A Work Project, presented as part of the requirements for the Award of a Master's degree in Management from the Nova School of Business and Economics.

A Step-By-Step Plan For Value-Based Healthcare Implementation: Implementing and Improving

MARIIA SEDYKH

Work project carried out under the supervision of:

Professor João Marques Gomes

30/01/2025

Abstract

Title: A Step-By-Step Plan For Value-Based Healthcare Implementation: Implementing and Improving

This research aims to study the Value-Based Healthcare (VBHC) paradigm and create a roadmap for pharmaceutical and medical device companies to adopt it. It covers the Implementing and Improving phases, focusing on aligning outcomes with stakeholder priorities and integrating real-world evidence. While Phase IV addresses value propositions, cost-saving strategies, and flexible procurement contracts linked to outcomes, Phase V highlights ongoing feedback and dynamic outcome registries to enhance healthcare delivery and the company's market position. The work is based on a thorough literature review, expert insights, and a research into outcome measurement part of Phase II (Mapping and Design), providing a step-by-step plan for industry leaders to transition to a patient-centred, competitive approach.

Keywords: Value-Based Healthcare, Implementation, Value-based procurement, KPI measurement, Performance, Impact, Feedback

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

Table of Contents

1. Introduction 3
2. Literature Review 5
2.1. Education, Change Management, and Cultural Shift 5
2.2. Cost Measurement 9
2.3. Outcome Measurement 14
2.4. Data 18
2.5. Partnerships 23
2.6. Regulatory Compliance 30
3. Methodology 31
4. Findings 33
5. Discussion 55
5.1. Implementation Plan 55
Plan Overview 55
Phase IV – Implementing 61
Phase V – Improving 66
5.2. Next Steps 68
6. Conclusion 70
7. Bibliography 71
8. Appendices 86

1. Introduction

Global healthcare systems face escalating pressures as demand increases while resources remain constrained (OECD 2024). By 2040, a billion more people will inhabit the planet; since life expectancy is increasing, we will face the aging of the overall population (United Nations 2024). In addition to these demographic changes, the demand for healthcare will rise, causing total healthcare costs to grow at nearly double the pace of GDP growth, which will place significant strain on budgets (OECD 2024). Projections indicate that health and long-term care spending could consume twice the proportion of GDP by 2060 (Guillemette and Turner 2021).

Healthcare delivery is marked by significant inconsistencies across nations and providers, spanning costs, practices, and outcomes. These disparities are exacerbated by insufficient ways to evaluate service quality (Cowen et al. 2017). The substantial portion of healthcare — nearly half of clinical interventions — does not show proven effectiveness, people end up wasting 20-40% of income on treatments that are unnecessary or lack evidence of benefit (World Health Organization 2014).

In this setting, the market shift towards value-based healthcare (VBHC), as the opposite to volume-based, presents unprecedented opportunities to increase effectiveness and efficiency (Porter and Lee 2013).

Pioneers of VBHC, including Porter, Teisberg and Lee, identified six fundamental steps to make this vision the reality: 1) creating integrated practice units, 2) measuring outcomes and costs per patient, 3) using bundled payment, 4) integrating care delivery systems, 5) expanding worldwide, 6) building information technology (IT) platform (Porter and Teisberg 2006).

While the principles of VBHC and comprehensive studies of the topic created a theoretical foundation, practical adoption can still be considered in the pilot phase (IQVIA 2024). Thus,

the need for a generic plan to guide value-based transformation remains high.

This research intends to investigate the approaches manufacturers worldwide follow to implement VBHC and strategies they adopt to overcome the practical obstacles associated with the transition. The primary goal is to create a generic step-by-step roadmap that will provide guidance in addressing these challenges and will be customized to fit various manufacturers.

2. Literature Review

Value-Based Health Care has emerged as a transformative approach focused on maximizing health outcomes relative to the costs incurred. By analyzing existing research, this review will illuminate how these core elements — cost optimization, effective partnerships between stakeholders (such as providers, payers, and patients), and comprehensive data utilization — intersect to foster sustainable improvements in health care delivery. Understanding these interconnected factors will provide a robust foundation for further discussions and insights pertinent to advancing VBHC initiatives.

2.1. Education, Change Management, and Cultural Shift

Introduction to Education in VBHC

The implementation of VBHC requires a strong educational foundation across all levels of healthcare. However, practical guidance on its educational dimensions remains limited, complicating implementation for many organizations (Staalduinen et al. 2022; Lewis 2022). Unlike traditional models, VBHC emphasizes multi-professional collaboration, requiring shared understanding and responsibility across clinical, operational, and financial roles (Lewis 2022).

Patient literacy is equally critical, as informed patients reduce system costs and improve preventive care. Higher literacy levels correlate with increased participation in preventive measures and efficient healthcare use (Sørensen et al. 2015; Welsh Value in Health Centre n.d.; Lewis 2024). Therefore, VBHC educational initiatives must empower not only healthcare providers and manufacturers but also patients, fostering active patient participation to achieve meaningful outcomes.

Sustainable VBHC adoption depends on structured, long-term educational strategies. For instance, a Dutch university hospital's multi-year VBHC implementation prioritized staff

knowledge and awareness in early phases to ensure organizational readiness (Engen et al. 2024). Similarly, training gaps within Accountable Care Organizations (ACOs) highlight the need for continuous education to address coordination and governance challenges (McAlearney, Walker, and Hefner 2018). As Phipps-Taylor and Shortell (2016) emphasize, a supportive culture is foundational to any strategic change, making education a cornerstone of VBHC.

Cultural Shift and Organizational Alignment

Implementing VBHC requires a cultural shift from volume-based to value-based models that prioritize patient outcomes through data-driven practices (Lewis 2022). This transition must align clinical, operational, and strategic areas toward shared VBHC goals (Welsh Value in Health Centre, n.d.). As illustrated in the Dutch university hospital's VBHC pilot the need for consistent collaboration across organizational levels is needed to ensure a unified approach (Engen et al. 2024).

A clear, shared purpose fosters alignment across all healthcare roles. Defining the "why" behind VBHC efforts ensures stakeholders, from clinicians to operational staff, are united in delivering patient-centered value (Sinek 2009). This principle is especially relevant in sectors like pharmaceuticals, where VBHC adoption requires redefined strategies to prioritize patient outcomes (Plessis et al. 2017).

Integrating digital health with VBHC underscores the importance of cultural readiness, as technology alone does not ensure improved outcomes. Meskó et al. (2017) emphasized that data-driven practices rely on a cohesive commitment to VBHC values. Motivating employees by fostering purpose and autonomy further supports behavior change essential for VBHC success (McAlearney, Walker, and Hefner 2018). These cultural shifts emphasize the need for unified strategies, patient-centered focus, and adaptability to technology-driven practices to

sustain VBHC.

Leadership and Mindset Change Management + Restructure the Organization

Building on the need for cultural alignment, effective leadership is crucial for fostering mindset and structural changes essential for VBHC. Leaders must align staff goals with patient-centered outcomes while driving organizational restructuring to support cohesive VBHC integration (Plessis et al. 2017; Lewis 2024). Gradual approaches, like the Dutch University Hospital's phased VBHC model, demonstrate the importance of strategic leadership in managing resistance and securing buy-in. This included creating a Central Support Team (CST) and a steering committee, which later expanded to involve IT specialists and other key stakeholders to ensure comprehensive alignment (Engen et al. 2024).

Establishing performance indicators and outcome measurements is also a crucial point as allows leaders to track VBHC progress effectively. Metrics such as patient engagement, satisfaction ratings, and decision-making involvement provide quantifiable insights into alignment with VBHC principles (Getz 2015; Lee et al. 2024). Teisberg, Wallace, and O'Hara (2020) highlight that these indicators enable leaders to assess and adjust strategies, ensuring the sustainability of VBHC initiatives.

Leadership also plays a key role in motivating employees through purpose and accountability. Programs like Queensland VBHC highlight how fostering autonomy and collaboration supports cultural transformation (Carlini et al. 2023; Scott 2014; Damschroder et al. 2009). Similarly, success stories from institutions like Karolinska University Hospital underline the significance of dedicated VBHC teams and active promotion by senior leaders to embed patient-centered value within organizations (Ramos et al. 2021).

Training and Skill Development

Developing skills and providing training are also crucial for supporting the organizational and

cultural transformations required for VBHC. Training must be integrated into every level of professional education to ensure clinical, operational, and administrative staff understand and apply VBHC principles consistently (Moriates, Gandhi, and Vinas 2019). Comprehensive training programs complement leadership and organizational alignment efforts, embedding VBHC as a foundational element in healthcare organizations (Plessis et al. 2017).

Initial VBHC training should introduce core concepts while fostering environments for collaboration and problem-solving. For example, the Queensland VBHC program conducted workshops for multidisciplinary teams, covering outcome-based payment models, policy contexts, and data resources (Gavaghan, Finch, and Clarke 2024). This practical approach goes beyond theory as prepares professionals for collaborative VBHC practices (McAlearney, Walker, and Hefner 2018).

Digital learning tools also play a pivotal role in addressing training barriers (Moriates et al. 2019). The Discovering VBHC modules from Dell Medical School provide interactive, flexible educational resources for healthcare professionals, supporting continuous learning and adaptability (Dell Medical School University of Texas at Austin, n.d.; Cayea et al. 2018).

Incorporating VBHC into graduate medical education is another avenue to promote long-term adoption. Despite its importance, only a third of internal medicine programs in the U.S. include VBHC content, indicating the need for standardized education (Cayea et al. 2018; Weinberger 2011). Early exposure ensures new professionals enter the workforce with a value-oriented mindset, driving the cultural and organizational changes needed for VBHC sustainability (Hackbarth and Boccuti 2011; Teisberg, Wallace, and O'Hara 2020).

Challenges and Future Opportunities

Finally, it is important to address the challenges and opportunities associated with mindset change.

First, fee-for-service payment models that incentivize volume over value present a significant challenge to VBHC implementation, creating misalignment between compensation structures and VBHC principles. This conflict disrupts alignment efforts, highlighting the need for policy reforms that support outcome-based compensation (Engen et al. 2024; Plessis et al. 2017).

Additionally, skepticism regarding VBHC's commercial viability also poses a barrier, particularly when combined with departmental misalignment (Plessis et al. 2017). Shared learning and collaborative discussions provide a pathway for overcoming these challenges. Regular meetings enable healthcare teams to troubleshoot and refine practices, fostering a culture of continuous improvement (Moriates et al. 2019; Lewis 2024). Outcome measurement, as highlighted by Teisberg, Wallace, and O'Hara (2020) further reinforces VBHC's value by demonstrating improved patient outcomes, reducing skepticism, and building stakeholder confidence.

2.2. Cost Measurement

Introduction

Kaplan and Porter (2001) underscore that the main purpose of any healthcare system is to provide the best possible value to patients; this results in focusing on achieving good health for every dollar spent. More care, resulting in pricier care, does not directly mean better care (Kaplan and Porter 2001).

Poor cost measurement has also led to "huge cross-subsidies across services," which further distorts supply and efficiency in healthcare provision (Kaplan and Porter 2001). These cross-subsidies create misaligned incentives that hinder the shift towards more effective reimbursement models. VBHC, within the main goal of providing better care for patients, has as the aim of Lowering costs (De Bustamante 2020).

Tracking costs per care treatment remains challenging, as existing accounting systems often fail to support detailed cost analysis, leaving an understandable perception of cost across the care cycle as exclusive. Different stakeholders, particularly non-clinicians, often describe costs in conflicting terms; some see costs as an “investment” while others consider them an “expense” (Wolf et al. 2022).

Due to the lack of precise per-patient cost data, project teams implementing VBHC relied on cost proxies instead, focusing on cost drivers like hospital stay length and frequency of follow-up visits. This means that manufacturers are led to use this approximate data as well. Different stakeholder groups perceived the concept variably; many respondents prioritized improved outcomes over cost containment, while non-clinicians leaned toward a cost-focused view, aligning value with budgetary control (Wolf et al. 2022).

The divergence between clinicians’ focus on outcomes and non-clinicians’ emphasis on costs highlights the need for balanced leadership that integrates these perspectives (Bååthe et al. 2022). Integrating patient-centered care model and the patient’s voice is essential to building a sustainable healthcare model that effectively balances economic constraints with the goal of enhanced patient outcomes (Wolf et al., 2022; Britten et al., 2020).

Cost Drivers in Traditional Healthcare

A key challenge for healthcare systems is the rising costs that strain finances without proportional improvements in value or patient outcomes, especially in misaligned fee-for-service models. According to the OECD (2017), a significant part of healthcare expenditure in developed countries is to be considered inefficient, such as avoidable hospital admissions, administrative inefficiencies, high pharmaceutical prices, with a significant share classified as wasteful.

One of the biggest factors driving up costs is the excessive utilization of healthcare services

that give little to no benefit to patients. For instance, it is estimated that more than 10% of hospital spending goes toward addressing preventable harm, such as medical errors or hospital-acquired infections, which could have been avoided with better preventive practices and patient safety protocols (OECD 2017). This impacts healthcare manufacturers, as their resources will inevitably occur when preventable errors occur.

Pharmaceutical expenditures also represent a significant driver of healthcare costs. The cost of branded medicines remains high in many countries, despite the availability of cheaper generic alternatives that offer the same therapeutic benefits. The underutilization of generics leads to wasted financial resources and unnecessary spendings. This issue is compounded by large cross-country variations in the prescription of antibiotics, revealing excessive consumption that not only wastes resources but also contributes to the development of antimicrobial resistance, a major global health concern (OECD 2017).

Beyond inefficiencies in care delivery and administration, the traditional healthcare model is also characterized by fragmented care and poor coordination across providers, which drives up costs unnecessarily. For example, patients with chronic conditions often experience gaps in care that lead to avoidable hospitalizations or emergency room visits. These exacerbations could have been managed more effectively in a primary care setting, but the lack of integration and communication between different levels of care leads to costly and preventable hospital admissions (OECD 2017).

Healthcare costs are not only a problem in developed countries but are also increasingly affecting lower- and middle-income countries, where rising out-of-pocket expenditures are putting financial pressure on populations and limiting access to essential healthcare services. As Cutler and Ghosh (2012) observe, taking as an example the United States, healthcare costs have continued to grow at an unsustainable rate, contributing to the lack of affordable care and exacerbating health disparities, relying on manufacturers as well. While OECD countries

face similar pressures, their healthcare expenditure as a percentage of GDP remains lower than that of the United States, highlighting the greater financial burden on the American healthcare system. In lower- and middle-income countries, rising healthcare costs have led to increased financial strain on households, particularly through out-of-pocket spending, which further results in inequities in access to care and limits the capacity of vulnerable populations to receive timely and appropriate treatments (Cutler and Ghosh 2012).

Addressing these cost drivers requires a concerted effort to shift from traditional fee-for-service models, which incentivize volume over value, toward more sustainable, VBHC models. A key aspect of this transformation involves improving the measurement and management of healthcare costs and ensuring that these are aligned with patient outcomes. The OECD (2017) estimates that as much as one-fifth of current healthcare spending could be redirected toward more productive uses if these inefficiencies were addressed.

Current Measures Implemented

Evidence from real-world VBHC programs suggests a significant potential for cost reduction, as shown by Figueroa et al. (2016), who highlight the role of the value-based purchasing (VBP) program. The VBP program ties payments to performance metrics, incentivizing providers to improve patient outcomes and satisfaction while reducing costs associated with subpar performance. In addition to VBP programs, accountable care organizations (ACOs) serve as another example of VBHC's cost-control success. McClellan et al. (2016) demonstrate that ACOs, which are groups of providers who choose to collaborate to provide coordinated high-quality care to their Medicare patients, can reduce expenditures while enhancing outcomes. ACOs typically share in the savings generated from cost reductions, thus incentivizing them to focus on preventive care and care coordination.

Furthermore, transitioning to VBHC is seen as a path to achieving long-term cost savings.

Cutler and Ghosh (2012) underscore that Medicare's transition to VBHC models, including programs aimed at preventing avoidable hospitalizations and managing chronic conditions more effectively, offers sustainable financial benefits.

Overall, VBHC represents a promising shift, especially in terms of cost savings. Nevertheless, the successes observed in VBP programs, ACOs, and Medicare's value-focused initiatives indicate that VBHC has the potential to fundamentally transform healthcare cost structures, emphasizing quality and outcomes over volume.

Other opportunities, to support VBHC implementation, such as the Hospital Value-Based Purchasing (HVBP) program, incentivize healthcare providers by linking reimbursement rates to specific performance metrics, with the objective of improving clinical outcomes and overall patient value. While some evidence suggests that value-based programs can support cost control and enhance outcomes (McClellan et al. 2016), different studies demonstrate evidence that raised concerns about the overall effectiveness of pay-for-performance models (Appendix 1 for evidence).

A study from the Netherlands (Veghel 2019) evaluated a VBHC model for coronary artery bypass graft (CABG) surgeries. This approach used time-driven activity-based costing (TDABC) (Appendix 2) to capture in-hospital expenses related to each patient's journey, from the initial decision to surgery to 120 days post-operation (Veghel 2019). This model allows physicians to identify areas for process improvement, enhancing both cost efficiency and patient outcomes.

High-risk approaches might need to be considered, such as the Alternative Payment Model (APM) contracts. The Centers for Medicare & Medicaid Services (CMS) must prioritize positioning APMs across payers, simplifying administration, reshaping performance benchmarks, and mandating APM when feasible (Werner et al. 2021).

The private sector's large share of healthcare spending underscores the need for widespread adoption of aligned Alternative Payment Models (APMs) to drive practice transformation by increasing providers' APM-linked revenue. (Werner et al. 2021).

2.3. Outcome Measurement

Importance of Outcome Measurement

The focus on outcomes, rather than service volume, requires comprehensive and accurate measurement of key performance indicators (KPIs) across clinical, operational, financial, and patient experience dimensions (Porter 2010). In the context of pharmaceutical and medical device manufacturing, aligning product performance with VBHC principles necessitates the use of standardized outcomes and KPIs to demonstrate value.

The importance of measuring outcomes lies in its capacity to drive improvements in healthcare delivery, align stakeholder incentives, and ensure accountability (Porter and Teisberg 2006). Batalden and Davidoff (2007) argue that continuous outcome measurement is essential for improving healthcare quality and safety, providing insights into both patient well-being and operational efficiencies. Without robust measurement, it is impossible to assess whether healthcare interventions or medical products are delivering value in terms of patient health and cost-effectiveness.

