IMPLEMENTING VALUE-BASED HEALTH CARE IN EUROPE

HANDBOOK FOR PIONEERS

EIT Health

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Academic director

Prof. Gregory Katz, Chair of Innovation & Value in Health, University of Paris School of Medicine, Founding Director, VBHC Consortium

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- Dr. Sally Lewis, National Clinical Lead for Value-Based and Prudent Healthcare, NHS Wales

Research team

- Clara Bardin, Research Engineer, University of Paris School of Medicine, Sorbonne University
- Sophie-Christin Ernst, Research Engineer, University of Paris School of Medicine, Münster University
- Dr. Vinh-Phuc Luu, Research Engineer, University of Paris School of Medicine
- Dr. Gabriela Martins Caetano, Research Engineer, University of Paris, AP-HP, University of Coimbra
- Dr. Alba Nicolas-Boluda, Research Engineer, Project Manager, University of Paris School of Medicine
- Charles Ouzana-Vedrine, Research Engineer, University of Paris School of Medicine
- David Springer, University of Vienna School of Medicine
- Ioana Stoenica, University of Paris, Carol Davila University of Medicine & Pharmacy of Bucharest
- Laure Vergeron, Research Engineer, Project Manager, University of Paris School of Medicine

Special contributions

- Hans Martens, Chairman of Coalition for Health, Ethics and Society, Senior Advisor at European Policy Centre
- Elissa Swift (co-author), Former Director, Value-Based Payment New-York City Department of Health
- Dr. Jordi Varela, Assistant Professor at ESADE Business School and Editor of Advances in Clinical Management
- Scott Wallace, Co-founder and Managing Director of the Value Institute for Health and Care at Dell Medical School, The University of Texas at Austin

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> “Valuing is creating: hear it, ye creating ones!
> Without valuation, the nut of existence would be hollow[1].”
>
> *Friedrich Nietzsche (1883)*

Foreword

As I write this foreword, the impressions of the EIT Health Summit 2019 are still fresh in my mind. At the Summit we presented and discussed key findings of this report, and Elisabeth Teisberg of the Value Institute reminded us that health care should actually be two words. We have tended to think of health care as encompassing treatment and care only, rather than being about achieving health.

EIT Health has been formed to deliver innovation that supports people living longer and healthier lives. As we know, innovation for innovation's sake will no longer have a place in an ever-changing and demanding health care landscape and so the focus on value for patients is key. To create solutions, we must understand the needs, which means understanding the needs of people being served. This knowledge must inform every step of the innovation process.

This report is an important step for EIT Health to contribute to establishing a common language around high value care in Europe. We offer a framework to analyse the actual implementation and scaling of cases from all over Europe. We aim to expand the body of cases in the report over time.

More than 240 expert interviews in 22 countries in Europe with the involvement of over 30 leading medical centres have been conducted over the past few months to compile this report. I would like to thank every single participant for their dedicated time and effort. I would also like to credit the team that has worked on making this report a reality, most notably Prof. Gregory Katz, Elissa Swift, and Dr. Christina Akerman. They have been supported by a dedicated team of nine researchers around Europe.

This report is intended for:

- The practitioners who are driving change towards more high value care every day. It should provide sources of inspiration and offer additional insights. Of course, the report shall also acknowledge the success shown through the cases.
- The innovators who are aspiring to deliver new 'solutions', and offer greater understanding of needs and of what 'value' of innovation actually means.
- Policy makers who are interested in driving much needed system change, who would like to build international connections and gain a better understanding of how pilots could be scaled.

We would like this report to stimulate the debate around high value care and how we can accelerate its development. This debate needs to span various sectors and disciplines, and we hope that EIT Health can act as a trusted facilitator. In order to succeed, we rely on the feedback of the health innovation community and encourage you all to reach out with your contributions.

Jan-Philipp Beck,
CEO, EIT Health

Introduction

Value & waste

Health care should be driven by a constant focus on delivering outcomes that truly matter to patients. However, this drive towards value-based health care (VBHC) is hindered by a paucity of transparent and standardised outcomes data. Further, a lack of clarity regarding the definition of value has led to divergent approaches and slow progress in performance improvement. Some use the term 'value' to convey the humanistic tenets underpinning health systems[2], while others employ the term to refer to cost reduction and overall process efficiency[3]. Philosophical value and cost containment are both important, however, improving health outcomes is essential to value creation[4].

