be incentivised through priority access to MOH-organised training activities and speaking opportunities at MOH AVBC events. Formal recognition for their contributions to AVBC implementation can also be provided by the Ministry as well as their Clusters.

AVBC Mentorship Programme

To facilitate knowledge transfer and support the widespread adoption of AVBC principles, the Clusters can consider setting up a mentorship programme within their institutions. For example,

AVBC champions could partner with practitioners to implement AVBC practices and programmes, thereby fostering a collaborative learning environment.

AVBC-Focused Continuing Education Credits

To align professional development requirements with AVBC adoption, additional Continuing Medical Education and Continuing Professional Education (CME/CPE) credits could potentially be awarded for MOH-organised AVBC-related training activities (e.g., expanded VDC workshops). This approach would encourage practitioners to engage in AVBC-focused learning activities, ensuring that their ongoing professional education directly supports the adoption of AVBC principles in their practice. By integrating AVBC into the continuing education framework, we can reinforce its importance and equip practitioners with the knowledge and skills necessary to implement AVBC effectively in their daily work.

Glossary of Terms

Key terms	Definitions
Medical technologies	Medical devices, medical services or procedures that serve a therapeutic or investigative purpose. Medical devices are generally defined as those used for human beings for: • Diagnosis, prevention, monitoring, treatment, or alleviation of disease; • Diagnosis, monitoring, treatment, alleviation of, or compensation for, an injury or disability; and • Investigation, replacement or modification of the anatomy or a physiological process for medical purposes. Currently, the Medical Technology Advisory Committee (MTAC)'s scope of medical technologies excludes (this list may be updated from time to time): • Medical technologies that are currently subsidised in the PHIs; • Medical technologies that are not registered or not requiring registration with HSA and/or other relevant regulatory entities; • Medical technologies that are still in the research stage of development; • Models of care (i.e., the way health services are delivered, which outlines best practice of care and services for the patient cohort as they progress through the stages of a condition); • Screening tests; • Vital sign monitoring devices; • Contraceptive, fertility, and cosmetic technologies; • Dental technologies or services; and • Proton beam therapy.
New medical technology	A new medical technology can be defined by its regulatory status (new to market, standardised nationally), adoption status (new to use, can differ across institutions), subsidy status (new to subsidy, can differ across institutions) and degree of innovation (e.g., novel class of med tech, or me-too technology of something in market or in use).

AVBC

Appropriate and
Value-Based Care

Driving Value and Transforming Care for Patients, Together