Achieving an initial balance between priorities is often challenging, with external circumstances frequently driving a focus on either cost efficiency or quality enhancement. Progress may be better achieved through collaborative discussions, where alignment with the organization’s overarching business strategies informs decision-making – “through conversation (instead of conflict)” (Ramos et al. 2021). Brennan et al. (2014) argue that the healthcare system needs to leverage big data and advanced analytics to transform care and drive outcome improvements by identifying patterns that can enhance both quality and cost-

efficiency.

The fact that there is not enough cost data remains an issue, making enhanced collecting and reporting a priority for the manufacturers. A unified framework for communicating value is essential to enable collaborative decision-making among all participants in value-driven healthcare (Allen et al. 2021). Berwick et al. (2008) further support this view, arguing that the "Triple Aim" approach – which puts in the center population health and patient experience – offers a structured way to measure outcomes that align with both patient and system-level goals.

Defining and Measuring Outcomes

Though accurately defining and measuring outcomes is fundamental to VBHC, it presents several challenges. Porter and Teisberg (2006) highlight that a major difficulty in defining outcomes stems from the diverse priorities of all stakeholders. For pharmaceutical and medical device manufacturers, outcomes must integrate clinical efficacy with operational efficiency and long-term cost-effectiveness.

Challenges in defining outcomes also arise from the complexity of healthcare itself. Berwick (2008) notes that defining outcomes in healthcare involves balancing multiple dimensions of quality (clinical effectiveness, patient experience, and cost), which often have conflicting demands. For example, focusing solely on reducing costs may negatively impact patient experience or clinical quality if not managed properly.

Clinically, outcomes such as adherence rates, readmission rates, and quality of life assessments are central to VBHC. Donabedian (1988) argues that these indicators reflect the effectiveness of healthcare delivery, while ICHOM (2021) has standardized these outcomes into global sets that allow for consistent measurement across healthcare systems.

St John et al. (2021) point out that evaluating outcomes, processes, and resources, as outlined

in Donabedian's model, combined with measures to maintain balance, offers a reliable method for measuring outcomes in implementation protocols. This approach also helps mitigate unintended effects in care pathways. The author further argues that real-world data can provide stronger support for this process by driving changes based on the value proposition and using a care-pathway-oriented business framework for implementation.

The ICHOM Standard Sets encompass clinical and patient-reported outcomes and are increasingly being adopted by manufacturers to assess product performance in real-world scenarios (Porter, Larsson and Lee 2016).

On the operational side, outcomes such as time to market and manufacturing defect rates are crucial for aligning the production of medical devices and pharmaceuticals with VBHC goals (Pisano, 1997). Kaplan and Porter (2011) promote TDABC as a method to measure the total cost of care while linking it to outcomes, enabling manufacturers to balance operational efficiencies with clinical results.

Patient-Reported Outcomes

In VBHC, patient satisfaction is paramount, as it directly reflects the quality of care as it is evaluated by patients. Patient-Reported Outcome Measures (PROMs) are health assessments determined by patients themselves, providing invaluable feedback for evaluating treatment effectiveness. While PROMs are significant in transforming healthcare by focusing on patient-centered care (Black 2013), they are integrated into clinical workflows to enhance decision-making and product development (Basch et al. 2016).

Challenges in Outcome Measurement

Data availability and quality are significant barriers, as outcome data must be both comprehensive and reliable. Gliklich, Dreyer, and Leavy (2014) point out that gaps in real-world data collection and quality often hinder accurate outcome measurement. Manufacturers

must navigate these challenges by leveraging clinical registries, electronic health records, and other data sources to improve outcome tracking.

Regulatory considerations also present obstacles in outcome measurement. As Rawson and Kaitin (2003) explain, pharmaceutical and medical device manufacturers must adhere to stringent regulatory frameworks that sometimes conflict with the measurement of innovative VBHC outcomes. Regulatory bodies prioritize safety and efficacy, which may limit the ability to incorporate broader financial and patient-reported outcomes into evaluations.

Furthermore, stakeholder alignment is critical for successful outcome measurement in VBHC. As Friedberg et al. (2013) discuss, misalignment between healthcare providers, manufacturers, and regulators can result in inconsistent outcome measures. Manufacturers must ensure that their KPIs resonate with the needs of patients, providers, and payers to demonstrate product value effectively.

Outcome measurement facilitators include technological advancements in data collection and analytics. combining electronic health records (EHRs) with clinical decision support systems (CDSS) enhances the capacity to monitor and evaluate outcomes across various healthcare environments. Kaplan and Porter (2011) also stress the role of TDABC. They believe this approach is the key for linking operational efficiency with patient outcomes, making it easier to align business and clinical metrics.

However, several barriers to outcome measurement persist. Berwick and Hackbarth (2012) point to the fragmentation of healthcare data systems, where siloed information across providers and lack of interoperability can hinder seamless measurement and comparison of outcomes. Additionally, Friedman et al. (2017) identify resistance to change among healthcare professionals as a barrier to adopting new outcome measurement tools and practices.

Existing Outcome Measurement Standards

To address the challenges of outcome measurement in VBHC, several frameworks and standards have emerged. The International Consortium for Health Outcomes Measurement (ICHOM) has been instrumental in developing standardized sets of patient-valued outcomes, facilitating global benchmarking across conditions (Porter, Larsson, & Lee, 2016). PROMs and tools like EQ-5D provide valuable patient-reported data, helping manufacturers align their products with patient-centric outcomes (Black 2013; Herdman et al. 2011).

In the medical device industry, the ISO 13485 standard provides a quality management system (QMS) for manufacturers, outlining requirements for measuring and monitoring product performance and safety (ISO, 2016). This standard ensures that manufacturers can track operational KPIs, such as manufacturing defect rates, while also addressing clinical outcomes and regulatory compliance. ISO 13485 is especially relevant for aligning product quality with VBHC principles, ensuring that devices not only meet safety standards but also deliver value in terms of patient outcomes.

Another widely recognized framework is the Triple Aim. This model is centered around population health that can be improved through patient experience, and lowering per capita costs (Berwick, Nolan and Whittington 2008). For manufacturers, the Triple Aim serves as a guiding principle for product development and outcome measurement, as it emphasizes the balance between clinical outcomes, patient satisfaction, and cost-effectiveness.

2.4. Data

The role of data in driving value-based healthcare

Effective data management and technology are foundational for Value-Based Health Care. By monitoring, analyzing, and securely sharing data, stakeholders enable personalized and proactive patient care. Integrating clinical outcomes, financial metrics, social determinants, and treatment adherence data helps track care quality, enhance patient outcomes, and optimize

efficiency.

Research highlights the importance of advanced health IT systems in supporting VBHC. For instance, Baillieu et al. (2020) reveal that optimized health IT, especially EHR and decision-support tools, significantly enhances care quality by facilitating outcome tracking and improving coordination among providers. Similarly, big data analytics in VBHC, enable the integration of diverse health data sources to support personalized care and efficient resource utilization (Imran et al. 2021).

Without comprehensive and accurate data, manufacturers cannot assess how their products contribute to patient outcomes or pinpoint areas for innovation. Marques-Gomes, Salt, and Pereira-Neto (2021) emphasize that data collection is the first critical step in identifying opportunities for improvement, refining products, ensuring compliance and make informed decisions.

Real-time data

Real-time data further enhances these benefits by enabling manufacturers to address production inefficiencies, optimize supply chains, and adjust products to evolving market demands. This approach directly aligns with VBHC's emphasis on quality outcomes and cost containment. Similarly, data-driven supply chain solutions improve inventory control and product availability, reducing waste and enhancing product quality through optimized logistics management (Think AI 2023).

Data-driven strategies

Manufacturers of pharmaceutical products and medical devices, alongside healthcare providers, are increasingly exploring digital strategies to enhance outcomes, improve patient satisfaction, and optimize costs. The Consumer Technology Association (2020) outlines four essential technological strategies that manufacturers can adopt to facilitate VBHC

implementation:

First, standardizing clinical coding, collaboration and data security across the healthcare landscape is essential to dismantling isolated systems, aligning the goals of stakeholders, and fostering collective progress toward VBHC (Consumer Technology Association 2020). For instance, Santeon hospitals in the Netherlands use standardized scorecards to track patient outcomes and enhance (Okunade et al. 2017).

Second, it is crucial for manufacturers to gather and share transparent, interoperable data, ensuring that all stakeholders in the healthcare ecosystem can leverage this information to drive value (Consumer Technology Association 2020). However, Steinmann et al. (2020) warn that overly transparent data can be susceptible to manipulation, which may limit its learning potential.

Third, incorporating technology is crucial in closing the gap between patient expectations and the priorities of the healthcare system. It facilitates better communication, decision-making, and process integration, thereby aligning patient care with healthcare system objectives (Consumer Technology Association 2020). As Cossio-Gil et al. (2023) highlight, healthcare systems and device companies need to adopt bundled payments for care cycles and ensure the implementation of robust information technology platforms to achieve Value-Based Healthcare.

Lastly, manufacturers can boost efficiency and accountability by leveraging technology-driven value-based payment systems that provide access to critical data and meaningful incentives, reinforcing their role in VBHC efforts (Consumer Technology Association 2020). Digital transformation in healthcare integrates advanced tools and clinical data management to enhance governance, resource utilization, and patient satisfaction (Rosalia et al., 2021).

Data integration

Data integration is essential for improving care coordination and driving Value-Based Health Care models. By analyzing data from different sources, such as claims, EHR, and patient feedback, healthcare organizations can identify care gaps and improve communication among providers. This integrated approach allows patients to receive timely and appropriate care, addressing the inefficiencies and costs associated with fragmented services (HealthConnect 2024).

Data integration allows healthcare providers to gain a comprehensive understanding of patient health, enabling them to recognize patterns and trends that can inform proactive care strategies. This capability not only improves patient outcomes but also enhances care coordination by ensuring that all providers involved in a patient's care have access to the same information (ThoroughCare 2023).

Moreover, a robust data infrastructure is essential for measuring both costs and outcomes effectively. It enables continuous improvement within VBHC models by facilitating the assessment of quality metrics and patient-reported outcomes (MedVanta 2024). Overcoming challenges such as data silos, privacy concerns, and ensuring data accuracy will further support these goals, ultimately fostering a more integrated and efficient healthcare system (ThoroughCare 2023).

Data and patients: collection, use, and challenges

In the realm of VBHC, patient data plays a crucial role in improving outcomes, personalizing treatment, and enhancing overall care quality. One of the primary ways patient data is collected is through PROMs. These tools enable patients to share insights about their health status, quality of life and treatment effectiveness, helping to align clinical decisions with their preferences and expectations (Westerink et al. 2024). The inclusion of patients in this process allows healthcare providers and manufacturers to craft interventions that truly reflect patient-

centered care.

Effective patient data collection relies on diverse methods, including electronic health records, patient-reported outcome measures and wearable technologies. PROMs are particularly valuable because they empower patients to self-report their conditions in real-time, which enhances communication between patients and clinicians (Westerink et al. 2024).

Advantages of collecting patient data:

- Personalized Care: comprehensive patient data enables healthcare providers to deliver more tailored treatments by predicting patient outcomes and refining treatment plans accordingly, as seen in examples like the Martini Klinik (Porter, Deerberg-Wittram and Feeley 2019).
- Enhanced Decision-Making: PROMs and real-time data access support meaningful discussions about treatment options and expected outcomes (Westerink et al. 2024), while integrated data across stakeholders improves validation processes in drug development and reduced clinical trial timelines (Boehncke et al. 2023).
- Empowerment and Self-Management: when patients have access to their health data, they can monitor their progress, which enhances self-management, particularly in chronic condition care (Westerink et al. 2024). Investments in technologies like wearables and home monitoring devices increase data collection outside traditional clinical settings, promoting patient engagement (Boehncke et al. 2023).
- Revenue Opportunities: healthcare data serves as a valuable resource for supporting innovation and research, with potential to generate significant financial returns for organizations sharing it (Boehncke et al. 2023)."

Challenges in data collection:

- Availability and Visualization: data often needs better visualization tools to engage

patient in shared decision-making (Westerink et al. 2024).

- Privacy and Security: ensuring compliance with privacy regulations and implementing strong anonymization protocols is essential, especially with sensitive genetic data (Boehncke et al. 2023).
- Data Quality, Completeness, and Standardization: incomplete or inconsistent data sets hinder analyses. Standardization across geographies and providers support integration and longitudinal tracking, linking outpatient and inpatient data (Porter et al. 2019).

Enhancing patient care and efficiency through data collaboration

A robust, patient-centered data infrastructure is essential for pharmaceutical companies aiming to excel in VBHC initiatives. By organizing data around patients rather than departmental silos, the system provides effective collaboration across the healthcare ecosystem (Boehncke et al. 2023). This infrastructure allows companies to track individuals through various stages of care, from hospitalization to outpatient services, ensuring continuity and quality in patient care.

Standardized definitions for diagnoses and treatment, coupled with real-time insight, enhance data reliability and clinical governance. Incorporating templates and expert systems simplifies workflows and improves patient outcomes, ultimately enhancing care quality and operational efficiency (Boehncke et al. 2023).

2.5. Partnerships

Introduction to Partnerships in VBHC

Collaborative partnerships, or inter-organizational relationships (IORs), unite diverse entities to pool resources, expertise, and capabilities for shared goals (Palumbo, Cosimato, and Tommasetti 2017; Cao and Zhang 2010). These alliances are vital in healthcare, enabling multidisciplinary collaboration among caregivers, manufacturers, providers, insurers, tech

firms, public entities, and patient associations to deliver patient-centered solutions (Teisberg, Wallace, and O'Hara 2020). Such partnerships help organizations overcome institutional barriers, foster knowledge sharing, and drive innovations that improve outcomes while streamlining care delivery (Page et al. 2015; Parmigiani and Rivera-Santos 2011).

Faced with rising costs and demands for quality improvements, healthcare organizations increasingly adopt strategic relationships to enhance efficiency and sustainability (Fleiszer et al. 2015). Manufacturers play a crucial role, leveraging advances in digitalization, personalization, and RWD to co-create value with stakeholders, aligning products and services with VBHC objectives (Jones et al. 2024; Seewald et al. 2020). For instance, partnerships enable data sharing to support evidence-based treatment models, advancing patient care and fostering adaptability and innovation (Jones et al. 2024).

By integrating diverse capabilities, these partnerships generate value beyond what individual entities can achieve, driving continuous improvements across the sector (Teisberg, Wallace, and O'Hara 2020; Carlini et al. 2023).

Partnerships Between Manufacturers, Healthcare Providers, and Patients

Pharmaceutical companies are increasingly building long-term, trust-based partnerships with healthcare providers to enhance patient outcomes and manage financial constraints (Seewald et al. 2020). These partnerships prioritize high-quality, data-driven care, improving treatment pathways, and advancing medical practices (Seewald et al. 2020). A key aspect is the generation of RWD, which fosters mutual understanding and strengthens research collaborations by enabling ongoing monitoring and enhancement of treatment outcomes (Seewald et al. 2020). By engaging with healthcare providers around optimal patient outcomes, manufacturers are moving beyond traditional transactional roles to a collaborative problem-solving model (Seewald et al. 2020). This shift enables healthcare providers and

manufacturers to address challenges together, aligning their efforts around broader objectives that support the VBHC framework (Seewald et al. 2020).

Manufacturers hold a crucial position in these partnerships by delivering innovative treatments and offering data-driven insights to providers (Seewald et al. 2020). Their global reach facilitates the exchange of best practices across regions, empowering healthcare systems to adopt effective strategies and enhance patient care (Seewald et al. 2020). Engagement between manufacturers and healthcare providers is not limited to clinical aspects but also involves communication about new therapies (Jones et al. 2024). For example, personalized treatments, such as biologics, require clear communication between manufacturers and providers to address benefits, limitations, and broader implications (Jones et al. 2024). Boehringer Ingelheim mentions that progress in biological treatments can be achieved by collaborating with healthcare professionals, payers, employers, and patient associations which demonstrates how partnerships can improve treatment journeys and bring value to healthcare communities (Boehringer Ingelheim, n.d.).

Patient and public involvement (PPI) is equally vital in VBHC. Manufacturers increasingly collaborate with advocacy groups to address patient needs and preferences in treatment decisions (Plessis et al. 2017). For example, UCB and AstraZeneca engage patients in research and development, aligning strategies with real-world needs through digital platforms and direct involvement (Plessis et al. 2017). PPI in healthcare decision-making is globally recognized for its value, since studies across 73 countries confirm its universal applicability and importance in shaping patient-centered care models (Bergholtz et al. 2024). Incorporating patient voices drives innovation and ensures healthcare solutions meet clinical and personal needs, further aligning with VBHC goals.

Cross-Sector Partnerships

While the relationship between healthcare providers, patients, and manufacturers has been previously addressed, this section will explore the broader landscape of cross-sector partnerships. These collaborations, involving pharmaceutical companies, technology firms, insurers, healthcare providers, and community organizations, advance VBHC by integrating diverse capabilities to drive progress in areas such as data-driven treatment development, digital health innovation, integrated care models, and personalized treatment.

An example of data-focused collaboration is Boehringer Ingelheim's partnership with IBM which uses artificial intelligence (AI) to accelerate antibody drug discovery, enhancing precision and efficiency in drug development (Waldron 2023; Vermeer and Thomas 2020). Similarly, Pfizer collaborates with Tempus to leverage AI systems for oncology treatment development, integrating multimodal data to advance personalized cancer therapies (Tempus 2023; Jones et al. 2024). AI applications in diagnostics and treatment customization enable personalized plans tailored to patient profiles, exemplifying healthcare innovation (Jones et al. 2024).

Novartis exemplifies digital innovation partnerships through its collaboration with Microsoft to establish an AI innovation lab focused on life sciences (Vermeer and Thomas 2020). This partnership applies AI to enhance various stages of drug development and healthcare delivery, supporting Novartis's commitment to digital transformation (Vermeer and Thomas 2020). Additionally, Novartis' SMS for Life program uses mobile technology to optimize medicine accessibility in low-income regions through improved inventory management (Novartis 2019). These partnerships allow pharmaceutical companies to leverage digital solutions from tech firms, while tech companies benefit from healthcare expertise and regulatory guidance (Bréant, Turina-Malard, and Kleinmann 2018).

Collaborations with insurers also emphasize value-based care models. For example, in its partnership with Boehringer Ingelheim, UPMC Health Plan has developed a value-based

reimbursement model to align incentives and improve patient outcomes while controlling costs (Chernew and Fendrick 2018). These models tie reimbursement to treatment effectiveness rather than service volume, fostering accountability and sustainable healthcare practices.