The definition of value in health care is outcomes that matter to patients divided by the cost to achieve these outcomes. This definition was introduced by Michael Porter and Elizabeth Teisberg in their seminal book *Redefining Health Care* – a work that launched the entire field of Value-Based Health Care. In this value ratio, the numerator (outcomes) designates condition-specific results that matter most to patients, such as functional recovery and quality of life, while the denominator (cost) applies to the total spending for the full cycle of care[5]. Accordingly, if outcomes that matter to patients are not improved, the resulting value is low. This definition applies to the entirety of the care pathway, from primary to secondary and tertiary care, including post-hospital care for patients affected by a single or multiple conditions. However, today's health care quality is heavily focused on process measures and, despite efforts to introduce guidelines, checklists and standardised quality measures, providers vary in processes and outcomes to a remarkable degree[6], as illustrated in Figure 1. For example, the figure shows that in Sweden, which has some of the world's best orthopaedic clinics, patients who undergo total hip replacement experience a vast range of outcomes. Those treated at the lowest-performing hospitals require follow-up surgery within two years at rates that are six times higher than patients treated in the top ranked hospitals. Currently, very few health systems assess impact on quality of life from the perspective of the people they serve. Performance metrics in health tend to focus principally on inputs and outputs. Outcomes such as life expectancy are important, but metrics do not often exist on outcomes that patients truly value, including pain, functionality and quality of life[17]. To fill in these gaps, the Organisation for Economic Cooperation and Development (OECD) received a mandate from Health Ministers, to launch the Patient-Reported Indicators Surveys (PaRIS) initiative in 2017, with the goal of benchmarking outcomes that matter most to patients.

Outcome variation is also impacted by payment models. Fee-for-service models incentivise providers to increase service volume, which can generate overmedicalisation and wasteful spending[18]. Unnecessary treatments can be performed without complications, thus remaining undetected despite the fact that they do not enhance patients' quality of life. Appropriateness of care is central to value[19]. The only way to evaluate the true value of care is to measure patient health gains according to what they consider most important in their daily life. Measuring results of a treatment from the patient perspective is essential to improve its value.

Figure 1:
Differences in hospital outcomes[7-16]

Country	Variation	
🇬🇧	2x	in one-year survival rates for lung-cancer treatment in England* [7]
🇳🇱	3x	in complications after colon cancer surgery in the Netherlands* [8]
🇩🇪	5x	in reoperations due to complications after knee replacement in Germany* [9]
🇸🇪	6x	in reoperations within two years after total hip replacement in Sweden [10]
🇸🇪	7x	in percentage of complications after colon cancer surgery in Sweden [11]
🇧🇪	7x	in mortality rate after rectal cancer surgery in Belgium* [12]
🇬🇧	8x	in reoperations following coronary artery bypass grafts in the UK [13]
🇩🇪	11x	in severe incontinence after radical prostatectomy in Germany [14]
🇬🇧	15x	in 30-day mortality rates after emergency hospital admissions for COPD in England [15]
🇸🇪	31x	in capsule complications after cataract surgery in Sweden [16]

*Risk-adjusted

The World Health Organization (WHO) and the OECD both estimate that around 30% of resources spent on health care are wasted on avoidable complications, unnecessary treatments or administrative inefficiencies[20-22]. Wales is an example of a health system that has begun to apply outcome measurement to defining value and making investment decisions. The National Health Services (NHS) in Wales found that 19% of cataract surgeries do not improve visual disability – as reported by patients; however, with a cost of £615 per surgery (€731), it is fair to question the added value to the patient if these surgical procedures have no impact on activity limitations in daily life[23]. Further, as complication rates for cataract surgery are low (1.6% on average)[24], but unnecessary treatments are significant (19%), patient-reported outcome measures (PROMs) are now strategically used by the NHS and clinicians in triage to determine the optimal care pathway for each patient. This example illustrates that high quality care is not necessarily high value care, and furthermore, that PROMs can play an instrumental role in determining the judicious deployment of resources[25].

Focus on implementation

The starting point for achieving value is to measure outcomes. At macro and micro levels, outcome measurement can affect both underperformance (e.g. complication rates) and disutility of care (e.g. overmedicalisation). Although taking on outcome measurement can ultimately lead to changes in strategy, culture and operations, it is not rocket science. Hundreds of provider organisations have embraced this challenge. Examples originate from a wide variety of countries and health systems, but all of these European pioneers share the same objective – to maximise outcomes that matter most to patients. Despite this entrepreneurial energy, significant barriers remain, including – and most specifically – the resistance to changing the traditional siloed culture within health care organisations.

> ***Unnecessary treatments can be performed without complications, and thus remain undetected despite the fact they do not enhance patient quality of life. Appropriateness of care is central to value.***

The aim of this handbook is to help more providers tackle the challenge of implementing VBHC, and for this reason, we chose to build on learning from the frontlines on which change is happening. We conducted semi-structured interviews with 246 local, regional and national VBHC leaders across European health systems, representing a wide array of functions and organisation-types: clinicians, hospital managers, patient representatives and academics, as well as health insurers, health authorities, start-ups and life science companies – all involved in VBHC. Our interviews included players across 22 countries: Austria, Belgium, Croatia, Denmark, England, Finland, France, Germany, Hungary, Ireland, Israel, Italy, Latvia, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland and Wales. From these interviews, we identified 30 leading medical centres and health organisations that have tackled VBHC implementation challenges. Through this comprehensive survey, we estimate that over a hundred sites in Europe have embarked on their VBHC journey. We visited these early adopters and subsequently developed a series of case studies presented here.

This handbook focuses primarily – but not exclusively – on implementing VBHC at the provider service level – the point of care delivery where patient outcomes are collected. Nevertheless, beyond the scope of this work, further investigations should be conducted to develop a broader understanding of VBHC implementation across the continuum of care. It is easy to over- or underestimate the difficulty of executing on a vision. Our goal is to address the challenge of operationalising these transformative efforts. This user guide aims to share tools and best practices to facilitate the acceleration of the development of outcomes measurement, enabling medical teams to compare, improve and incentivise results over time. Of course, there is no one-size-fits-all solution for measuring outcomes, and all providers must make adjustments specific to their organisation, in order to customise implementation. However, we have found that providers do take similar steps, overcome similar hurdles and converge on similar solutions. Based on these patterns, we have designed an implementation model entitled the VBHC Implementation Matrix, which defines five key dimensions critical to most VBHC initiatives.

1. **Recording** refers to measuring processes and outcomes through a scorecard and data platform;
2. **Comparing** refers to benchmarking teams through internal and external reports;
3. **Rewarding** refers to investing resources and creating outcome-based incentives;
4. **Improving** refers to organising improvement cycles through collective learning;
5. **Partnering** refers to aligning internal forces and forging collaborations with external partners.

These dimensions are detailed in the first chapter of this report. The case studies in the second chapter apply the Matrix framework to various health system actors: public and private hospitals, condition-specific clinics, outpatient chronic care clinics, health systems, third-party quality registries, independent caregivers, and payers. This work does not aspire to deliver a definitive or comprehensive solution in this realm. As VBHC is still in its infancy, our intention is to share operational lessons that will likely evolve over the years to come. These learnings derive from dedicated leaders who have agreed to share their experience and the tools they have used to prototype change within their own environments. Despite imperfections, prototyping a VBHC pilot requires starting with simple steps rather than grand solutions[26]. By taking these early steps, health care leaders can begin to move in the right direction towards success in the long-term.

The Implementation Matrix

Getting started on tracking outcomes is not easy. To address this challenge, we have built an implementation roadmap – the Matrix – through our experience working with leaders implementing outcome measurement. The Matrix captures a shared language for describing, visualising and implementing a value-based programme. The challenge is to make each concept concrete and relevant, while not oversimplifying complexities. Each of the five dimensions of the Matrix is made up of *building blocks*[27]. The relationship between the dimensions and the building blocks is displayed in Figure 2, in which the five dimensions are colour coded. This Matrix can be applied across most health care organisations and systems. Each building block is detailed in the following chapter.

Figure 2:
The Implementation Matrix

1. Condition

Identifies a patient group

2. Internal forces

Consists of mobilising a core team, involving patients and making board support visible

3. Scorecard

Defines processes, costs and outcome indicators while applying case-mix adjustment

4. Data Platform

Enables data capture, interface interactions, data analytics and access to data

5. Benchmarks

Provide transparent outcome comparisons across providers

6. Investments

Involve human and financial resources mobilised for implementation

7. Incentives

Create outcome-based payments and behavioural encouragements

8. Learning community

Relies on improvement cycles, training programmes and research projects

9. External collaborations

Refers to partnering with insurers, life science companies and health authorities

Image by EIT Health Germany

1. Condition

VBHC initiatives can be implemented at a population or individual level, including episodic and chronic diseases. At the population level, prevention means preserving the healthy status of a population, where avoidance of care is a positive outcome from a prevention perspective[28]. For example, the *healthspan calculator* tool measures value for health systems by integrating population segments and cost inputs, then calculating the potential savings resulting from the additional time people remain in good health[29]. On the individual level, recovery from disease is a positive outcome from a clinical perspective: implementing a value-based programme at this level requires choosing a condition for which outcomes will be measured. This decision should be based on several parameters.