Additionally, healthcare providers are increasingly partnering with community organizations to address social determinants of health, such as food security and housing support (Lundeen et al. 2017; Rog et al. 2014). As an illustration, EHR systems now incorporate evaluations of social determinants, enabling providers to refer patients to relevant social services (Solomon and Kanter 2018). An example is North Carolina's NCCARE360 program which connects healthcare providers with social services, facilitating coordinated care that addresses patients' broader needs (Fichtenberg et al. 2020). By integrating healthcare with community support, these partnerships enhance patient outcomes and encourage holistic, sustainable care models.

Through data sharing, digital solutions, and coordinated care approaches, cross-sector partnerships play a critical role in advancing VBHC by addressing diverse patient needs, improving care quality, and ensuring long-term sustainability.

Metrics for Evaluating Partnerships

Despite their importance in advancing VBHC, partnerships lack standardized metrics for evaluation. Addressing this gap requires multidimensional approaches to assess financial, social, and operational impacts, ensuring alignment with VBHC goals. However, there are some methodologies and frameworks that have been used to guide these evaluations and provide valuable insights.

Frameworks like the value-mapping method (Appendix 3) proposed by Bocken et al. (2013) offers tools for identifying value creation, destruction, and capture within partnerships, enabling organizations to understand dynamics across their value networks, including

employees, suppliers, and communities (Carlini et al. 2023).

Additionally, methodologies such as the Innovation Ecosystem Map, Canvas, and Scorecard further delineate stakeholder roles and objectives, fostering structured collaborations that drive innovation (Jones et al. 2024). Moreover, tools like the Ecosystem Strategy and Dashboard help organizations set goals, track progress, and ensure alignment with VBHC principles, thereby supporting transparency and accountability across all partners involved (Jones et al. 2024).

Challenges and Opportunities in Partnerships

While partnerships are vital for advancing VBHC, they face distinct challenges and opportunities. Key hurdles include aligning diverse organizational structures, cultures, and operational priorities, as well as fostering trust among stakeholders. Successfully navigating these complexities is essential to maximize the value these partnerships offer.

Trust, particularly from patients and healthcare providers, is critical but often difficult to achieve. Concerns about the intentions, reliability, and data-sharing practices of external partners can hinder collaboration (Miller, Nath, and Line 2017; Al-Majali 2019). Overcoming these barriers requires transparency, sustained commitment, and clear communication about the benefits and limitations of new treatments (Plessis et al. 2017; Seewald et al. 2020). Trust-based partnerships enhance coordination and align stakeholders with VBHC principles (Seewald et al. 2020).

Direct patient engagement is another challenge for manufacturers, constrained by perceptions that such interactions are inappropriate (Plessis et al. 2017). However, frameworks like the Consensus Framework for Ethical Collaboration provide guidance to foster transparent relationships between manufacturers, providers, and patients (Fralick 2014).

Another core challenge in partnerships lies in managing differences in organizational

structures, business models, and cultural approaches. While even internal workflows can be complex, these challenges multiply when multiple entities with distinct systems and priorities collaborate (Fichtenberg et al. 2020). For example, pharmaceutical companies often favor rigorous risk assessments, while technology firms prioritize rapid, iterative experimentation (Thomas 2016; Vermeer and Thomas 2020). Bridging these differences requires balancing precision with agility to create cohesive workflows that leverage the strengths of each partner.

Operational and financial alignment also poses difficulties, particularly in collaborations with human services organizations that often face limited funding and fragmented systems. These constraints can hinder their ability to meet the operational demands of healthcare partnerships (Fichtenberg et al. 2020). Power imbalances further complicate matters, as healthcare organizations typically wield greater financial and political influence. Sustainable financing models and equitable resource-sharing mechanisms are essential to fostering balanced and mutually beneficial partnerships (Fichtenberg et al. 2020).

Data privacy and security present another critical concern in VBHC partnerships. The growing reliance on data-sharing introduces risks, including privacy breaches, data misuse, and cybersecurity threats (Al-Majali 2019; Grom 2013). Patients may feel uncomfortable with external access to their personal data or its potential commercial misuse. Robust data protection frameworks, active involvement of legal and compliance teams, and transparent communication are necessary to safeguard data and maintain trust (Berger and Ball 2017).

Despite these challenges, partnerships provide significant opportunities for learning, experimentation, and innovation. Effective collaboration enables organizations to identify strategic priorities, explore tailored partnership models, and develop capabilities to navigate evolving payer markets. For example, partnerships promote resource-sharing and risk distribution, particularly in high-cost, high-risk areas like personalized medicine. Developing treatments for small patient populations carries substantial financial risks, but collaborations

with external organizations, such as tech firms or start-ups, help distribute costs and enhance innovation (Roland, Fox, and Baker 2024; Jones et al. 2024). By leveraging complementary expertise, organizations can deliver advanced, patient-centered solutions while minimizing financial strain.

2.6. Regulatory Compliance

Regulatory compliance is an essential element in the healthcare system that allows to sustain the safety and the quality but it presents significant challenges for manufacturers within VBHC frameworks (Rawson and Kaitin 2003).

Regulatory Standards for Pharmaceuticals and Medical Devices

Regulatory bodies enforce strict standards that safeguard public health, demanding rigorous processes such as clinical trials, post-market surveillance, and safety monitoring (Basch et al 2016). Among such organizations, the U.S. Food and Drug Administration (FDA) or the European Medicines Agency (EMA) can be brought as an example. Compliance with these standards is resource-intensive, requiring manufacturers to undergo lengthy and costly approval processes, which can limit their ability to innovate and adapt to VBHC (Pammolli et al. 2011). International guidelines, such as ISO 13485, provide a framework for quality management, promoting risk control and consistent quality assurance critical for regulatory compliance and aligned with VBHC goals (Donawa 2016).

Challenges Faced by Manufacturers

Compliance with regulatory standards poses significant operational limitations for manufacturers due to the high costs and extended timelines of clinical development and approval processes (DiMasi et al. 2016). Lengthy regulatory processes can delay the availability of innovative products and make it challenging for manufacturers to respond swiftly to VBHC requirements (Pisano 1997). Additionally, the preference of regulatory

bodies for controlled clinical trial data over real-world evidence (RWE) limits manufacturers' ability to leverage RWE for demonstrating product value in real-world applications, which are crucial for VBHC models (Basch et al. 2016).

Some experts advocate for regulatory flexibility, suggesting that agencies should modernize their standards to allow greater use of RWE while maintaining safety standards, which could accelerate the introduction of value-aligned products (Gottlieb & Woodcock 2018). However, balancing regulatory caution with flexibility is challenging, as maintaining data integrity and robust validation remains a primary concern for regulatory bodies (Porter 2010).

3. Methodology

This project aims to create a structured, step-by-step plan for implementing Value-Based Health Care within pharmaceutical and medical device companies, collectively referred to as manufacturers. To achieve this objective, a qualitative methodology was used to investigate the obstacles, strategies, and opportunities associated with the transition to VBHC.

In-depth interviews were chosen as the primary data collection methods to obtain precious insight from industry experts (Appendix 4 for interview questions). Participants were selected through a multi-stage process: an initial list of 126 professionals (Appendix 5) was compiled based on targeted research, including, recent winners of the VBHC Prize 2023/2024f and prominent VBHC experts. From this pool, 20 experts agreed to share their knowledge with our project (Appendix 6). Subsequently, 8 additional participants joined the study, referred by Professor João Marques Gomes (Appendix 6).

Experts represented diverse roles of the industry, including consultants, hospital managers, clinicians, practitioners, pharmaceutical and medical device representatives, healthcare IT specialists, procurement experts, payers/insurers, and academic researchers.

The interviews were conducted between September 23, 2024, and November 6, 2024, in

English, Portuguese and Italian to accommodate the participants' linguistic preferences.

Prior each interview, participants were asked for permission to record the audio to ensure accurate transcription and analysis.

Following the interviews, transcripts were carefully reviewed and categorized by topic using an Excel spreadsheet, with special consideration to the profile of each interviewee. Recurring patterns within each category were identified, allowing the identification of key insights directly from industry experts (Appendix 7).

In addition to this, participation in the Société Française pour la Valeur en Santé conference in Paris provided an opportunity to share ideas and gather valuable perspectives. This includes learning from previous studies and pilot projects, underlying a comprehensive understanding of multi-stakeholders' approaches, key to have a broader vision of the whole scenery.

This qualitative approach enhances our understanding of best practices and obstacles in VBHC implementation, providing a grounded basis for our proposed framework.

Themes were categorized for detailed examination, resulting in key findings across the following areas: 1. Institutional Strategy, 2. Business Model Transformation, 3. Preparation, 4. Mapping and Design, 5. Building, 6. Implementation, 7. Improvement Cycle.

Additional examples were also included to enrich the analysis and provide practical insight.

Key findings from the qualitative researched were analyzed in depth and combined with insight from a comprehensive literature review to develop a step-by-step plan for implementing VBHC in manufacturing companies. This plan outlines actionable steps that address key areas identified during the research, ensuring a tailored strategy that aligns with the specific needs and operational dynamics of the manufacturing sector.

The plan prioritizes adaptability and practicality, providing clear guidance on overcoming

implementation challenges and optimizing outcomes for stakeholders.

Ethical considerations

The study adhered to stringent ethical standards, with informed consent obtained from all participants. Confidentiality was safeguarded through anonymization, and all audio recordings and transcripts were securely stored to comply with data protection regulations. Participants were also given the option to review and withdraw their contributions if desired, ensuring transparency and trust throughout the research process.

4. Findings

4.1. Education, Cultural Shift and Change Management

The insights gathered from experts underscore the critical role of education, cultural shift, and change management in advancing VBHC. Experts emphasized that for VBHC to be successful, it is essential to build a strong educational foundation, foster a value-based cultural mindset, and implement structured change management practices that support long-term transformation.

Education and Skill Development

Education is a cornerstone for the successful implementation of VBHC, as experts emphasized the need for continuous training at all organizational levels to embed its principles within healthcare practices. Sally Lewis highlighted that the foundation of VBHC relies on educating industry professionals to understand diverse perspectives across the healthcare system, from policy to clinical settings.

"You have to start with education and engagement of the industry workforce, which includes understanding the various perspectives within the healthcare system, from policy to providers to clinicians." Sally Lewis (Independent healthcare consultant, previously working for NHS)

Sally Lewis further noted the importance of continuous professional development, advocating for a sustained focus on upskilling teams in the principles and application of VBHC.

Graham Elderfield emphasized that the starting point for education is ensuring a shared understanding of VBHC principles across all stakeholders.

"The first and foremost thing is to get everybody to understand what value-based Healthcare is and ensure everyone is on the same page." Graham Elderfield (International Healthcare Partner)

This alignment is essential to establish a collaborative environment where all stakeholders are working towards a common vision.

Training also extends beyond initial education to include real-world application skills. Chester Good emphasized that handling value-based contracts requires specialized knowledge.

"Training in handling value-based contracts and related data is essential for healthcare staff." Chester Good (Senior Medical Director at UPMC Health Plan)

Lastly, experts also highlighted the importance of educating commercial teams in understanding and communicating VBHC's impact on patient outcomes rather than focusing solely on product features. Jennifer Clawson explained that sales teams in pharmaceutical and medical technology companies need training to communicate the outcomes-focused value of their products.

"Training its commercial teams means educating the sales force on why competing on outcomes matters and how to measure them." Jennifer Clawson (Partner & Director, Value-Based Health Systems at BCG)

This shift from feature-based sales to outcome-focused communication represents a significant adjustment in how companies engage with healthcare providers and patients, supporting the broader cultural shift necessary for VBHC.

Cultural Shift Towards a Value-Based Mindset

Implementing VBHC requires a fundamental cultural shift within organizations, and Craig Barratt emphasized that VBHC integration necessitates a transformation at every level, potentially involving new hires who are aligned with VBHC principles.

"*You either have to fundamentally change the culture and behavior of everyone you currently hire, or you need to hire different people" Craig Barratt (Principal at Oliver Wyman)*

In addition, experts like Luís Pereira noted resistance among clinicians who are hesitant about outcome-based evaluations due to fears of personal performance assessments.

"Many physicians resist outcome-based evaluations due to fear of personal performance assessments." Luís Pereira (Country Director in Medtronic Portugal)

This insight reveals a cultural challenge within clinical teams, where change management efforts must address such apprehensions to achieve broader acceptance of VBHC.

Change Management and Organizational Alignment

For VBHC initiatives to succeed, a structured approach to change management is essential, as it provides a clear framework to guide transitions and align organizational priorities. Elisabeth Angelina emphasized the need for systematic change management, which is how they practice

in Singapore General Hospital.

"In change management, the process should follow specific steps; doing projects erratically without a solid framework rarely yields results." Elisabeth Angelina (Manager at Value-Based Healthcare Office of Singapore General Hospital)

Robert McGough also highlighted the importance of aligning incentives across teams to prevent fragmented efforts that could undermine VBHC goals. Emphasizing that misaligned incentives can lead to conflicting priorities.

"The mindset change for a successful value-based implementation is when everyone operates together toward outcomes." Robert McGough (Partner at Hill Dickinson LLP)

Role of Leadership in Driving Cultural and Structural Change

Leadership emerged as a crucial element in the implementation of VBHC, with experts highlighting that leaders are essential for guiding cultural and structural change. Effective leadership begins with asking fundamental questions like "why" and "what" to establish a clear purpose and direction. Elizabeth Teisberg emphasized that leaders should start by questioning how to create value for patients, which sets the tone for organizational priorities.

"Companies should always start by asking, 'How do we create value for patients?' instead of 'What's the value to us?'" Elizabeth Teisberg (Executive Director of the Value Institute for Health and Care University of Texas)

Mike Cullen shared his experience in leading VBHC initiatives at B. Braun, noting that strong leadership is needed to "win over hearts and minds internally" and to drive the organization towards a value-based focus. He emphasized the importance of leaders who understand and communicate the strategic value of VBHC, aligning staff efforts with the overall mission of improving patient outcomes, because it was with a leader that the transformation started in B

Braun UK.

To ensure sustainable change, leaders must also establish performance indicators that track VBHC progress and demonstrate its impact. This approach helps maintain organizational alignment and encourages continuous improvement as mentioned by César Abicalaffe.

“Regular evaluation of KPIs and feedback sessions allow manufacturers to continuously refine their approach and ensure alignment on shared goals.” César Abicalaffe (CEO and Founder 2iM Inteligência Médica)

Experts also suggested that the responsibility of VBHC leadership extends to restructuring organizational processes to support collaborative, cross-functional teams. Alexandra Schmidt explained that organizations must assign responsibility for VBHC processes to dedicated teams, each focused on specific outcomes, evidence generation, and patient care plans.

“The whole organization was structured around these streams, with appointed teams coordinating efforts to make it move forward.” Alexandra Schmidt (Value Transformation Director at Air Liquide)

Vincent Wiersma further emphasized the critical role of healthcare consultants in bridging the gap between manufacturers and healthcare providers.

"In our organization, healthcare consultants are crucial in helping hospitals collaborate effectively to achieve better outcomes. They work directly with healthcare professionals, not just setting up collaboration frameworks, but also providing ongoing, hands-on assistance throughout the process, which is a key element that not everyone implements." Vincent Wiersma (Value, Access & Policy Manager Cardiovascular at Amgen)

4.2. Pricing and Costs Pathways

Experts in the field, both for pharma companies and medical devices ones emphasizes the

need for pricing strategies that align with outcomes that can be measurable and deliver mutual value. Many frame value-based pricing as a form of shared responsibility rather than simply a cost-cutting tool.

Nevertheless, many parts on the practicality of these models. While some support value-based pricing's potential to improve care, others question its feasibility, naming challenges like logistical complexity and high administrative costs. There is also quite a debate over the level of accountability suppliers should bear through performance-based contracts and the optimal financial models for VBHC, starting from baseline pricing to complex repayment systems.

Overstatements of Value

Experts in healthcare pricing and value-based healthcare agree that overstatements of value significantly interfere with effective pricing strategies for medical products. When suppliers exaggerate the benefits of drugs or devices, it leads to unjustified price increases that weight healthcare providers and patients. These inflated claims complicate the measurement of real-world outcomes, eroding trust between suppliers and providers and resulting in poor treatment decisions. To establish fair pricing models, experts emphasize the importance of relying on verifiable, evidence-based claims. By focusing on accurate data and transparent reporting, stakeholders can develop pricing strategies that truly reflect the value delivered, ultimately improving patient outcomes.

Alan Wain (Partner & Chief Operating Officer at EPSCOT) underlines how strategies of many pharma and devices companies often sell their products at a higher price focusing on value and Brian Mangan (Executive Board Member European Association of Value-Based Health Care) also focuses on the need of having a model that aligns with measurable outcomes to evaluate prices and value.

Luís Rocha (Invited Professor Healthcare management ISCSP-ULisboa) aligns with the need

of defying value at first:

"Value can be used for pricing, but it depends how you define this. You can use value-based health care not only for pricing but for broadening your clients and gain better achievements. A model that defines value, and therefore price is needed."

Cost-benefits analysis

Luís Gomes' example of hepatitis C treatment highlights the complexities of evaluating cost-effectiveness in medicine, where different treatments can vary significantly in cost and outcomes. He points out that the new hepatitis C drug, priced between 50k-100k per treatment, must be compared not only to the previous chronic medication but also to the potential cost of a liver transplant, which can reach around 500k.

"We must effectively compare what is the cost saving of the new product."

Luís Gomes (Consultant at Hovione)

Here, Gomes underlines the importance of evaluating new treatments in the context of both immediate and long-term financial impact and stresses out how challenging is that considering their potential to improve patient quality of life.

Elizabeth Angelina adds that even treatments that possibly and effectively can bring more value to patients can drive costs higher:

"In our department, we take a comprehensive approach to evaluating costs…one procedure might allow for same-day discharge with minimal monitoring, while another, despite being cheaper, may require an additional day in the hospital."

Angelina's point of view is that comprehensive costs evaluation must consider all factors, not only different procedures and prices. Treatments with higher upfront costs may actually be more cost-effective if they reduce hospital stays and monitoring needs, providing better value

to patients.

Michel Mohler (CEO and Founder of Lyfegen) notes the fundamental uncertainty in evaluating value in the medical sector:

"There are still a lot of things to be discovered here, because many things can happen that are not in anyone's hands."