First, it is important to find clinical champions willing to measure their outcomes and to be transparent with their peers and patients. These trailblazers are critical to selecting the specific condition and generating the momentum necessary to resolve early challenges[30]. Second, it is important to consider whether the care team is motivated to dedicate its time and efforts to measuring outcomes and analysing variation over time. Indeed, the buy-in of the whole team, and not just one or two cheerleaders, is a critical component of a successful VBHC initiative. Lastly, focusing on one specific condition is an important first step to maximising the success of implementation. All efforts and resources should be directed towards one single proof of concept, while other conditions should be targeted later. In order to catalyse inspiration across teams, it is essential to share and celebrate early success stories to stimulate motivation within the organisation.

Implementing outcome measurement should be relatively straightforward for patients affected by only one condition, but it is much more complex for patients affected by multiple diseases, who represent 42% of patients in some EU countries[31]. For example, a patient with heart failure and depression may receive questionnaires from different clinics or departments, which only partially overlap, and are not aligned. To address this challenge, Charité University Hospital in Berlin is developing a framework that combines a generic PROM questionnaire with condition-specific questions. Where possible, each question should be codified and flagged in the patient's electronic medical record (EMR), to enable other clinicians, from inside or outside the hospital, to detect outcome variations and take real-time actions[32]. While this effort to address multiple diseases is an important advance, focus on a single condition offers the most realistic chance of success for value-based pilots. As PROMs collection becomes more widespread, strategies need to be adopted to avoid overwhelming patients with constant surveys and to reach them conveniently without jeopardising privacy.

Image by Sharon McCutcheon

2. Internal forces

Mobilising internal forces is essential to overcoming resistance to change. As with any transformation, VBHC has its critics and skeptics, giving rise to such reactions as: *We don't have time for PROMs! Is it the role of clinicians to capture data like bureaucrats? What lessons can we draw given that the data will inevitably be incomplete? Is this the starting point for a name and shame game? VBHC is another fad from across the Atlantic, let's not copy them again!* While there are valid questions, challenges and concerns, some providers may hesitate to measure outcomes, even internally, finding reasons to prioritise the status quo, resist accountability and thwart progress through outcome measurement[4].

In contrast, VBHC pioneering health care organisations catalyse transformation around core values such as patient involvement, team empowerment and accountability, end-result transparency and continuous improvement. This cultural shift reconnects medical teams with their humanistic aspiration to deliver outcomes that matter to patients. The case studies included in this report demonstrate that this value shift may begin at the top or bottom of an organisation. In all cases, vision is not sufficient to trigger implementation. First, implementation requires clinician and administrative leaders working in tandem, combining medical and managerial competencies, and jointly accepting the risks inherent to change. These value-champions motivate staff to persevere through the disruption of established norms and habits[33]. The second step for senior leadership is to build bridges across functions and commit necessary resources for long-term impact. Finally, it is critical to appoint a cross-functional VBHC management team to determine a roadmap, define deadlines and key milestones and create traction broadly – from the operating room to the boardroom.

> ***Implementation requires clinician and administrative leaders working in tandem, combining medical and managerial competencies, accepting together the risks inherent to change.***

A powerful example of mobilising internal forces to launch a VBHC initiative comes from Vall d'Hebron University Hospital in Barcelona (Spain). The CEO appointed a VBHC management team, which organised a series of process mapping workshops with caregivers. The management team invited doctors, nurses and nurse-assistants to assess the value of each action across the cycle of care. Participants used coloured stickers to denote poor, medium or high value actions. As a result, on average, caregivers discovered that 55% of their actions could be defined as low value to patients. Visualising and quantifying existing organisational inefficiencies in a trusted environment is the starting point to empower and encourage teams to change care delivery from the bottom up.

Image by Hospital Vall d'Hebron

Another Vall d'Hebron exercise consisted of switching positions among doctors, nurses and nurse-assistants during a full workday to map patient-oriented actions and record the number of colleague interruptions. This exercise revealed that interruptions between peers were significant. In some cases, nurses walked nearly 10 km per day through hospital corridors, inevitably resulting in them becoming exhausted, discouraged and stressed. This collective awareness catalysed a desire to implement change. These workshops enhanced empathy, communication, team spirit and respect between team members, and following the workshops, medical teams organised improvement cycles with patient representatives to drive change. Patients and caregivers felt empowered and part of the solution according to Maria Gutierrez San Miguel, Clinical Pathway Project Manager, pointing to the corner stone of VBHC implementation – the capacity to mobilise internal forces[34].

3. Scorecard

The scorecard aims to measure the value of care for a specific condition, by incorporating a minimal set of process, outcome and cost indicators. *Process* measures how care was delivered. *Outcomes* measure the impact on patient health status. *Costs* measure the money spent to achieve these outcomes. Combined, these three metrics track changes to detect variation over improvement cycles. For each indicator included, the scorecard should specify a baseline and a target range. Outcome indicators should be risk-adjusted according to case-mix variables such as age, gender, previous illnesses, comorbidity, educational level, work status, etc. Case-mix adjustment is essential to limit adverse selection, i.e. to prevent providers from avoiding treating complex cases to skew their results. A scorecard must be simple, easy to interpret and replicable to enable comparisons across medical teams (Table 1).

Process mapping

Care pathway mapping is essential to understand processes and measure costs at patient level. The pathway captures the baseline from which organisational changes can be tested and measured throughout improvement cycles. Process mapping enables the visualisation of the interdependence of each step over the care cycle, especially the average time spent by caregivers (Figure 3).

In these process maps for prostate brachytherapy, each box represents a stage through which a patient passes. The number at the top of each box represents the order of activities. Colours represent the resource that completes the activity. Numbers circled at the bottom right corner of each activity represent the estimated number of minutes needed to complete the activity. Percentages signify the probability that patients pass through each step of the process[36].

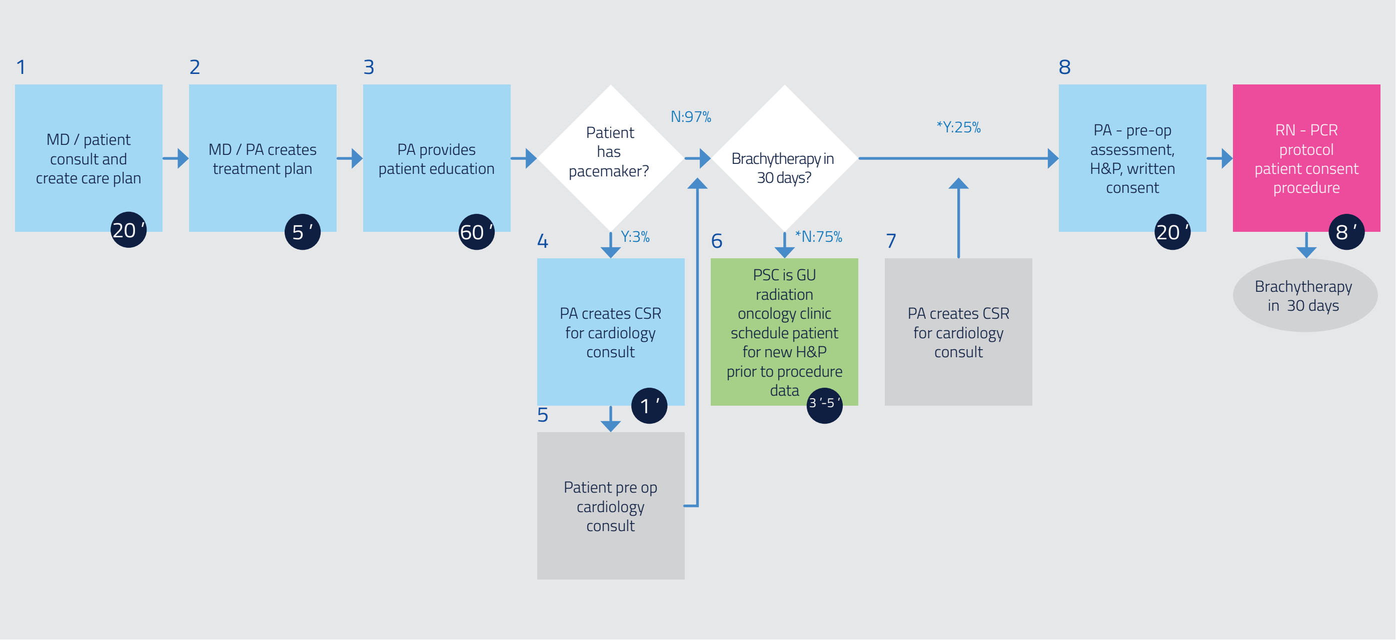
Table 1:

Scorecard for breast cancer[35]