He emphasizes the unpredictability of medical outcomes, focusing on the fact that evaluations in healthcare requires flexibility and a realistic view of the potential for unpredicted complications.

To conclude, many experts agree that in the medical sector it is hard to focus on a VBHC model, since the unpredictability of the outcomes and the measurement can lead to a misinterpretation of the pricing models.

Guaranteeing Pathway Cost Reduction

Cost reduction has been challenging when evaluating VBHC and experts have highlighted differences within the solutions and models that can be taken into account.

Chester Good argues that even though VBHC contracts claim to lower drug costs too, they focus on helping monitoring clinical outcomes, especially in rebate-reliant systems.

"While valuable for tracking clinical outcomes, value-based contracts do not inherently lower drug costs, particularly in systems that rely on rebates. They remain challenging to scale due to the complexity and cost of administering each contract."

Here, Good highlights the challenge of using value-based contracts to reduce costs due to their administrative complexity, which can make true cost reduction difficult to achieve.

Hans Bax (Procurement Expert in VBHC) points out the importance of collaboration within

organizations and recalls establishing a baseline price for medical technology. In his view, this approach can lead especially to price stability, as well as to cost reduction.

"So this is a price which is always being paid for the technology and then based on the outcome the supplier gets a bonus payment or a penalty, but they will always get this baseline price - gives them security."

Bax's proposal defines how baseline pricing combined with outcome-based adjustments could help suppliers manage risk and maintain stability.

David Ikkersheim (Partner at KPMG Nederland, Strategy in Health Care & Life Sciences) advices that traditional billing models, with charges highlighted for different items, are more effective for cost management. Nevertheless, he also sees potential in value-based pricing for situations where treatment efficacy is uncertain or when treatments are highly utilized or expensive.

"Value-based pricing could be effective when there are questions around a treatment's efficacy, or if the treatment is either widely used or highly priced, as these situations can drive up transaction costs."

The meaning of what he meant is that value-based pricing may be best suited to high-stakes treatments, where its complexity can be justified by the potential for cost savings.

These insights reveal the challenges and nuances of implementing value-based pricing healthcare. Once again, these models may support outcome tracking and accountability, but their complexity and the need for a stable baseline price raise questions about their effectiveness in achieving costs reduction.

Different cost models

Experts have different opinions on pricing models for value-based healthcare cost reduction,

reflecting diverse areas of attention.

Alan Wain advocates for pathways costing with Activity-Based Costing (ABC) which he believes ensures better allocation of resources by assigning costs based on specific activities, therefore reducing financial waste.

Elizabeth Angelina highlights the importance of analyzing investment returns when introducing new products. For instance, in the context of robotic surgery, she suggests that the economic feasibility of a new product depends on the number of surgeons trained to use it and the volume of cases handled.

"We project the potential return on investment when introducing new products and consider how many surgeons can be trained and their willingness to adopt new methods, as some may have established preferences. If they are resistant to using new implants or products, then introducing a superior product may not be worthwhile."

Here Angelina underscores that to make VBHC sustainable, organizations must evaluate the return on investment for new technologies by considering the adoption rates and training costs among healthcare professionals.

César Abicalaffe sees discount-based models as an effective strategy for VBHC, suggesting that outcome-based rebates or future treatments discounts can support VBHC's financial viability. *"Discount-based models can help make VBHC financially viable, such as offering rebates based on outcomes or discounts on future treatments for patients who meet specific KPIs,"* he explains, emphasizing how aligning discounts with outcomes can help manage costs.

Similarly, a representative from Novartis advocates for new reimbursement mechanisms to make VBHC more broadly adopted. Giuseppe Banfi (VP and Managing Director Biogen Italia) adds that policy-driven pricing can also support VBHC when asked to demonstrate

value.

"Price determination is largely a policy decision but proving that a new drug or device provides genuine value can facilitate reimbursement."

Banfi says, suggesting that incremental improvements over current treatments are crucial to analyze VBHC pricing.

As it is possible to notice from these insights, experts are still not completely oriented in the same direction with the models that can be used regarding costs savings. Strategic alignment is indeed needed to have a better structure.

Luís Gomes believes that pharmaceutical companies are willing to commit to outcome-based contracts, as they have high confidence in their clinical results, backed by accurate testing before commercialization.

Michel Mohler points out the importance of clear patient eligibility in risk-sharing models, especially for costly treatments like cancer drugs.

"Pay for performance will only include those in that scope"

This clarifies that risk-sharing applies only to eligible patients.

4.3. Outcome measurement

The insights gathered from experts highlight the multifaceted nature of outcome measurement. Experts emphasize the importance of aligning outcomes with stakeholder priorities, where metrics should reflect not only clinical success but also patient-centered goals. Implementing effective outcome measurement involves overcoming significant real-world challenges, including the adaptability of metrics to diverse situations, and the gap between clinical trial efficacy and actual results. Additionally, standardizing outcome measures remains essential for benchmarking, while incorporating patient feedback based on PROMs and PREMs

(patient-reported experience measures) ensures that outcomes reflect what truly matters to people receiving care. This collective expertise shows the importance of building adaptable, reliable, and patient-focused outcome frameworks to advance adopting VBHC model by suppliers.

Defining Relevant Outcomes Across Stakeholders

Experts agree that a one-size-fits-all approach is ineffective, as each stakeholder values different aspects of outcomes. Alejandro Pacheco Padilla (Health Portfolio Manager) highlights that outcome measurement in VBHC must cater to diverse stakeholders aligning them in terms of delivering value.

> *"Though the outcome can vary, it's important to consider who benefits—patients, payers, regulators, companies, doctors." Alejandro Pacheco Padilla*

Focusing exclusively on the outcomes important to companies and hospitals neglects what is essential in patient care. Elizabeth Teisberg supports involving in setting the outcomes all the affected parties – including both patients and clinicians.

> *"Pharma and device companies should focus on outcomes that matter to patients, caregivers, and families, aligning these with what clinicians prioritize." Elizabeth Teisberg*

Challenges in Real-World Outcome Measurement

Several experts note that translating outcome measurements into real-world settings introduces major challenges. Alejandro Pacheco Padilla points out that models in healthcare often serve as initial guides and may fall unapplicable in real settings, particularly in complex medical areas. This fact of predictive models not matching reality is echoed by Chester Good, who insists that value-based contracts play an important role in bridging clinical trial performance with real-world efficacy.

"By setting real-world KPIs and benchmarks that pharmaceutical companies agree to meet, value-based contracts can address the uncertainty of new drug efficacy in diverse patient populations." Chester Good

Standardization and Benchmarking of Metrics

Standardized outcome measures are fundamental for achieving consistency and comparability across healthcare. Elisabeth Angelina emphasizes the importance of benchmarking, explaining that in Singapore, Clinical Quality Index is one of the most reliable methodic to establish a baseline for key metrics. These metrics form a standard list, and the hospitals consult experts for validation, as these indices are often specific to surgical conditions. Elisabeth also mentions trend analysis and deviation-based charting as practical methods for identifying discrepancies in care practices, advocating for a structured approach to outcome data. Jennifer Clawson further highlights the need for the measures standardized globally.

"The outcomes that are most important to measure are outcomes that matter to patient. Standardizing these metrics can ease the burden of measurement on clinical providers." Jennifer Clawson

Incorporating Patient-Centered Metrics

Elizabeth Teisberg especially emphasizes how patient-centered outcomes that encompass capability, comfort, and calm are important, that overall represents functional and emotional well-being prioritized beyond clinical metrics.

"Effective outcomes may not always align with typical clinical process...; even many PROMs fail to capture what truly matters to patients." Elizabeth Teisberg

4.4. Data

Limited Access to Reliable Health Data

The interviews revealed that access to reliable health data is critical for the effective implementation of VBHC, yet it remains a significant challenge. Consistent access to patient data is essential for evaluating treatment effectiveness, optimizing healthcare processes, and aligning stakeholders around patient-centered outcomes.

"An independent third party is often essential for managing data collection and distribution to maintain data integrity and trust across stakeholders." César Abicalaffe

By leveraging third-party partners, organizations can ensure that data is collected and shared transparently, fostering trust among stakeholders and supporting the broader healthcare ecosystem.

Chester Good adds another layer to this need, pointing out that:

"Access to medical data can vary widely, with integrated delivery systems being better positioned to monitor and evaluate health outcomes." Chester Good

For organizations without such integrated systems, the challenge lies in accessing data from external sources. In these cases, "off-the-shelf" contracts or external agreements may be necessary, but these solutions tend to be less flexible and adaptable to the unique needs of the organization.

Craig Barratt further underscores the importance of partnerships, particularly with data analysis firms. He notes,

"Robust data infrastructure is essential, particularly partnerships with data analysis firms. Yet, the true value in these partnerships lies in data access rather than purely analytical capabilities, as 'getting access to the data is what you want a partnership for."

Craig Barratt

Whether through third-party data management, external contracts, or collaborations with data analysis firms, partnerships help ensure that organizations have the data they need to drive continuous improvement in healthcare outcomes.

Real-Time Data Requirements for Efficacy Evaluation

Real-time data access is an important barrier. Michel Mohler emphasized the necessity of timely data points, particularly for understanding how treatments and medical technologies perform across diverse patient profiles.

Data should be actionable and regularly updated. Elisabeth Angelina highlighted that simply storing data is insufficient; it must be used to drive decisions and interventions. Luís Pereira further expands on this, noting that active medical devices enable real-time data collection and monitoring, crucial for tracking patient outcomes in a timely manner.

Enhancing Cross-Border Data Access and Inclusivity in Healthcare

Access to data across borders also introduces unique challenges. Stefanie Devos (Advisor Data & Health Economics beMedTech – Belgian Federation of Medical Technologies) discussed Belgium's new health data agency, developed under the European Health Data Space initiative, which aims to streamline data access for industry stakeholders while adhering to legal requirements. However, Devos notes that despite extensive data collection, much of it remains underused.

"Data is collected extensively but is underutilized for VBHC outcomes, often restricted to metrics like patient visits rather than more meaningful outcome measures." Stefanie Devos

"Ongoing efforts focus on standardizing procedures, creating templates, and defining clear guidelines for data access across hospitals and companies, although interpretations of GDPR remain a barrier." Stefanie Devos

Rossella Tomaiuolo (Associate Professor at Università Vita-Salute San Raffaele) underscores the importance of inclusive data collection practices. She stresses the need to move beyond basic gender distinction to consider specific life stages, such as premenopausal and postmenopausal women, pregnant women, and children. According to Tomaiuolo, these variations, can significantly affect product use and effectiveness, making such distinctions crucial for patient-centered care.

Building Data Infrastructure

An effective data infrastructure is necessary for secure and systematic integration across healthcare stakeholders. As Brian Mangan emphasized, trustworthy, "high integrity" data management systems are essential, especially in industry-led initiatives, to ensure accurate KPIs. César Abicalaffe highlights:

"Manufacturers must invest in robust data infrastructure for real-time collection and analysis, ensuring that data security and regulatory requirements (like patient privacy) are strictly followed." César Abicalaffe

A responsive and compliant data infrastructure is crucial for generating actionable insights into treatment efficacy, fundamental to VBHC.

“Integrated systems that employ data analysts and statisticians within the organization have a significant advantage in tracking KPIs and optimizing contract performance.”

Chester Good

To enhance data reliability, Elisabeth Angelina underscores the importance of harmonizing data across sources, noting that inconsistencies often arise when different healthcare professionals record the same information, like a patient’s "mobility status," in varying ways. Additionally, when data isn’t consistently structured across systems, extracting precise insights becomes more difficult, and often requires time-consuming manual reviews. Standardizing data collection methods and fields could minimize errors and improve reliability.

Some countries are advancing in data integration for healthcare, with Sweden serving as a notable example. Elizabeth Teisberg highlights Sweden’s early adoption of this approach, stating:

"Sweden was another early adopter in this movement, shifting toward the use of registries in the mid-2000s. They initially allowed people to opt-in for learning purposes, which eventually led to these registries being fully integrated into their healthcare system."

Elizabeth Teisberg

Data Analysis and Standardization

Standardizing metrics across healthcare stakeholders is vital for VBHC’s success. Mike Cullen (Head of Value & Access at B Braun) cited NHS England’s “Savings Methodology” as *"a document that really helps facilitate VB healthcare in the NHS (…) especially for devices, it is a rule book, a glossary of agreed evidence-based values for different savings”*. This shared "rule book" allows stakeholders to rely on common data points, making it easier to assess value-based outcomes accurately and ensuring that comparisons are based on a

consistent data standard.

Data quality and standardization are essential, as inconsistent collection across hospitals and regions hinders integration and comparison. Jennifer Clawson provides an example with the Health Outcome Observatory (H2O).

"This project brings together the public and private sectors to create an unprecedented, standardized data governance and infrastructure system across Europe to incorporate patients' experiences and preferences in decisions affecting their individual health care and those of the entire patient community." Jennifer Clawson

The H2O project uses a federated data platform that aggregates anonymized patient data, allowing patients to evaluate outcomes consistently while retaining complete control over their data. This initiative fosters healthcare innovation and advances VBHC by integrating real patient experiences into healthcare decisions.

Efficient data processing is equally important. Robert McCough (Partner at Hill Dickinson LLP) pointed out that merely collecting data is insufficient, it must be processed accurately to generate meaningful insights aligning data with clear objectives.

Finally, optimizing internal processes is crucial. As Elvis Graffeo (Partner and Industrial Operations Director for LifeBee) noted, predictive analytics and AI tools can help healthcare systems manage resources more efficiently, particularly during critical times like the COVID-19 pandemic. Using data to forecast trends allows health systems to better allocate resources, a critical aspect of delivering value-centered care.

4.5. Partnerships

The insights gathered from experts underscore the essential role of well-structured partnerships in advancing VBHC. Successful VBHC partnerships require a shift away from

short-term, transactional relationships toward collaborations that focus on long-term, patient-centered goals. Key elements such as clear alignment of goals, trust-building, and robust data-sharing frameworks are vital for establishing sustainable and effective partnerships.

Engagement Beyond Transactional Relationships

Several experts emphasized the need to move from transactional relationships to true collaborations that benefit VBHC's long-term goals. Hans Bax argued that health providers should start seeing manufacturers as "value drivers" rather than cost burdens.

"VBHC needs providers to see technology and drugs as adding value, not just as a cost."

Hans Bax

Craig Barratt highlighted this challenge, observing that many healthcare buyers perceive partnerships with pharmaceutical and medical device companies as primarily "sales-driven," which hampers trust and meaningful collaboration.

"Pharmaceutical and medical device companies must overcome perceptions that they lack real-world competence or ethical standards, especially as buyers often see them as primarily sales-driven." Craig Barratt

Alignment of Goals and Resources

To shift from transactional relationships to collaborative partnerships in VBHC, experts emphasized that clear alignment on goals and resources is essential. Hans Bax highlighted that both parties must agree on specific goals and allocate necessary resources through a collaborative "team-based" approach.

"For VBHC to work, we need alignment on the goal and resources from the start. The hospital managers, the clinicians, and the med tech companies need to be very well aligned on the goals, objectives, and resources of the partnership." Hans Bax

However, one of the main challenges in alignment is ensuring a consistent understanding of value across stakeholders. César Abicalaffe noted that the concept of "value" can often be misunderstood or interpreted differently, which complicates efforts to establish shared goals.

"The first challenge for manufacturers is aligning the understanding of VBHC principles with all stakeholders, as the concept of 'value' is often misunderstood or interpreted differently by each party involved." César Abicalaffe

César Abicalaffe also highlighted the importance of regular KPI evaluation and feedback sessions, allowing partners to adjust strategies and stay aligned on shared objectives.

"Regular evaluation of KPIs and feedback sessions with stakeholders allow manufacturers to continuously refine their approach and ensure alignment on shared goals."
César Abicalaffe

Trust as a Foundational Element

Building trust allows for deeper collaboration, open communication, and ultimately a more cohesive approach to achieving patient-centred goals. Hans Bax pointed out that building trust is a step-by-step process, especially since many procurement teams still view partnerships as transactional.

"It's all about trust, needs trust in building relationships. In this field there's a lot of distrust, however, it's increasing slowly. Clinicians understand the value however, procurement they are still very transactional focused." Hans Bax

According to Barratt, this lack of trust often stems from past experiences where short-term, transactional engagements failed to produce meaningful outcomes for either party.

"Trust is a foundational issue, and it's a crisis between providers and manufacturers. Buyers often see partnerships as more transactional than collaborative." Craig Barratt

This trust deficit needs to be addressed at an institutional level, shifting perceptions from short-term gains to long-term value.

Patient-Centered Partnerships

In line with VBHC's patient-centered model, experts underscored the importance of engaging patients as active partners within healthcare frameworks. Elizabeth Teisberg stressed that VBHC partnerships should begin with a focus on patient experiences, positioning patients as core contributors rather than passive recipients.

"When I talk about building partnerships, it's crucial that these start with patients. Imagine bringing together a group of patients or potential patients who could benefit from support, considering what matters to them in their care." Elizabeth Teisberg

Elvis Graffeo acknowledged the obstacles that can arise in patient-company partnerships, particularly around privacy concerns and the logistics of meaningful engagement. He emphasized, however, that adopting a shared-benefit model could help overcome these challenges.

"There is a potential for creating partnerships between companies and patients, though currently there are significant obstacles, such as privacy. Achieving a collaboration between patients, hospitals, and companies would require a system where everyone sees a shared benefit, even if this might mean a temporary reduction in profits for all parties." Elvis Graffeo

4.6. Regulatory compliance

Insights from experts reveal that legal constraints imply great challenges to adopting value-based healthcare. Key issues include restrictions on outcome-based payments and caps that limit the flexibility of VBHC contracts. The limitations prove the need for regulatory

adaptations to sustain VBHC full potential, as well as for guidance from the governmental and regulatory authorities.

Constraints on Outcome-Based Payments and Financial Caps

In public health institutions, where rigid procurement rules prioritize immediate costs over long-term outcomes, value-based contracts face additional constraints. Luís Pereira observes that procurement in these institutions often focuses on price rather than outcomes, creating a structural barrier for adoption. Sally Lewis adds that many procurement professionals view VBHC industry partnerships as risky or uncertain within the current legal framework, resulting in companies avoiding engagement in these contracts.