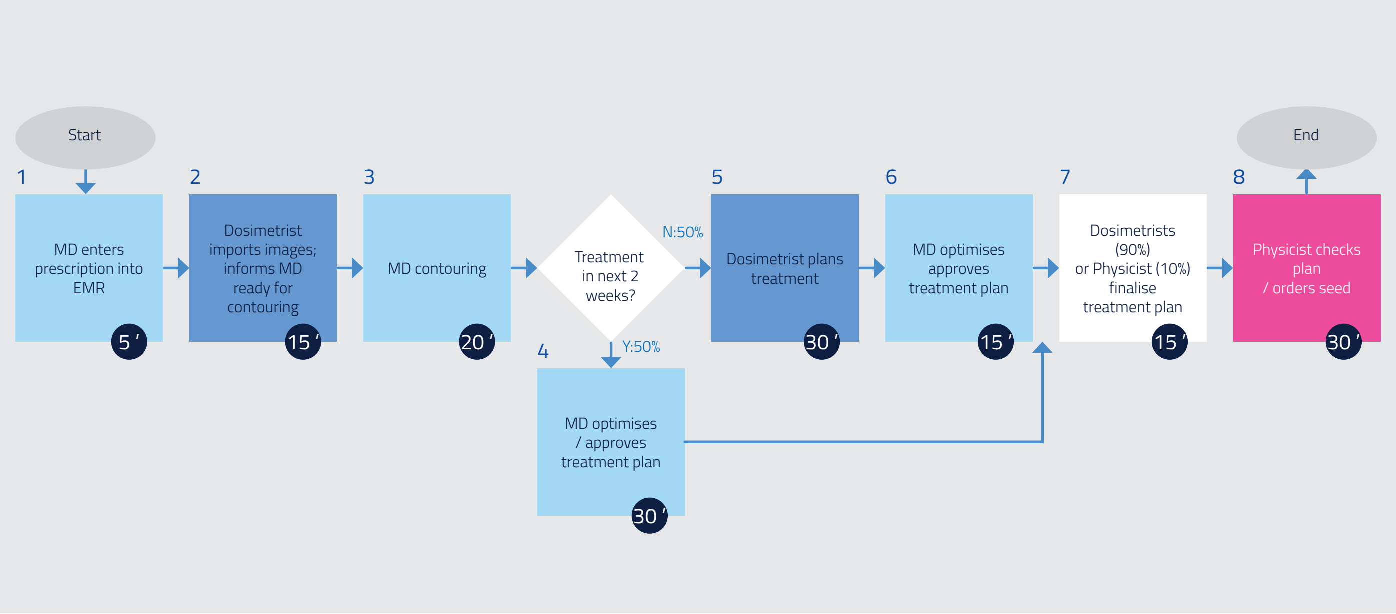
Category	Indicator
Outcomes	▪ 5-year survival rate, unadjusted (%) ▪ Repeat operations after a positive margin (%) ▪ Repeat operations after postoperative complications (wound infection or postoperative bleeding (%)) ▪ Unplanned admissions, deviation from treatment plan and/or heart failure after systemic therapy (%) ▪ PROM: quality of life, functioning, pain ▪ PROM: specific symptoms as a result of treatment (breast, arm, vasomotor)
Costs	▪ Nursing days per patient (number of days) ▪ Primary breast conserving operation without hospitalisation (%) ▪ Operating room-time per patient (minutes) ▪ Outpatient clinic consultations per patient (number) ▪ Additional diagnostic activities per patient (MRI, PET, CT, MammaPrint) ▪ Use of expensive medicines
Processes	▪ Duration from referral to first clinic visit ▪ Duration from first clinic visit to diagnosis (AP report) ▪ Duration from diagnosis (AP report) to discussion of the treatment plan ▪ Duration from discussion of the treatment plan to treatment commencement ▪ Dedicated contact person who supervises the patient and is known to the patient (%)
Treatment mix	▪ Percent of patients per treatment option (e.g. breast cancer conserving, direct reconstruction)

Figure 3:
Process mapping for prostate brachytherapy consultation and treatment[36]

Consultation



Treatment



Cost measurement

Measuring health care costs and making them transparent empowers clinical teams to be stewards of resources. In the value framework, the relevant cost is the total cost of all inputs – such as clinical and administrative – used during a patient's full cycle of care. The patient-level activity based cost accounting allocates to each patient the cost of the resources actually consumed. One may also integrate social costs related to sick leave and societal costs resulting from lack of autonomy. These costs apply to a specific medical condition, including the treatment of associated complications and comorbidities[4,37]. The cost of treating a patient with type 2 diabetes, for example, must include not only costs associated with endocrinological care, but also the costs of managing and treating associated conditions and complications such as vascular, retinal and renal disease, in addition to the costs of services in primary care.