"Some procurement professionals in healthcare systems are not quite sure how to build the sorts of industry partnerships that value-based healthcare lends itself to within the bounds of existing regulations." Sally Lewis

Regulatory Policies Impacting Pricing and Off-Patent Compliance

Pricing policies, especially for off-patent drugs, add another regulatory hurdle to VBHC implementation. Regulatory policies often prioritize standard price-focused models over value-based pricing. This rigidity in pricing and compliance frameworks inhibits the adoption of VBHC models that rely on more flexible pricing strategies. As regulations restrict how companies can adjust pricing based on outcomes, they also limit the competitive potential of VBHC to deliver improved healthcare results, thus justifying the variance of cost structures based on performance.

5. Discussion

5.1. Implementation Plan

Plan Overview

This Value-Based Health Care Implementation Plan is designed specifically for manufacturers in the healthcare sector—particularly pharmaceutical and medical device companies. The objective of this plan is to integrate the core principles of VBHC, prioritizing patient-centered care and placing health outcomes at the heart of every decision. Unlike traditional models that focus primarily on monetary compensation, VBHC emphasizes improving patient health, measuring care quality, and ensuring that value is derived from positive patient outcomes rather than service volume.

Development Process

The initial development of the implementation plan started with an extensive review of the theoretical concepts and potential of Value-Based Healthcare, highlighting insights from academic research and studies. Furthermore, in addition to this literature review, inputs were gathered from a diverse range of professionals, including those from medical device and pharmaceutical companies, as well as academic experts. The information retrieved covered various topics related to enhancing VBHC implementation.

By integrating findings from both the academic research and the expert contributions, the plan was shaped to reflect the most applicable information and actionable strategies. This plan represents a way to serve as a practical resource for manufacturers, to demonstrate how they can align their operations.

Key Principles

The whole plan represents the ones that are highlighted in the foundational concepts of Value-Based health care. The ones that are stressed in this plan is the emphasis on education,

suggesting a shared understanding of value that prioritizes patient health as the ultimate measure of success. Risk sharing is another central aspect, with the plan underlying the importance of building robust partnerships to drive its development. A sustainable approach to data sharing is also critical, ensuring that companies operate with clear and transparent guidelines. This includes establishing a standardized framework for highlighting key performance indicators and conducting feedback sessions. This leads to one of the most important principles: collaboration.

Plan Structure

The implementation is structured in six phases (Appendix 8) to ensure a phased adoption of VBHC principles across manufacturing operations:

- Institutional Strategy: Establishing a strategic alignment on VBHC principles, delineating a mindset change, and building board-level commitment to patient-centered care. This phase also includes assessing capabilities and forming a dedicated VBHC team (Appendix 9).
- Business Model Change: Restructuring the company's traditional business model to better reflect VBHC objectives, including risk-sharing strategies, outcome-based pricing, and starting the alignment from headquarters with the Value Team.
- Preparation: Identifying suitable products to apply the VBHC model, assembling cross-functional project teams, and ensuring alignment across all company levels through targeted training.
- Mapping and Design: Developing specific elements like outcome measurement, pricing frameworks, data access strategies, and partnerships to support VBHC practices within product planning and delivery.
- Building: Implementing the necessary data infrastructure and real-time analytics

capabilities to measure outcomes accurately, as well as training for sales and cross-functional team members to adapt to VBHC demands.

- Implementing and Improving: Implement VBHC-based procurement, reimbursement schemes, and agreements, followed by continuous improvement through regular feedback, KPI measurement, and partnership evaluations.

Timeline

This implementation plan is tailored for specific products, understanding the variability in feasibility and timelines across the diverse landscape of pharmaceutical and medical device companies. Given this breadth, the timeline will naturally depend on the product under consideration and its development requirements.

Nevertheless, the plan outlines specific key guidelines that companies need to follow. The procurement process to establish the Value Team should be completed with a maximum of three months. Following this, another 1-month trial period is conducted, where the team's suitability is assessed, and an educational plan is developed. This educational phase lasts between 6 to 8 months. The goal is to ensure the preliminary groundwork is completed within 1 year. This structure enables prompt product development.

Phase II – Mapping and Design

At this point it is necessary to define the outcome measurements and pricing strategy, ensure data access and launch work towards building valuable partnerships.

Outcome measurement

Select meaningful and measurable KPIs and align them across stakeholders

The Value Team works to identify outcomes that align with the interests of all stakeholders, including patients, payers, providers, and the company. For patients, these include improvements in quality of life: increased mobility or reduced pain. Payers require metrics that demonstrate economic value. There are decreased treatment costs or minimized emergency care utilization among them. Providers focus on clinical effectiveness measures, like treatment success rates or adherence to evidence-based guidelines. Internally, the company should prioritize KPIs that showcase product differentiation and innovation, for which improved safety profiles or increased market adoption rates can be chosen, for example.

The Project Team (Appendix 9) defines patient-centered metrics like functional capabilities, comfort, and ease of daily life. These goals reflect patient priorities, such as the ability to work and experience reduced discomfort, making outcomes that resonate with patients and support supplier goals.

The Project Team selects KPIs that are simple, measurable, and relevant in real-world healthcare settings, such as hospitalization days and readmission rates. These KPIs serve as foundational measures, which can evolve as VBHC models mature to include more disease-specific and sophisticated indicators. The data experts help by designing KPI metrics that capture both clinical trial data and real-world performance.

Predictive KPIs offer an additional layer of insight. By analyzing patterns in patient behavior or clinical data, the Project Team can flag potential risks, such as non-adherence or

complications, allowing proactive interventions. These predictive models have a potential for adding to the stakeholder value through optimizing outcomes and resource allocation.

Standardize outcome measures across products

The Project Team uses standardized measures, such as those from ICHOM, to maintain consistency across products. This standardization simplifies reporting, reduces the administrative load on healthcare providers, and allows comparisons across different VBHC contracts and initiatives. Both teams work to align these standardized measures with global benchmarks in order to support scalability, facilitate quality control, and demonstrate that outcome measurements are in line with international best practices.

To streamline implementation, the company should develop an Outcome Measurement Handbook. That serves as a centralized resource for teams to have access to templates, similar cases, and standardized processes. The handbook becomes a clear guidance on KPI selection and lays the foundation for consistency and accelerates adoption across regions and products.

Incorporate PROMs and PREMs

The Project Team focuses on PROMs and PREMs to include the patients voice in outcome metrics. Metrics like functional recovery, quality of life, and satisfaction with care will provide the foundation for outcomes to be aligned with patient priorities and provision of a holistic view of treatment impact.

The Value Team coordinates with healthcare providers to ensure patients have regular opportunities to give feedback, whether through forms, surveys, or direct communication. This feedback is essential for aligning outcome metrics with patient preferences and adapting outcome measurement to reflect real patient experiences.

Expand patient engagement initiatives to include co-design workshops. When inviting

patients to participate in the design of PROMs and PREMs, it is vital to make sure that the metrics resonate with their lived experiences. This collaboration can build trust and improve metric relevance.

Adapt outcomes based on real-world evidence

The data experts support the work of teams tracking real-world evidence, analyzing data for variation in outcomes due to patient demographics and healthcare settings. The results of the teams work in benchmarking against industry standards serve as the tool for identifying and addressing variations in care from the side of the Project Team. This team in turn does simulations of patient journey to map the pathways in each particular disease or patient condition. Here the variation analysis plays also a great role in pointing out gaps, such as prolonged recovery times or process inefficiencies. These insights can then be used as guidance for adjustments to outcome measures and for standardizing care across varied healthcare environments.

Expand reporting and communication strategies

The Project Team develops advanced reporting tools to enhance transparency and stakeholder engagement. Interactive dashboards allow providers and payers to visualize real-time performance data, track trends, and compare outcomes against benchmarks. Automated reports simplify the sharing of key insights, reduce administrative workloads and improve accessibility.

Phase IV – Implementing

This phase is designed for integrating VBHC following the above defined roadmap, with active involvement from the internal dedicated teams, specialists from various departments including sales, marketing and finance who completed the value-based healthcare foundations training, as well as external data specialists.

Prepare a strong value proposition

The Value team starts implementation by ensuring each product has a clear, evidence-based value proposition. At this moment, it is equipped with data on key outcomes (the following can serve as the references: reduced hospital stays, lower infection rates, or improved patient functionality).

To enhance the value proposition, the team should include:

- Scenario-Based Evidence: provide healthcare providers with data illustrating the product's impact under varied real-world conditions. For example, models that demonstrate how the product reduces recovery time across patient demographics can appear more appealing.
- Patient-Centric Messaging: tailor value propositions to resonate with patient priorities through proper highlighting of the benefits the product provides.
- Competitive Benchmarking: compare product outcomes against competitors to emphasize superior performance and justify premium positioning.

This prepares the company to position products effectively in competitive VBHC environments. It must be ready to compete on outcomes that are both clinically effective and cost-efficient. The basis of the value proposition, and consequently of the competitive advantage, lays in the pre-collected performance data that is used to model and prove the products real-world efficacy.

Compete on pathway cost reduction and present measurable benefits

Competing not only on the product price but also on pathway efficiencies and total cost savings is essential for the Project team to consider when preparing the value proposition. The goal here is to make sure that outcomes achieved through the product demonstrate a reduction in overall care costs. Though as some experts mention that each product influences the cost pathways differently, resulting in increases, absence of change or decreases in particular parts of the clinical pathway this product is involved in, the overall pathway cost is bound to be decreasing to facilitate the value.

Indirect cost factors should be integrated into the value narrative. For example, faster recovery enables patients to return to work sooner – this is a clear benefit for employers and the social protection system. Besides that, higher patient satisfaction scores, with a proven connection to corresponding better outcomes, also appeal to providers that navigate procurement relying on performance-based metrics.

It is also important to allow flexibility for healthcare providers to propose varied solutions to meet outcome goals, instead of narrowly defining criteria. Collaborating with providers to co-design workflows optimizes the product's integration, minimizing unnecessary costs and enhancing efficiency. To substantiate claims, the team uses intuitive data visualizations and real-world case studies to demonstrate cost reductions in diverse healthcare settings. For example, dashboards highlight savings from reduced bed occupancy alongside clinical improvements.

Value-sharing models further strengthen provider partnerships by offering financial incentives tied to pathway efficiencies and aligning the company's success with that of its stakeholders. The company should combine holistic cost analysis, tailored solutions, and transparent data. Then it will be able to deliver a compelling case for pathway cost reduction that resonates

with both payers and providers.

Rollout Implementation

To reduce risks and fine-tune processes, the Project team initiates programs within carefully selected healthcare systems. These projects are the practical application of value propositions, procurement contracts, and financial models in a controlled environment. By focusing on a manageable scale, the team identifies operational bottlenecks, gathers feedback from stakeholders, and observes real-world product performance. This approach allows the team to make data-driven adjustments to both the implementation strategy and specific product metrics.

The outcomes of these projects are systematically analyzed by the data experts to identify patterns and challenges that could inform broader rollouts. Successful strategies are standardized, while inefficiencies are addressed before scaling the VBHC model across regions or products.

Develop and manage value-based procurement contracts

Then each product project team manages to establish a procurement contract for the particular product with the procurement team of the healthcare provider or payer. Such a contract aligns financial incentives with successful treatment outcomes. For instance, a pay-for-performance model adjusts reimbursement based on the product's clinical success. This team manages the agreement, ensuring providers only pay full price when outcome targets are met, which makes high-cost treatments more accessible. In turn, the contracts contain terms that consider situations when the product is underperforming or overperforming, to align the compensation with the actual results based on the value.

Flexible pricing models can help tailor payment structures to specific treatment goals. The finance specialists of the Project team design models that include a base fee with variable

payments based on patient outcomes, reducing financial risk for both parties.

For new or innovative products, temporary reimbursement schemes can be considered that allow real-world data collection during an initial trial phase. This approach is monitored by the data specialists, and it allows a broader product market reach in the future by demonstrating the results before requiring full financial commitment from providers.

Contracts are aimed to directly link pricing and reimbursement to measurable real-world outcomes, ensuring clinical efficacy stays at the level corresponding to financial benefits. For example, contracts for treatments targeting chronic conditions could measure success by reducing hospital visits or unplanned work absences. The Project team is responsible for negotiating and structuring these contracts to capture both clinical and financial goals.

Another aspect to be paid attention to is the specification of patient eligibility and scope within each agreement to avoid financial penalties for outcomes outside the intended patient group. For example, only patients meeting specific criteria (e.g., age, condition severity) should be included in performance-based pricing. The Project team assists in defining these criteria based on clinical guidelines and patient profiles.

It is essential to include flexibility for contract updates to enable adapting outcome metrics as healthcare priorities evolve. The dedicated product team should incorporate into the workflow the periodical reviews and adjustments mechanism, so to reduce potential disputes and keep the contract relevant.

Develop Patient Support Programs

Recognizing that patient engagement is central to achieving VBHC outcomes, the Value team develops tailored support programs to assist patients throughout their care journeys. These programs include digital tools: mobile apps, that enable patients to track their progress, receive reminders for medications or follow-ups, and access educational content about their treatment

plans. For example, an app for patients recovering from surgery may provide guidance on exercises, nutrition, and warning signs of complications.

Implement financial models that de-risk investment

Deploy the financial models that were created in Phase II by the financial specialists in the Value team that absorb initial investment risks. It facilitates the transition to a VBHC model by the healthcare supplier company. For example, smooth financial models may phase payments or provide financial cushioning, allowing the company to adjust gradually to outcome-based reimbursement and avoid abrupt financial strain.

Collaborate with External Partners for Industry Alignment

To align with broader industry standards and foster innovation, the Value team actively engages with academic institutions, industry consortia, and regulatory bodies. These collaborations with external partners validate outcomes through independent studies or benchmarking projects and strengthen the credibility of VBHC initiatives. For instance, partnering with a respected academic institution to publish a case study on the product's impact in a VBHC framework enhances its market positioning.

These partnerships also provide opportunities for companies to keep the leading position in industry developments. When companies contribute to shared research projects or global benchmarking efforts, they not only align with emerging trends but also influences the overall direction of VBHC practices. It can be seen as a collaborative approach that, in its turn, maintains a company's leadership in the value-based healthcare environment.

Phase V – Improving

The last step is a continuous phase that facilitates VBHC expansion within the company.

Establish data-based feedback

Both the Value Team and the Project Team arrange regular feedback sessions with healthcare providers, leveraging health system data and third-party services to ensure continuous improvement: the first team is responsible for this procedure on the corporate level to leverage the feedback for the overall institutional approach in the long-term perspective, the latter one uses the sessions to enhance the performance of the particular product and tackle current issues.

The Project Team reviews KPIs frequently with hospitals to ensure alignment with shared goals. Adjusting KPIs based on real-time data enables the team to refine outcome measurement methods and address evolving needs in patient care to emphasize the relevance of VBHC efforts.

The Value Team should tailor feedback approaches on the higher level according to the type of healthcare provider, recognizing that private hospitals may be more flexible in implementing feedback, while public institutions may require more structured and gradual adjustments due to administrative constraints.

Introduce a dynamic outcome registry

The creation of a dynamic outcome registry is a next level in the company's transformation to the VBHC strategy. This centralized system tracks outcomes for each product across regions and healthcare systems and provides a complete view of performance. For the Project team, the registry play a role of a resource that helps them to identify high-performing practices and replicate their success. Simultaneously, it helps the Value Team compare performance across markets to fine-tune corporate strategies and assess product outcomes on

a broader scale.

Refine KPI measurement to reflect the company's impact

The Project Team prioritizes outcome metrics that capture the manufacturers impact on patient health. This includes both clinical data and patient-reported outcomes, ensuring that improvements in safety, health outcomes, and access are accurately measured. These metrics provide concrete evidence of product effectiveness and reinforce VBHC goals.

The Value Team tracks global metrics: market coverage, patient access, sales growth, return on investment etc. to assess the broader impact of VBHC models on the company's market position. These indicators are there to show that more patients are benefiting from the treatment and to provide demonstratable proof of the VBHC efforts success.

Expand patient engagement mechanisms

The Project Team builds on the centrality of patient perspectives foundation by incorporating patient advisory groups into the feedback process. The aim of these groups is to bring firsthand perspectives, to refine treatment approaches and to ensure that products remain aligned with real-world needs. Engaging patients into the outcome defining process in the role of active participants brings trust and strengthens the company's position as a patient-centric healthcare partner.

Incorporate sustainability metrics into VBHC models

Since environmental impact remains a growing concern, the Value Team should integrate sustainability metrics into the VBHC framework. These metrics assess reductions in medical waste, energy-efficient manufacturing practices, and eco-friendly packaging solutions. Thus the company has a chance to attract providers and payers with shared environmental goals.

5.2. Next Steps

Scalability

Scalability represents the next step in this implementation plan journey, transitioning from the successful implementation of VBHC in one or a few products to integrating these principles across the organization's portfolio. Lessons learned from these initial projects serve as a foundation for broader efforts, enabling the organization to refine its strategies, identify challenges, and replicate successes on a larger scale.

Standardization plays a crucial role in this process, with the organization establishing consistent protocols, outcome measurement tools, and KPIs. However, flexibility is equally important, as scaling VBHC requires adapting to the diverse needs of various markets, healthcare systems, and organizational structures.

Collaboration is also key to navigate complexity, as highlighted during interviews. Sharing learnings and best practices with healthcare stakeholders contributes to the broader advancement of VBHC adoption.

Scalability has been identified by many interviewees as one of the most significant challenges in the current VBHC landscape. Nevertheless, by focusing on prioritizing industry collaboration, and continuously refining approaches through feedback and data-driven insights, the organization can position itself for long-term success in achieving value.

Pricing Models

Different experts' opinions highlighted the potential benefits of introducing rewards for companies implementing VBHC. However, this implementation plan is specifically designed to emphasize a more strategic approach: optimizing the allocation of financial resources within the company to achieve substantial cost reductions. Aligning the pricing model with the whole plan aims to streamline cost distribution and significantly minimize financial waste, creating value without the need for external rewards.

While compensating companies for adopting such a model could incentivize participation, the proposed strategy advocates to level and make accessible cooperative efforts.

Opportunities

Partnerships among stakeholders-such as financial supports, healthcare providers and manufacturers, can offer a more sustainable pathway. These collaborations not only share the financial burden but also seek innovation, resource sharing and long-term commitment to VBHC principles.

Participating in VBHC events to stay informed, network with industry leaders, and showcase their innovations are suggested and key for companies that want to implement this model. The major events such as the VBHC Summit, ThINc360: The Healthcare Innovation Congress, and many other events organized by different entities provide platforms for discussing strategies, understanding outcome measurement techniques, and building partnerships.

An example of such conferences and cooperations is the new-born Société Française pour la Valeur en Santé and the so-called conference, held on November 25th in Paris. This event highlighted the importance of collaboration among diverse parties; including physicians, pharmaceutical and medical device companies, and healthcare institutions; and demonstrated how different stakeholders and countries approach VBHC implementation differently. The conference underscored the critical role of cooperation in addressing shared challenges and creating a unified framework for sustainable VBHC adoption.

With relevant importance, key takeaways from the event include the presentation of various pilot projects, which serve as a practical example that companies can and should take into consideration when creating VBHC projects. The event also showcased the effectiveness of cross-functional education initiatives, which have demonstrated their value in advancing VBHC practices within highlighted projects. These examples reinforce and underline the importance of manufacturers participating in such conferences to gain actionable insights.

6. Conclusion

This thesis has developed a comprehensive roadmap for the implementation of Value-Based Healthcare within the manufacturing sector, pharmaceutical and medical device companies. By addressing a significant gap in the existing literature, where most studies focus on healthcare providers, this research highlights the underexplored role of manufacturers in the VBHC landscape.

The work is structured into three core components: a literature review to establish the theoretical basis and identify gaps, findings derived from expert interviews to uncover common challenges and best practices, and a detailed implementation plan.

In addition to this work, future research is necessary to test and refine the proposed roadmap through real-world implementation and its applicability across different regions and market conditions. Such research should also focus on identifying areas for improvement and addressing challenges that arise in practical applications, ensuring the framework remains adaptable and impactful in diverse settings.

In conclusion, this thesis provides a critical framework for the implementation of VBHC within the manufacturing sector, addressing a key gap in research and practice. By equipping manufacturers with a structured roadmap, it underscores the transformative potential of VBHC to reframe how value is created and delivered in healthcare. As global healthcare challenges continue to grow, the adoption of VBHC across all sectors, including manufacturing, is not merely an option but an imperative. Its implementation ensures that healthcare systems prioritize measurable outcomes, align stakeholder efforts, and ultimately place value at the core of decision-making.

7. Bibliography

1. Al-Majali, Dr. Husam. 2019. “Innovation Arabia 12 Proceedings Health and Environment Conference.”
2. Allen, Casey, Jarrod Eska, Nikhil Thaker, Thomas Feeley, Robert Kaplan, Ryan Huey, and Ching-Wei Tzeng, et al. 2021. “Developing a Value Framework: Utilizing Administrative Data to Assess an Enhanced Care Initiative.” *The Journal of surgical research*, 262, 115–120. https://doi.org/10.1016/j.jss.2020.12.061
3. Basch, Ethan, Allison Deal, Mark Kris, Howard Scher, Clifford Hudis, Paul Sabbatini, and Lauren Rogak et al. 2016. “Symptom monitoring with patient-reported outcomes during routine cancer treatment: a randomized controlled trial.” *J Clin Oncol*. 34(6):557-565. https://doi.org/10.1200/JCO.2015.63.0830
4. Batalden, Paul, Frank Davidoff. 2007. “What is “quality improvement” and how can it transform healthcare? Qual Saf Health Care.” 16(1):2-3. https://doi.org/10.1136/qshc.2006.022046
5. Berger, Ariel, and Cheryl Ball. 2017. “Using Real-World Evidence in Payer Negotiation.” *Evidera.*
6. Bergholtz, Jana, Axel Wolf, Vanessa Crine, Helena Cleeve, Maria Jose Santana, and Ida Björkman. 2024. “Patient and Public Involvement in Healthcare: A Systematic Mapping Review of Systematic Reviews - Identification of Current Research and Possible Directions for Future Research.” *BMJ Open* 14 (9): e083215. https://doi.org/10.1136/bmjopen-2023-083215.
7. Berwick, Donald. 2008. “The science of improvement.” *JAMA*. 299(10):1182-1184. doi:10.1001/jama.299.10.1182
8. Berwick, Donald, Andrew Hackbarth. 2012. “Eliminating waste in US health care.” *JAMA*, 307(14), 1513-1516. https://doi.org/10.1001/jama.2012.362

9. Berwick, Donald, Thomas Nolan, and John Whittington. 2008. "The triple aim: care, health, and cost." *Health Aff (Millwood)*. 27(3):759-769. https://doi.org/10.1377/hlthaff.27.3.759

10. Black, Nick. 2013. "Patient reported outcome measures could help transform healthcare." *BMJ*. 346:f167. https://doi.org/10.1136/bmj.f167

11. Bocken, Nancy, Samuel Short, Padmakshi Rana, and Steve Evans. 2013. "A Value Mapping Tool for Sustainable Business Modelling." *Corporate Governance (Bingley)* 13 (5): 482–97. https://doi.org/10.1108/CG-06-2013-0078.

12. Bodenheimer, Thomas, and Christine Sinsky. 2014. "From triple to quadruple aim: care of the patient requires care of the provider." *Ann Fam Med*. 12(6):573-576. https://doi.org/10.1370/afm.1713

13. Boehncke, Klaus, Guillaume Duparc, Jonathan Sparey, Andre Valente. 2023. "Tapping into new potential: Realising the value of data in the healthcare sector." *L.E.K. Consulting*, 25(101). Accessed October 23, 2024. https://www.lek.com/insights/hea/eu/ei/tapping-new-potential-realising-value-data-healthcare-sector

14. Boehringer Ingelheim. n.d. "Bringing Value to the Healthcare Community." Accessed October 24, 2024. https://www.boehringer-ingelheim.com/us/bringing-value-healthcare-community.

15. Bréant, Alexandre, Francis Turina-Malard, and Bertrand Kleinmann. 2018. "Strategic Alliances: The Right Prescription to Survive the Healthcare Revolution." *CEPTON Strategies*. Accessed November 2, 2024. https://ceptonstrategies.com/en/strategic-alliances/.

16. Brennan, Niall, Allison Oelschlaeger, Christine Cox, Marilyn Tavenner. 2014. "Leveraging the big-data revolution: CMS is expanding capabilities to spur health

system transformation." *Health Affairs*, 33(7), 1195-1202. https://doi.org/10.1377/hlthaff.2014.0130

17. Cao, Mei, and Qingyu Zhang. 2010. "Supply Chain Collaborative Advantage: A Firm's Perspective." *In International Journal of Production Economics*, 128:358–67. https://doi.org/10.1016/j.ijpe.2010.07.037.

18. Carlini, Joan, Kim Lehman, Maria Dharmesti, and Kathy Knox. 2023. "Maximizing Value in Healthcare Partnerships: A Case Examining an Inter-Organizational Relationship in the Public and Non-Profit Sectors." *Journal of Philanthropy and Marketing* 28 (3). https://doi.org/10.1002/nvsm.1796.

19. Cayea, Danelle, Kim Tartaglia, Amit Pahwa, Heather Harrell, Amy Shaheen, and Valerie J. Lang. 2018. "Current and Optimal Training in High-Value Care in the Internal Medicine Clerkship: A National Curricular Needs Assessment." Academic Medicine 93 (10): 1511–16. https://doi.org/10.1097/ACM.0000000000002192.

20. Centers for Medicare & Medicaid Services. 2021. "Quality Payment Program." Accessed October 29, 2024. https://www.cms.gov/Medicare/Quality-Payment-Program

21. Chernew, Michael, and Mark Fendrick. 2018. "Value-Driven Partnerships - A Stakeholder Case Study." *Diabetes Care*.

22. Consumer Technology Association. 2020. "4 ways technology can drive value-based health care." Accessed October 24, 2024. https://www.cta.tech/Resources/Articles/4-Ways-Technology-Can-Drive-Value-Based-Health-Car

23. Cossio-Gil, Yolima, Maisa Omara, Carolina Watson, Joseph Casey, Aelxandre Chakhunashvili, Maria Gutiérrez-San Miguel, and Pascal Kahlem, et al. 2021. "The Roadmap for Implementing Value-Based Healthcare in European University Hospitals—Consensus Report and Recommendations." *Value in Health*, 25(7), 1148-

1156. https://doi.org/10.1016/j.jval.2021.11.1355

24. Cowen, Nick, Baljinder Virk, Stella Mascarenhas-Keyes, and Nancy Cartwright. 2017. “Randomized Controlled Trials: How Can We Know “What Works”?” *Critical Review*, 29(3), 265–292. https://doi.org/10.1080/08913811.2017.1395223.

25. Cutler, David, et al. 2012. “The potential for cost savings in Medicare’s future.” *Journal of Economic Perspectives*, 26(4), 65-82.

26. Damschroder, Laura, David Aron, Rosalind Keith, Susan Kirsh, Jeffery Alexander, and Julie Lowery. 2009. “Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science.” *Implementation Science* 4 (1): 50. doi: 10.1186/1748-5908-4-50.

27. Dell Medical School University of Texas at Austin. n.d. “Discovering Value-Based Health Care: Interactive Learning Modules from Dell Medical School.” Accessed November 3, 2024. http://vbhc.dellmed.utexas.edu.

28. DiMasi, Joseph, Henry Grabowski, and Ronald Hansen. 2016. “Innovation in the pharmaceutical industry: New estimates of R&D costs.” *Journal of Health Economics*, 47, 20-33. https://doi.org/10.1016/j.jhealeco.2016.01.012

29. Donabedian, Avedis. 1988. “The quality of care: how can it be assessed?” *JAMA*. 1988;260(12):1743-1748. doi:10.1001/jama.1988.03410120089033

30. EIT Health. 2020. “Implementing Value-Based Health Care in Europe: Handbook for Pioneers.” Directed by Gregory Katz. Accessed October 20, 2024. https://eithealth.eu/wp-content/uploads/2020/05/Implementing-Value-Based-Healthcare-In-Europe_web-4.pdf

31. Engen, Veerle van, Martina Buljac-Samardzic, Rob Baatenburg de Jong, Jeffrey Braithwaite, Kees Ahaus, Monique Den Hollander-Ardon, Ingrid Peters, and Igna Bonfrer. 2024. “A Decade of Change towards Value-Based Health Care at a Dutch

University Hospital: A Complexity-Informed Process Study." *Health Research Policy and Systems* 22 (1). https://doi.org/10.1186/s12961-024-01181-z.

32. European Data Protection Board. 2021. "Guidelines 07/2020 on the concepts of controller and processor in the GDPR." Accessed October 22, 2024. https://edpb.europa.eu

33. Fichtenberg, Caroline, Jorge Delva, Karen Minyard, and Laura M. Gottlieb. 2020. "Health and Human Services Integration: Generating Sustained Health and Equity Improvements." *Health Affairs* 39 (4): 567–73.

34. Figueroa, Jose F., Yusuke Tsugawa, Jie Zheng, John E. Orav, and Ashis K. Jha. 2016. "Association between the value-based purchasing program and patient outcomes." *New England Journal of Medicine*. doi: 10.1136/bmj.i2214.

35. Fleiszer, Andrea, Sonia Semenic, Judith Ritchie, Marie-Claire Richer, and Jean-Louis Denis. 2015. "The Sustainability of Healthcare Innovations: A Concept Analysis." *Journal of Advanced Nursing* 71 (7): 1484–98. https://doi.org/10.1111/jan.12633.

36. Food and Drug Administration. 2022. "Breakthrough Devices Program." Accessed on 23 October, 2024. https://www.fda.gov/medical-devices

37. Fralick, Michael. 2014. "Putting Patients First in the Age of Pharma." *Canadian Medical Association Journal* 186 (4): 253–253. https://doi.org/10.1503/cmaj.109-4716.

38. Friedberg, Mark, Peggy Chen, Kristin Van Busum, Frances Aunon, Chau Pham, John Caloyeras, and SoerenMattke, et al. 2013. "Factors affecting physician professional satisfaction and their implications for patient care, health systems, and health policy." *Rand Health Q*. 2013;3(4):1.

39. Friedman, Charles, Adam Wong, and David Blumenthal. 2010. "Achieving a nationwide learning health system." *Sci Transl Med*. 2(57):57cm29.

doi:10.1126/scitranslmed.3001456

40. Gavaghan, Belinda, Jennifer Finch, and Katelyn Clarke. 2024. “Creating a Framework for Change: Transitioning to Value-Based Healthcare in Queensland.” *Australian Health Review 48* (2): 123–28. https://doi.org/10.1071/AH24001.

41. Getz, Kenneth A. 2015. “Establishing Return-on-Investment Expectations for Patient-Centric Initiatives.” *Therapeutic Innovation & Regulatory Science* 49 (5): 745–49. https://doi.org/10.1177/2168479015579521.

42. Gliklich, Richard E., Nancy A. Dreyer, and Michelle B. Leavy. 2014. “Registries for Evaluating Patient Outcomes: A User’s Guide”. *3rd ed. Agency for Healthcare Research and Quality* (US); 2014.

43. Goddard, Maria. 2015. “Competition in healthcare: good, bad or ugly?” *Int J Health Policy Manag*. 4(9):567-569. doi:10.15171/ijhpm.2015.144

44. Gottlieb, Scott, Woodcock, Janet. (2018). Real-world evidence and evolving regulatory framework for medical devices. *JAMA*, 320(4), 315-316. https://doi.org/10.1001/jama.2018.9121

45. Grom, Taren. 2013. “Commercialization Payers: The Power of Payer Partnerships Lies in Data Sharing.” Pharma Voice. Accessed October 29, 2024. https://www.pharmavoice.com/news/data-sharing/613479/.

46. Guillemette, Yvan, and David Turner. 2021. “The long game: Fiscal outlooks to 2060 underline need for structural reform”, *OECD Economic Policy Papers*, No. 29, OECD Publishing, Paris, https://doi.org/10.1787/a112307e-en.

47. Hackbarth, Glenn, and Cristina Boccuti. 2011. “Transforming Graduate Medical Education to Improve Health Care Value.” *New England Journal of Medicine* 364 (8): 693–95. https://doi.org/10.1056/NEJMp1012691.

48. HealthConnect. 2024. "How Value-Based Care Improves with Interoperability."

Accessed Novembre 13, 2024. https://healthconnect.mindbowser.com/value-based-care-with-interoperability

49. Herdman Michael, Claire Gudex, Andrew Lloyd, M.F. Janssen, Paul Kind, David Parkin, Gouke Bonsel, and Xavier Badia. 2011. “Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L).” *Qual Life Res.* 20(10):1727-1736. doi:10.1007/s11136-011-9903-x

50. Imran, Sohail, Tariq Mahmood, Ahsan Morshed, and Timos Sellis. 2021. “Big data analytics in healthcare—A systematic literature review and roadmap for practical implementation.” IEEE/CAA *Journal of Automatica Sinica*, 8(1), 1–14.

51. IQVIA White Paper. 2024. “Value-based pricing agreements: How the pharmaceutical industry is adapting to outcomes-based models.” Accessed October 25, 2024. https://www.iqvia.com/-/media/iqvia/pdfs/australia-and-new-zealand/white-papers/transitioning-to-value-based-healthcare-a-closer-look-at-australias-progress.pdf

52. Jones, Charles H., Subha Madhavan, Kannan Natarajan, Michael Corbo, Jane M. True, and Mikael Dolsten. 2024. “Rewriting the Textbook for Pharma: How to Adapt and Thrive in a Digital, Personalized and Collaborative World.” *Drug Discovery* Today 29 (9): 104112. https://doi.org/10.1016/J.DRUDIS.2024.104112.

53. Kaplan, Robert S., Michael E. Porter. 2011. “How to solve the cost crisis in health care.” *Harvard Business Review*. 89(9):46-52.

54. Kaplan, Robert S., Mary L. Witkowski. 2014. "Better Accounting Transforms Health Care Delivery." *Accounting Horizons* 28, no. 2: 365-383. doi:10.2308/acch-50625

55. Kaplan, Robert S., Michael E. Porter. 2014. “Measuring Health Care: Time-Driven Activity-Based Costing in Health Care.” Boston: *Harvard Business Review Press*.

56. Larsson, Stefan, Jennifer Clawson, and Josh Kellar. 2022. “The Patient Priority: Solve

Health Care's Value Crisis by Measuring and Delivering Outcomes That Matter to Patients." *New York: McGraw-Hill Education*. ISBN 9781264741625.

57. Lee, Randall A., Selma Masic, Joseph Bland, Elizabeth Handorf, Alexander Kutikov, Nestor Esnaola, Jeffrey Farma, et al. 2024. "Transition to Value-Based Healthcare: Development, Implementation, and Results of an Optimal Surgical Care Framework at a National Cancer Institute–Designated Comprehensive Cancer Center." *European Urology Focus* 10 (1): 123–30. https://doi.org/10.1016/j.euf.2023.08.003.

58. Lewis, Sally. 2022. "Value-Based Healthcare: Is It the Way Forward?" *Future Healthcare Journal 9* (3): 211–15. https://doi.org/10.7861/fhj.2022-0099.

59. Lewis, Sally. 2024. "The Cultural Shift towards a Value-Based Approach to Healthcare." *Australian Health Review*. CSIRO. https://doi.org/10.1071/AH24005.

60. Lundeen, Elizabeth A., Karen R. Siegel, Holly Calhoun, Sonia A. Kim, Sandra P. Garcia, Natalie M. Hoeting, Diane M. Harris, et al. 2017. "Clinical-Community Partnerships to Identify Patients With Food Insecurity and Address Food Needs." *Preventing Chronic Disease* 14 (November):170343. https://doi.org/10.5888/pcd14.170343.

61. Marques-Gomes, João, Matthew J. Salt, Rita Pereira-Neto, Franca S. Barteldes, Vera Gouveia-Barros, Alexandre Carvalho, Antonella d'Arminio-Monforte, et al. 2021. "Development of the HIV360 International Core Set of Outcome Measures for Adults Living with HIV: A Consensus Process." *HIV Med*. 2022 Jul;23(6):639-649. doi: 10.1111/hiv.13221. Epub 2021 Dec 28. PMID: 34964226.

62. McAlearney, Ann Scheck, Daniel M. Walker, and Jennifer L. Hefner. 2018. "Moving Organizational Culture from Volume to Value: A Qualitative Analysis of Private Sector Accountable Care Organization Development." *Health Services Research* 53 (6): 4767–88. https://doi.org/10.1111/1475-6773.13012

63. MedVanta. 2024. “Data sharing is a cornerstone of value-based care.” Accessed October 29, 2024. https://medvanta.com/news/2024/08/28/data-sharing-cornerstone-value-based-care-02037

64. Meskó, Bertalan, Zsófia Drobni, Éva Bényei, Bence Gergely, and Zsuzsanna Győrffy. 2017. “Digital Health Is a Cultural Transformation of Traditional Healthcare.” *MHealth 3* (September):38–38. https://doi.org/10.21037/mhealth.2017.08.07.