> ***Costs remain largely a black box for payers, and a blind spot for hospital managers.***

As the denominator of the value ratio, cost is difficult to measure for several reasons. First, most hospital cost-accounting systems are department-, not patient-based, and are designed for billing of transactions reimbursed under fee-for-service contracts[37]. In most health care organisations, there is virtually no accurate information on the cost of the full cycle of care for a patient for a particular medical condition. As a result, cost allocations are often based on charges, not actual costs. Second, most providers are reluctant to share cost information in order to ensure that their net profit margin remains confidential, particularly since this information could weaken their negotiating stance with payers. Finally, prices, tariffs and charges are dramatically different across European health systems, which makes cost comparisons meaningless. For these reasons, costs remain a black box for payers, and a blind spot for hospital managers.

In order to shed light on cost measurement, Robert Kaplan and Michael Porter introduced the application of Time-Driven Activity Based Costing (TDABC) in health care settings[37]. In essence, TDABC requires a project team to map every administrative and clinical process involved in a complete care cycle (see Figure 4). Based on condition-specific process maps, the team documents each step, the job classification of the person performing the step, and the time required to complete it. TDABC then estimates the cost per minute for the clinical and administrative personnel involved in the care process. This ratio, known as the capacity cost rate, is calculated by dividing an individual's annual compensation and support costs, such as supervision, by the total number of work minutes per year attributed to patients (Figure 4).

Attempts to develop process-oriented cost-accounting methods in health care, have proven challenging to implement, as this methodology is often considered too resource intensive in large organisations[38]. Following testing at Basel University Hospital in Switzerland, the TDABC approach was found to be "highly laborious and not scalable especially in health care settings with complex or diverging patient pathways"[39].

Based in Bilbao, Spain, Cruces University Hospital's finance department has developed an analytic tool to measure costs over the primary to secondary care cycle. For a given care pathway, a theoretical cost is calculated according to the

Figure 4:

Time-driven activity-based costing of prostate brachytherapy[36]