65. Miller, Elise, Trishna Nath, and Laura Line. 2017. “Working Together Toward Better Health Outcomes.” Developed by Partnership for Healthy Outcomes: Bridging Community-Based Human Services and Healthcare.

66. Moriates, Christopher, Saurin Gandhi, and Emily Vinas. 2019. “How to Implement High-Value Health Care Training in Graduate Medical Education.” *Journal of Graduate Medical Education*. NLM (Medline). https://doi.org/10.4300/JGME-D-19-00750.1.

67. Moriates, Christopher, Victoria Valencia, Sara Stamets, Joseph Joo, Jonathan MacClements, Lu Ann Wilkerson, Elizabeth A. Nelson, Kevin Bozic, and Susan M. Cox. 2019. “Using Interactive Learning Modules to Teach Value-Based Health Care to Health Professions Trainees across the United States.” *Academic Medicine* 94 (9): 1332–36. https://doi.org/10.1097/ACM.0000000000002670.

68. Novartis. 2019. “Novartis Social Business Report 2018 Contents.” Accessed October 29, 2024. https://www.novartis.com/sites/novartis_com/files/novartis-social-business-report-2018.pdf

69. OECD. 2017. “Tackling Wasteful Spending on Health.” OECD Publishing, Paris. Accessed October 25, 2024. https://www.oecd.org/en/publications/tackling-wasteful-spending-on-health_9789264266414-en.html

70. OECD. 2019. Health care quality indicators project: 2019 annual report. Accessed

November 3, 2024. https://doi.org/10.1787/health-data-en

71. OECD. 2024. “Fiscal Sustainability of Health Systems: How to Finance More Resilient Health Systems When Money Is Tight?” OECD Publishing, Paris. Accessed October 30, 2024. https://doi.org/10.1787/880f3195-en.

72. Okunade, Oluwakemi, Jason Arora, Annemarie Haverhals, and Leonique Niessen. 2017. “Collaborating for value: The Santeon hospitals in the Netherlands.” International Consortium for Health Outcomes Measurement (ICHOM) & Santeon. www.ichom.org

73. Page, Stephen B., Melissa M. Stone, John M. Bryson, and Barbara C. Crosby. 2015. “Page Value Creation by Cross-Sector Collaborations: A Framework and Challenges of Assessment.” *Public Administration* 93 (3): 715–32. https://doi.org/10.1111/padm.12161.

74. Palumbo, Rocco, Silvia Cosimato, and Aurelio Tommasetti. 2017. “Dream or Reality? A Recipe for Sustainable and Innovative Health Care Ecosystems.” *TQM Journal* 29 (6): 847–62. https://doi.org/10.1108/TQM-02-2017-0023.

75. Pammolli, Fabio, Laura Magazzini and Massimo Riccaboni. 2011. “The productivity crisis in pharmaceutical R&D.” *Nature Reviews Drug Discovery*, 10(6), 428-438. https://doi.org/10.1038/nrd3405

76. Parmigiani, Anne, and Miguel Rivera-Santos. 2011. “Clearing a Path through the Forest: A Meta-Review of Interorganizational Relationships.” *Journal of Management.* https://doi.org/10.1177/0149206311407507.

77. Phipps-Taylor, Madeleine, and Stephen M. Shortell. 2016. “More Than Money: Motivating Physician Behavior Change in Accountable Care Organizations.” *The Milbank Quarterly* 94 (4): 832–61. https://doi.org/10.1111/1468-0009.12230.

78. Pisano, Gay. P. 1997. “The development factory: Unlocking the potential of process

innovation." *Harvard Business Press.*

79. Plessis, Danie du, John Kenneth Sake, Katarina Halling, Jackie Morgan, Anna Georgieva, and Neil Bertelsen. 2017. "Patient Centricity and Pharmaceutical Companies: Is It Feasible?" *Therapeutic Innovation and Regulatory Science* 51 (4): 460–67. https://doi.org/10.1177/2168479017696268.

80. Porter, Michael E. 2010. "What Is Value in Health Care?" *New England Journal of Medicine,* 363(26), 2477-2481. https://doi.org/10.1056/NEJMp1011024

81. Porter, Michael E., Deerberg-Wittram, J., & Feeley, T. W. 2019. Martini Klinik: Prostate Cancer Care 2019. *Harvard Business Publishing*. https://www.thecasecentre.org/products/view?id=121390

82. Porter, Michael E., Stefan Larsson, and Thomas H. Lee. 2016. "Standardizing patient outcomes measurement." *N Engl J Med*. 374(6):504-506. doi:10.1056/NEJMp1511701

83. Porter, Michael E., and Thomas H. Lee. 2013. "The Strategy That Will Fix Health Care." *Harvard Business Review*, no. 10: 50–70.

84. Porter, Michael E., and Thomas H. Lee. 2018. "What 21st Century Health Care Should Learn from 20th Century Business." *New England Journal of Medicine Catalyst*. Accessed September 15, 2024. https://catalyst.nejm.org/doi/full/10.1056/CAT.18.0098.

85. Porter, Michael E., and Elizabeth Teisberg. 2006. "Redefining Health Care: Creating Value-Based Competition on Results." *Harvard Business Review Press.*

86. Ramos, Pedro, Carl Savage, Johan Thor, Rifat Atun, Karin Solberg Carlsson, Marcia Makdisse, Miguel Cendoroglo Neto, Sidney Klajner, Paolo Parini, and Pamela Mazzocato. 2021. "It Takes Two to Dance the VBHC Tango: A Multiple Case Study of the Adoption of Value-Based Strategies in Sweden and Brazil." *Social Science and Medicine* 282 (August). https://doi.org/10.1016/j.socscimed.2021.114145.

87. Rawson, Nigel, Kaitin, Kenneth I. 2003. “Canadian and US Drug Approval Times and Safety Considerations.” *Annals of Pharmacotherapy.* https://doi.org/10.1345/aph.1D110

88. Robert, Baillieu et al. 2020. “Impact of health information technology optimization on clinical quality performance in health centers: A national cross-sectional study”.

89. Rog, Debra J., Tina Marshall, Richard H. Dougherty, Preethy George, Allen S. Daniels, Sushmita Shoma Ghose, and Miriam E. Delphin-Rittmon. 2014. “Permanent Supportive Housing: Assessing the Evidence.” *Psychiatric Services* 65 (3): 287–94. https://doi.org/10.1176/appi.ps.201300261.

90. Roland, Alexander, William Fox, and Ann Baker. 2024. “Efficiency, Effectiveness and Productivity in Pharmaceutical R&D.” *Nature Reviews Drug Discovery* 23 (9): 656–57. https://doi.org/10.1038/d41573-024-00068-6.

91. Rosalia, Rodney A., Khaled Wahba, and Neda Milevska-Kostova. 2021. “How digital transformation can help achieve value-based healthcare: Balkans as a case in point.” *The Lancet Regional Health – Europe.* https://doi.org/10.1016/j.lanepe.2021.100100

92. Scott, Ian. 2014. “Ten Clinician-Driven Strategies for Maximising Value of Australian Health Care.” *Australian Health Review* 38 (2): 125. https://doi.org/10.1071/AH13248.

93. Seewald, Michael J., Jonathan M. Plumb, Ben Gutierrez, Johan Liwing, Maurille Feudjo Tepie, Mette Hammer, Robert LoCasale, et al. 2020. “Strengthening Pharma’s Contract with Society: The Value of Trusted Partnerships between Pharma and Healthcare Facilitated by Real-World Data.” *Journal of Comparative Effectiveness Research* 9 (3): 155–59. https://doi.org/10.2217/cer-2019-0183.

94. Sinek, Simon. 2009. *Start with Why: How Great Leaders Inspire Everyone to Take Action.* Penguin Books.

95. Solomon, Loel S, and Michael H Kanter. 2018. “Health Care Steps Up to Social Determinants of Health: Current Context.” *The Permanente Journal* 22 (4S). https://doi.org/10.7812/TPP/18-139.

96. Sørensen, Kristine, Jürgen M. Pelikan, Florian Röthlin, Kristin Ganahl, Zofia Slonska, Gerardine Doyle, James Fullam, et al. 2015. “Health Literacy in Europe: Comparative Results of the European Health Literacy Survey (HLS-EU).” *The European Journal of Public Health* 25 (6): 1053–58. https://doi.org/10.1093/eurpub/ckv043.

97. Staalduinen, Dorine J. van, Petra van den Bekerom, Sandra Groeneveld, Martha Kidanemariam, Anne M. Stiggelbout, and M. Elske van den Akker-van Marle. 2022. “The Implementation of Value-Based Healthcare: A Scoping Review.” *BMC Health Services Research* 22 (1): 270. https://doi.org/10.1186/s12913-022-07489-2.

98. Steinmann, Gjis, Hester Van de Bovenkamp, Antoinette De Bont, and Diana Delnoij. 2020. “Redefining value: A discourse analysis on value-based health care.” https://doi.org/10.1186/s12913-020-05614-7

99. St John, Andrew, Maurice O'Kane, Robert Christenson, Paul Jülicher, Michael Oellerich, and Christopher P. Price. 2021. “Implementation of medical tests in a Value-Based healthcare environment: A framework for delivering value. Clinica chimica acta.” *International journal of clinical chemistry*, 521, 90–96. https://doi.org/10.1016/j.cca.2021.07.004

100. Teisberg, Elizabeth, Scott Wallace, and Sarah O’Hara. 2020. “Defining and Implementing Value-Based Health Care: A Strategic Framework.” *Academic Medicine. Wolters Kluwer Health.* https://doi.org/10.1097/ACM.0000000000003122.

101. Tempus. 2023. “Tempus Announces New Strategic Collaboration with Pfizer to Advance Oncology Therapeutic Development.” Accessed October 30, 2024. https://www.tempus.com/news/tempus-announces-new-strategic-collaboration-with-

pfizer-to-advance-oncology-therapeutic-development/

102. Think AI. 2023. “Revolutionizing healthcare manufacturing: Data-Driven Suypply Chain Optimization.” Accessed September 30, 2024. https://thinkaicorp.com/revolutionizing-healthcare-manufacturing-data-driven-supply-chain-optimization/

103. Thomas, Mark. 2016. “Enhanced Company Performance through the Development of Network Alliance Management Skills: A Four-Point Framework.” *Development and Learning in Organizations: An International Journal* 30 (2): 11–14. https://doi.org/10.1108/DLO-05-2015-0052

104. ThoroughCare. 2023. “Healthcare data integration & interoperability: Why they matter.” Accessed September 16, 2024. https://www.thoroughcare.net/blog/healthcare-data-integration-interoperability-why-they-matter

105. Veghel, Hendrikus. P. A. van. 2019. “Improving Cardiovascular Disease Management by Implementing Value-Based Healthcare Principles.” PhD thesis, Biomedical Engineering, Technische Universiteit Eindhoven. Accessed October 2, 2024. https://assets.w3.tue.nl/w/fileadmin/content/pers/2019/08_August/20190829_Veghel.pdf

106. VOH CoLab. "TDABC Method for Cost Analysis in Healthcare Pathways." Accessed November 3, 2024. https://vohcolab.org/tdabc-method-for-cost-analysis-in-healthcare-pathways/.

107. United Nations. 2024. “World Population Prospects: Key Findings and Advance Tables, 2024 Revision.” Accessed October 27, 2024. https://population.un.org/wpp/

108. Vermeer, Laurence, and Mark Thomas. 2020. “Pharmaceutical/High-Tech Alliances; Transforming Healthcare?: Digitalization in the Healthcare Industry.” Strategic

Direction. *Emerald Group Holdings Ltd.* https://doi.org/10.1108/SD-06-2020-0113

109. Waldron, James. 2023. “Boehringer Plugs in IBM-Trained AI Model to Boost Antibody Drug Discovery Efforts.” 2023. Accessed October 27, 2024. https://www.fiercebiotech.com/biotech/boehringer-plugs-ibm-trained-ai-model-boost-antibody-drug-discovery-efforts

110. Weinberger, Steven E. 2011. “Providing High-Value, Cost-Conscious Care: A Critical Seventh General Competency for Physicians.” *Annals of Internal Medicine* 155 (6): 386. https://doi.org/10.7326/0003-4819-155-6-201109200-00007.

111. Welsh Value in Health Centre. n.d. “Value-Based Health Care. NHS Wales.” Accessed November 5, 2024. https://vbhc.nhs.wales

112. Werner, Rachel M., Ezequiel J. Emanuel, Hoangmai H. Pham, and Amol S. Navathe. 2021. "The Future of Value-Based Payment: A Road Map to 2030." *Leonard Davis Institute of Health Economics*. Accessed October 10, 2024. https://ldi.upenn.edu/our-work/research-updates/the-future-of-value-based-payment-a-road-map-to-2030/

113. Westerink, Henrike J., Gijs Steinmann, Maarten Koomans, Michèle H. van der Kemp, and Paul B. van der Nat. 2024. “Value-based healthcare implementation in the Netherlands: a quantitative analysis of multidisciplinary team performance.” *BMC Health Serv Research*. https://doi.org/10.1186/s12913-024-10712-x

114. World Health Organization. 2014. “Global Expenditure Atlas.” Accessed September 22, 2024. https://cdn.who.int/media/docs/default-source/health-financing/atlas2014.pdf

8. Appendices

Appendix 1: Pay for Performance cases

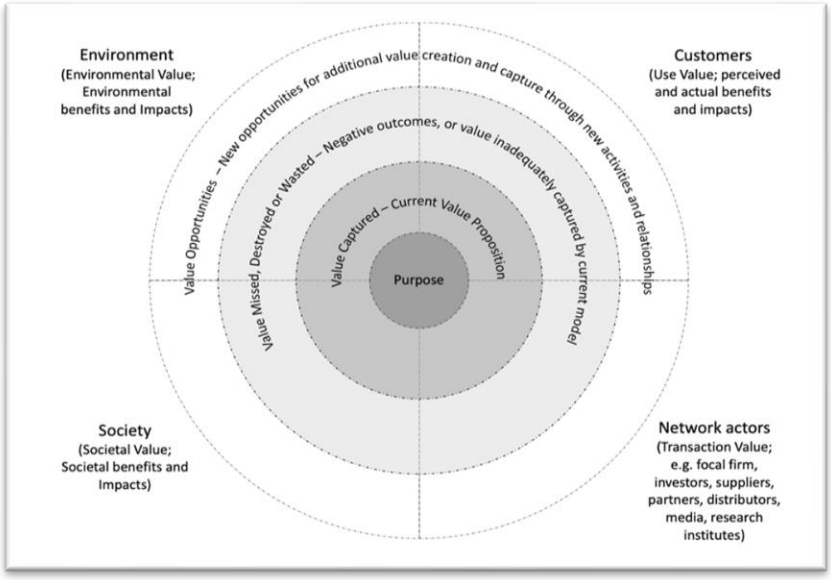
The Accountable Care Organizations (ACOs) believes and claims that value-based programs can cost control and enhance outcomes (McClellan et al. 2016). Recent research has raised concerns about the overall effectiveness of pay-for-performance models in achieving these aims. Figueroa et al. (2016) emphasize that while value-based purchasing (VBP) programs can reduce costs tied to poor performance, but their effectiveness in significantly improving patient outcomes remains uncertain. Moreover, a report by the U.S. Government Accountability Office and a quasi-experimental study with multiple control groups found no significant improvement in patient mortality rates among hospitals participating in the HVBP program compared to non-participating facilities (U.S. Government Accountability Office 2016). These findings echo results from evaluations of HVBP's predecessor, the Hospital Quality Incentive Demonstration program, which reported modest process improvements but no substantial impact on mortality (Figueroa et al., 2016). Similar conclusions were drawn from England's Advancing Quality initiative, which also saw no meaningful long-term improvements in mortality rates, despite early optimism (Figueroa et al. 2016).

Appendix 2: Time-Driven Activity-Based Costing, an explanation of the model

Time-Driven Activity-Based Costing is a cost-accounting method that in this specific case is tailored to healthcare, giving more possibilities to enhance resource allocation and care delivery. The difference between traditional methods such as Activity-based costing, TDABC simplifies costing by estimating the cost of care based on time and resources used for each activity in the patient care process. Implemented by a structured 7-step approach, it involves defining care pathways, mapping processes, estimating activity times, and calculating costs for resources. By providing precise patient-level cost insights, TDABC has proven

instrumental in redesigning care pathways, promoting cost-efficient and value-driven healthcare. (VOH CoLab 2019)

Appendix 3: Simplified Value Mapping Tool by Bocken et al. (2013)



Appendix 4: Interview questions guide

1. What benefits VBHC model can offer to manufacturers? What motivates the manufacturers to undertake the transition to this new model?
2. What are the key steps that pharmaceutical and medical device companies should take when transitioning to a Value-Based Health Care model?
3. What internal resources, in terms of personnel and technology, are crucial for manufacturers to implement a successful value-based care model? Based on your experience in VBHC projects, what shortages do you often observe?
4. Moving to one of the most important aspects, outcome measurement, how can companies define and measure "value" in terms of outcomes?
5. What role does data infrastructure play in the VBHC implementation process for medical devices, and how have you tackled challenges related to data collection, integration, and analysis in your projects?

6. How should manufacturers adapt their pricing strategies when transitioning from a fee-for-service model to a value-based care approach?
7. Looking at the broader business perspective, how can manufacturers effectively balance the short-term financial pressures they face with the long-term benefits that VBHC models promise to deliver?
8. How does value-based procurement that healthcare providers establish within their procedures support the implementation of VBHC, especially in relation to MedTech and pharma industries?
9. Collaboration is clearly key in any VBHC model. What role do partnerships between manufacturers and healthcare providers play in VBHC, especially in terms of driving efficiency and achieving better patient outcomes?
10. What are the regulatory considerations manufacturers must keep in mind when implementing VBHC, especially in terms of patient data privacy and cross-border agreements?
11. Once a VBHC model is in place, how should manufacturers track and measure the success of their agreements?

Appendix 5: List of experts selected and contacted

Name	Organization	Position
Adrienne Rivlin	LEK Consulting	Healthcare and Life Sciences strategy Lead
Agnes Benedict	Evidera	Healthcare Technology
Ahmad Al Assaad	Roche	Head of Innovation and Partnerships, Algeria, Tunisia and Libya
Ahmed Alshammari	Health Academy	CEO
Alan Wain	EPSCOT	Partner and Chief Operating Officer
Alejandro Pacheco Padilla	Accord Healthcare	Health Portfolio Manager

Alexandra Schmidt	Air Liquide	Value Transformation Director
Allison Smith	Johnson & Johnson	Medical Devices, Director Value Access and Pricing Strategy
Alvaro Calderon Gomez	Novartis	Head of Procurement Spain, France and Italy
Ana Román Muñoz	Air Liquide	Communication and Transformation Director
Andrew Heller	Boehringer Ingelheim	Director of Value and Access Marketing
Angela Garcia	Boehringer Ingelheim	Head of Pricing and Contracting UK and Ireland
Ann Cole	Baxter International	Head of Market Access and Government Affairs - UK
Annabel Barrett	Eli Lilly	Pharma, Senior Director Operations, Value, Evidence & Outcomes International
Anuj Kapadia	Thermo Fisher Scientific	Vice President
Bertrand Semay	Clinique Mutualiste Chirugicale St Etienne	Otrthopedic Surgeon
Bob Kaplan	Harvard Business School	Senior Fellow and Professor
Brian Mangan	Luach Consulting Group/European Association of VBHC	CEO/ Executive Board Member
Brian Nigro	Novo Nordisk	Pharma, Insulin Strategy & Value Communication Lead
Brian Ruff	PPO Serve	CEO and Founder
Carlos Parry Lafont	LLYC	Senior Director Public Affairs Healthcare
Caroline Moesen	Johnson & Johnson	Senior Manager Government Affairs & Policy
Cate McLaurin	Artificial Intelligence Centre for Value Based	Advisory Board Member

	Healthcare	
Celia Doussineau	Siemens Healthineers	Manager EU Government Affairs & Policy
César Luiz Abicalaffe	2iM Inteligência Médica S/A	CEO & Founder
César Velasco Munoz	Astrazeneca	Science & Innovation Director
Chester Good	UPMC Health Plan	Senior Medical Director
Christian Thonke	Novartis	Director Public Affairs - Europe
Chronis Manolis	UPMC Health Plan	Senior Vice President Pharmacy
Chuck Shih	Biogen	Pharma, Head of Pricing, Policy & Contracts
Claudia Vaz	Roche	Senior Director of Market Access - Pricing, Reimbursement and Patient Outcomes
Craig Barratt	Oliver Wyman	Principal/ Healthcare Strategist & Transformation Leader
Christoph Zinke	KPMG China	previously Partner, Head of China Strategy
Danielle Bargo	Astrazeneca	Pharma, Director, Global Real World Data Strategy
Darren Cox	Cleveland Clinic	Director of Supply Chain Management - UK
Diarmuid Murphy	National University Health Systems Singapore	Group Chief Value Officer
Diego Ossa	Previous Novartis	Access Strategy and Evidence Generation Lead
Dr Yaw Opoku	National Health Insurance Authority Ghana	Ag. Director, Quality Assurance
David Ikkersheim	KPMG Netherlands	Partner/ Head of Strategy & Operations
Ebele Anidi	G20 Global Innovation	Director of Partnerships & Engagement
Eduard Sidelnikov	Amgen	Pharma, Health Economics Director

Elisabeth Angelina	Singapore General Hospital	Manager (Office of Value-Based Healthcare)
Elizabeth Teisberg	UT Austin, Dell Medical School	Executive Director of the Value Institute for Health and Care/ Creator VBHC Framework
Elvis Graffeo	LifeBee	Partner and Industrial Operations Director
Emanuel Melo	Health Cluster Portugal	VBHC Project Manager
Emil Kakkis	Ultragenyx Brasil	Founder, Chief Executive Officer and President
Eva Villalba	Quebec Cancer Coalition	Executive Director
Omar Saeed	Sanofi	Value Assessment Lead
Faisal Alissa	Astrazeneca	Saudi Transformation Associate Director
Filipe Costa	Vision for Value	CEO & Founder
Florence Baron Papilon	Sanofi	Head of Corporate Public Affairs in Europe
Francisco Nuno Rocha-Gonçalves	Sanofi Portugal	Head of Market Access and Public Affaris
Giuseppe Banfi	Biogen Italia	VP and Managing Director
Girisha Fernando	Lyfegen	Founder and CEO
Graham Elderfield	Community Partners	Partner/ International Healthcare Consultant
Grogory Katz	Faculté de Santé - Université Paris Cité	Professor, Chair of Value in Health, Director
Hans Bax	CAPADEV LLP, BPC	Value Based Healthcare & Procurement Consultant
James McHale	Mölnlycke Health Care	Global Value-based Partnerships Manager
Jannie Van den Broek	The Janssen Pharmaceutical Companies	Strategic Partnership Lead

	of J&J	
Jennifer Clawson	BCG	Partner and Director - Value Based Health Systems
Jia Xuan Yeo	Singapore General Hospital	Manager (Office of Value-Based Healthcare)
Jim Hunsicker	Boehringer Ingelheim	Executive Director of Value & Access Solutions
Joe Ucuzoglu	Deloitte USA	CEO, Value-Based Procurement
Joris Bulens	Deloitte	Partner
Jose Adonis Fogaça	Abbott Brazil	Vascular Innovation & Strategic Management Manager
José Rivera	MD Anderson Cancer Center	Head of VBHC - Chief Admin Quality Officer
Joshi Venugopal	Novartis Switzerland	Head of Region Europe, Novartis Gene Therapy & Rare Diseases
Joshua Kellar	BCG	Managing Director & Partner
Joshua Snowden-Bahr,	Cleveland Clinic	Regional Director of Contracting and Business Markets (International Markets)
Kerin Adelson	Yeale Cancer Center	Chief Quality Officer
Kinga Borsos	Boehringer Ingelheim	Vice President Value & Access: HEOR
Koen Segers	Arthur D. Little	Partner
Kunegonde Carpentier	Johnson & Johnson	Senior Director External Affairs & Strategic Alliances EMEA
Kyle Hvidsten	Sanofi	Vice President, Head of Global HEOR
Liz Lewis	Takeda Pharmaceuticals	Pharma, Head of Global Oncology Patient Value, Policy, and Access
Lucia Cordon	Merck & Co.	Pharma, Global Market Access Director
Ludovica Borsoi	Bocconi	Lecturer
Luís Gomes	Hovione	Ex-Vice President of Generic Unit of

		Business / Currently Consultant
Luís Pereira	Medtronic Portugal	Country Director
Luís Rocha	ISCSP-ULisboa	Invited Professor Healthcare Management
Marcia Makdisse	Mak Valor Mentoring	Founding Partner
Maria Stewart	Boston Scientific	Medical Devices, Global Medical Technology Market Access Leader
Maribel Suárez	Sanofi Vaccines	Global Head of Health Economics & Value Assessment
Marta Diez	Sanofi Vaccines Iberia	General Manager
Mary Witkowski	Harvard Medical School	Faculty Lecturer in the Global Health and Social Medicine Department
Matthew Hoover	Cleveland Clinic	Director of Pharmacy Procurement and Logistics
Matthew Leonard	Pfizer	Head of Global Access & Value
Mécia Fonseca	Novartis	Value & Access Head Portugal
Medical Representative	Novartis	Medical Representative
Michael Porter	Harvard Business School	Professor/ Creator VBHC Framework/ Economist
Michel Mohler	Lyfegen	Founder and CEO
Mike Cullen	B Braun UK	Head of Value & Access
Mohammad Waghu	Cleveland Clinic - Abu Dhabi	Procurement Manager
Myrthe Van Den Heuvel	Dutch Orthopedic Association	Quality Policy Advisor
Patrick Mans	Philips	Head of Data Science & AI Engineering
Patrizio Armeni	Bocconi	Professor of Practice in Government, Health and Not for Profit
Pedro Soares	Centro Hospital Universitario de São João	Head of Pharmacy

Peter Gilmore	PWC	Principal
Raja Jamalamadaka	Roche	Managing Director
Ramona Sequeira	Takeda Pharmaceuticals	Pharma, President, Global Portfolio Division
Raquel Correia	Université de Paris	Program Director of the Value-Based Health Care Graduate Program
Rebecca Steele	Vintura	Life Sciences Manager
Reem Bunyan	Global Innovation Hub for Improving Value in Health	Executive Director
Rickard Sandin	Pfizer	Pharma, Director, Global Health & Value, Outcomes & Evidence
Robert McGough	Hill Dickinson LLP	Partner
Roger van den Heuvel	KPMG Switzerland	Life Sciences Strategy Leader
Rosanna Tarricone	SDA Bocconi	Associate SDA Dean for Government and Health Division
Sally Lewis	Kintsugi-International	Independent Healthcare Consultant/ International Advisor in Healthcare Systems
Samantha Wehmann	Johnson & Johnson	Medical Devices, Senior Director, Value, Access & Pricing
Sandra Guedj	Astrazeneca France	Head of Vaccines and Imune Therapies
Sara Correia Pinto	ResMed	Commercial Manager Portugal & Clinical Manager Iberia at ResMed
Sérgio Alves	Astrazeneca Portugal	Global Head of Health Equity
Sheryl Van der Hilst	Boehringer Ingelheim	Senior Associate Director
Silvia Terragni	EFLM Office	Association Manager
Simon Gineste	Novartis	General Manager Portugal
Stefan Larsson	BCG	Senior Advisor in Healthcare and Life Sciences and Chair of ICHOM
Stefanie Devos	Belgian Federation of	Advisor Data & Health Economics

	Medical Technologies	
Tamara Denie	Roche	Market Access Head Belgium
Thomas Allvin	EFPIA	Executive Director Strategy and Healthcare Systems
Thomas Janssens	Siemens Healthcare	Scientific and Value Partnership manager
Toby Colegate-Stone	Cleveland Clinic	Consultant Orthopaedic & Trauma Surgeon
Tomaiuolo Rossella	Università Vita-Salute San Raffaele	Professor
Valerie Kirchberger		Digital Health Expert
Vanessa Jacinto	Boehringer Ingelheim Portugal	Head of Market Access and Public Affairs
Victoria DiBiaso	Sanofi	Global Head Patient Informed Development & Health Value Translation
Vincent Wiersma	Amgen	Value, Access & Policy Manager Cardiovascular
Visegan Subrayen	PPO Serve	Chief Operating Officer
Yajuan Lu	Boston Scientific	Medical Devices, Director Corporate Health Policy & Reimbursement

Appendix 6: List of interviewees

Name	Organization	Position	Date
Alan Wain	EPSCOT	Partner & Chief Operating Officer	25/10/2024
Alejandro Pacheco Padilla	Accord Healthcare	Health Portfolio Manager	14/10/2024
Alexandra Schmidt	Air Liquide	Value Transformation Director	06/11/2024
Brian Mangan	Luach Consulting Group/European	CEO/ Executive Board Member	24/09/2024

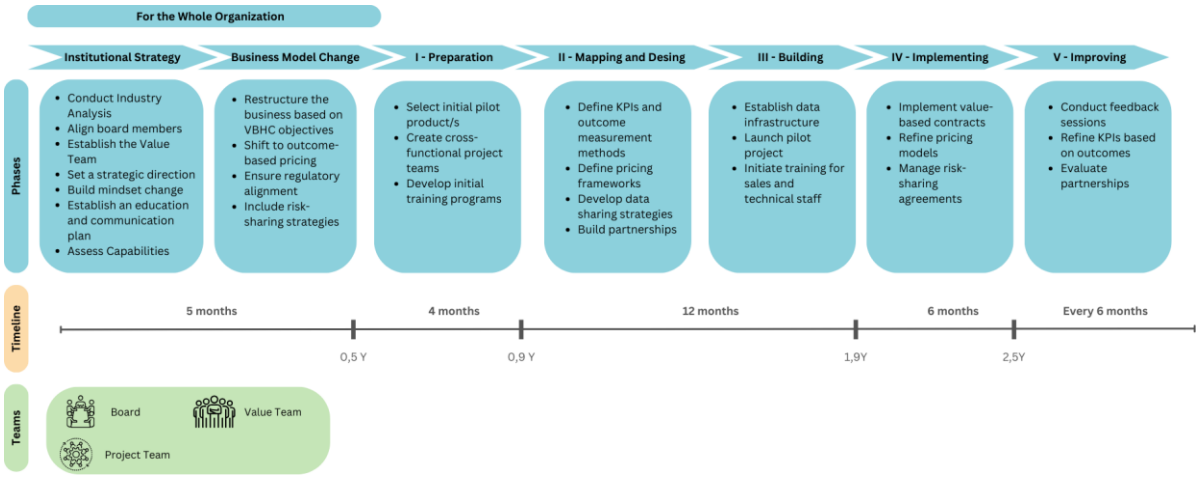
	Association of VBHC		
César Luiz Abicalaffe	2iM Inteligência Médica S/A	CEO & Founder	03/10/2024
Chester Good	UPMC Health Plan	Senior Medical Director	16/10/2024
Craig Barratt	Oliver Wyman	Principal/ Healthcare Strategist & Transformation Leader	25/10/2024
David Ikkersheim	KPMG Netherlands	Partner/ Head of Strategy & Operations	23/09/2024
Elisabeth Angelina	Singapore General Hospital	Manager (Office of Value-Based Healthcare)	24/09/2024
Elizabeth Teisberg	UT Austin, Dell Medical School	Executive Director of the Value Institute for Health and Care/ Creator VBHC Framework	11/10/2024
Elvis Graffeo	LifeBee	Partner and Industrial Operations Director	27/09/2024
Emanuel Melo	Health Cluster Portugal	VBHC Project Manager	17/10/2024
Giuseppe Banfi	Biogen Italia	VP and Managing Director	11/10/2024
Graham Elderfield	Community Partners	Partner/ International Healthcare Partner	23/10/2024
Jennifer Clawson	BCG	Partner and Director - Value-Based Health Systems	03/10/2024
Luís Gomes	Hovione	Ex-Vice President of Generic Unit of Business / Currently Consultant	29/10/2024

Luís Pereira	Medtronic Portugal	Country Director	30/09/2024
Luís Rocha	ISCSP-ULisboa	Invited Professor Healthcare management	07/10/2024
Hans Bax	CAPADEV LLP, BPC	Value Based Healthcare & Procurement Consultant	07/10/2024
Medical Representative	Novartis	Medical Representative	23/10/2024
Michel Mohler	Lyfegen	CEO and Founder	24/09/2024
Mike Cullen	B Braun UK	Head of Value & Access	17/10/2024
Robert McGough	Hill Dickinson LLP	Partner	24/09/2024
Rossella Tomaiuolo	Università Vita-Salute San Raffaele	Professor	17/10/2024
Sally Lewis	Kintsugi-International	Independent Healthcare Consultant/ International Advisor in Healthcare Systems	01/10/2024
Sara Pinto	ResMed	Commercial Manager Portugal & Clinical Manager Iberia	11/10/2024
Stefanie Devos	Belgian Federation of Medical Technologies	Advisor Data & Health Economics	06/11/2024
Vincent Wiersma	Amgen	Value, Access & Policy Manager Cardiovascular	06/12/2024

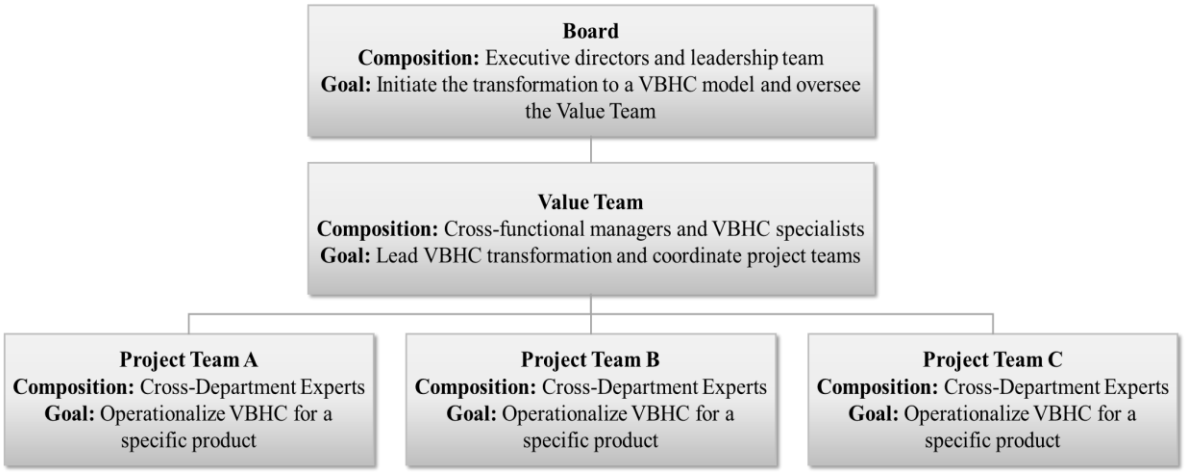
Appendix 7: Qualitative content analysis approach example

Interview Transcript	**Meaning Units**	**Condensed Meaning Units**	**Category**	**Subcategory**
"In every conversation I've had with pharma companies, their regulatory processes drive them to focus on "moving the mean up"—improving average outcomes. But the real challenge is to ensure that the lower end of the distribution, where patients may have different comorbidities, variations of the condition, or unique economic or social circumstances, also sees improved results. These patients often require a different approach to care than the current standard, and understanding their specific needs could lead to better outcomes. This consideration might even vary by region. I've worked with companies that adapt their care strategies based on location, such as in parts of Asia, South America, or remote areas in Norway and Australia, where care needs differ from those in major urban areas."	"Pharma companies are often driven by regulatory processes to improve average outcomes "moving the mean up", but this approach can overlook the specific needs of patients at the lower end of the distribution."	Regulatory focus on averages neglects patients with special needs	Institutional Strategy	Problems within the industry
	"Patients at the lower end of the distribution often have unique needs due to comorbidities, condition variations, or socio-economic differences, requiring a different approach to care beyond the standard."	Standard care models fail for patients with complex conditions	Mapping and Design	Outcome measurement
	"Care strategies need to be tailored to regional contexts, as healthcare needs in various parts of the world, such as Asia, South America, or remote areas ... differ significantly from urban centers."	Care strategies must adapt to regional healthcare needs	Business Model Change	Restructuring

Appendix 8: Implementation Plan Chart



Appendix 9: Teams Structure



Note: the number of project teams will be entirely dependent on the number of projects.