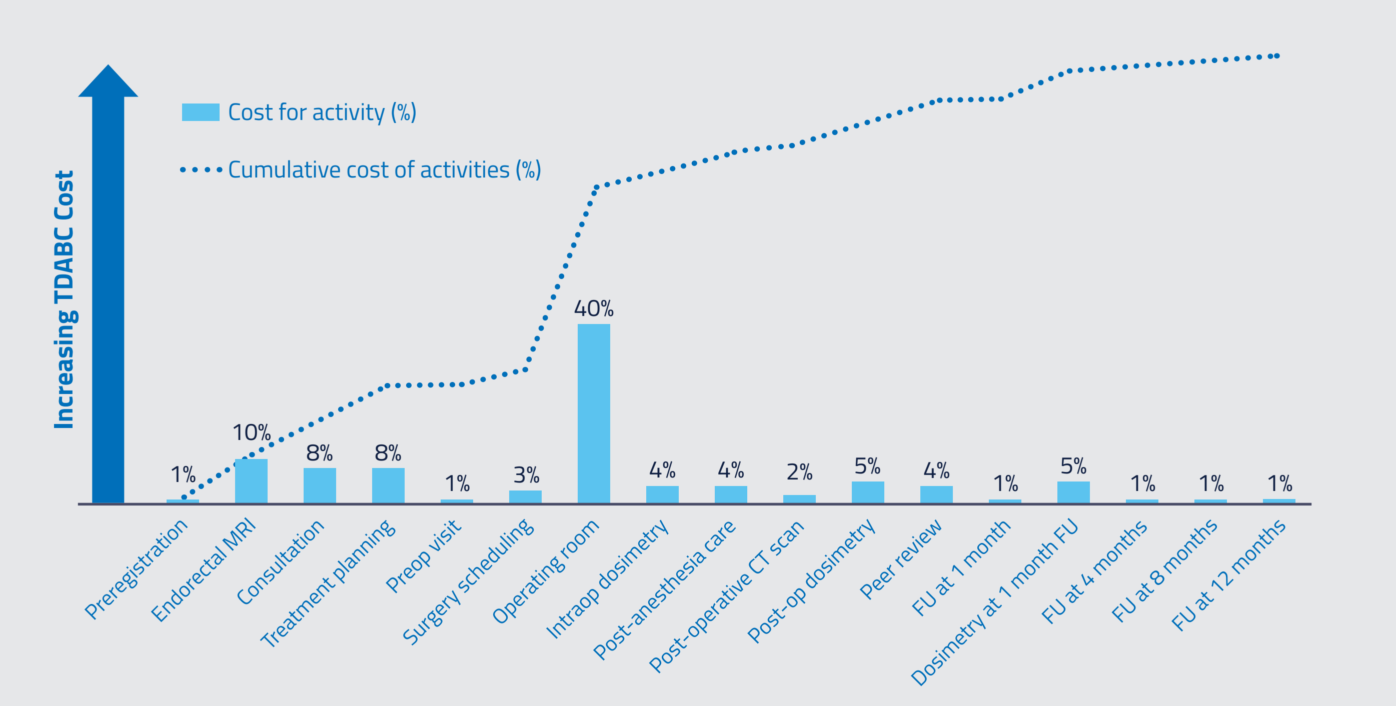


Image by Jafar Ahmed

process map, before being compared to the empirical cost. In 2019, Cruces compared three different care protocols for implanting a neurostimulator to treat patients affected by Parkinson's disease. With equivalent outcomes, cost analysis revealed that one of the three tested protocols had a cost of 53% lower than the most expensive one. Researchers are conducting similar cost analyses for surgical robots, where clinical outcomes and cost-effectiveness are being debated[40]. These examples are product- or service-centred and are important for procurement decisions, but fail to measure costs for the full cycle of care. Although TDABC is a relevant approach to drill down into cost variation between pathways, there is no broadly accepted methodology for measuring and benchmarking costs in Europe. To address this difficulty, NHS Wales has launched the "Finance Academy", a programme partnering clinicians and hospital finance leaders in developing practical methodologies (see Case Studies).

Outcome measurement

Clinicians already deal with various outcome indicators such as blood pressure, cholesterol, prostate specific antigen (PSA) or glycated haemoglobin (HbA1c). These clinician reported outcome measures (CROMs) are mostly obscure to patients, whereas patient reported outcome measures (PROMs) cover issues such as pain after surgery, recovery time before returning to work, and a patient's ability to carry out daily activities[41]. This is the reason why PROMs are also referred to as Patient *Relevant* Outcome Measures.

Patient Reported Experience Measures (PREMs) are not classified as a health outcome measure, rather as a process measure. They evaluate the level of patient satisfaction in terms of assistance and comfort over the care cycle, such as room cleanliness and interactions with caregivers. While PREMs are useful for health care provider assessment, they reveal little about patient health outcomes – the fundamental reason for seeking care. However, for most long-term conditions or even end-of-life processes, PREMs become an approximation for the measurements of outcomes. "Outcomes remain the ultimate validation of the effectiveness and quality of medical care"[42]. The combination of PROMs and CROMs creates a synergistic approach to measuring success in health care[37]. PROMs are measured before, during and after care; they employ instruments that are generic and condition-specific, risk-adjusted and multidimensional. In this way, PROMs focus on end-points of care as well as relevant milestones of care, rather than process measures, which serve as proxies for quality[43]. PROMs may also provide standardised measures for improvement, encourage patient engagement, and, most importantly, evaluate patient priorities[44].

Besides mortality, which is widely measured, very few health care organisations track outcomes that really matter to patients. Measurement of outcomes is generally performed short term (three to six months) and at the procedure level (e.g. spine surgery, prostatectomy). The VBHC approach measures outcomes at the level of a patient's medical condition (e.g. back pain, localised prostate cancer) for the full care cycle, making it possible to compare treatment options and inform patients about treatment choices. In the case of a knee injury or osteoarthritis, surgery is not the only treatment option. Non-invasive approaches (e.g. physiotherapy) can be appropriate in many cases. But to make an informed choice regarding their treatment options, patients need to be able to compare outcomes of each possible path and select the one that seems the most appropriate for their personal situation.

Implementing the collection of PROMs is challenging. It requires dashboards updated in real-time with different layouts and levels of detail for both clinicians and patients. It also necessitates creativity in finding effective ways to help patients answer questionnaires independently. For example, arthritis patients treated at Maastad Ziekenhuis, a Santeon hospital in the Netherlands, are invited to sit in the waiting room before their periodic consultation and answer a series of 82 questions on a tablet or in print. The figure below displays a PROM instrument with some general questions addressing patient's quality of life. Long questionnaires requiring significant time-investments may be painful for some arthritic patients, especially without comfortable table-top support in filling out the printed document or its digital version. Scientific bodies in charge of designing these PROM instruments are working on shorter versions, and some providers are also investing in engaging design to improve response rate (see Figure 5).

Figure 5:

Quality of life questionnaire discussed with patients during consultations[103]

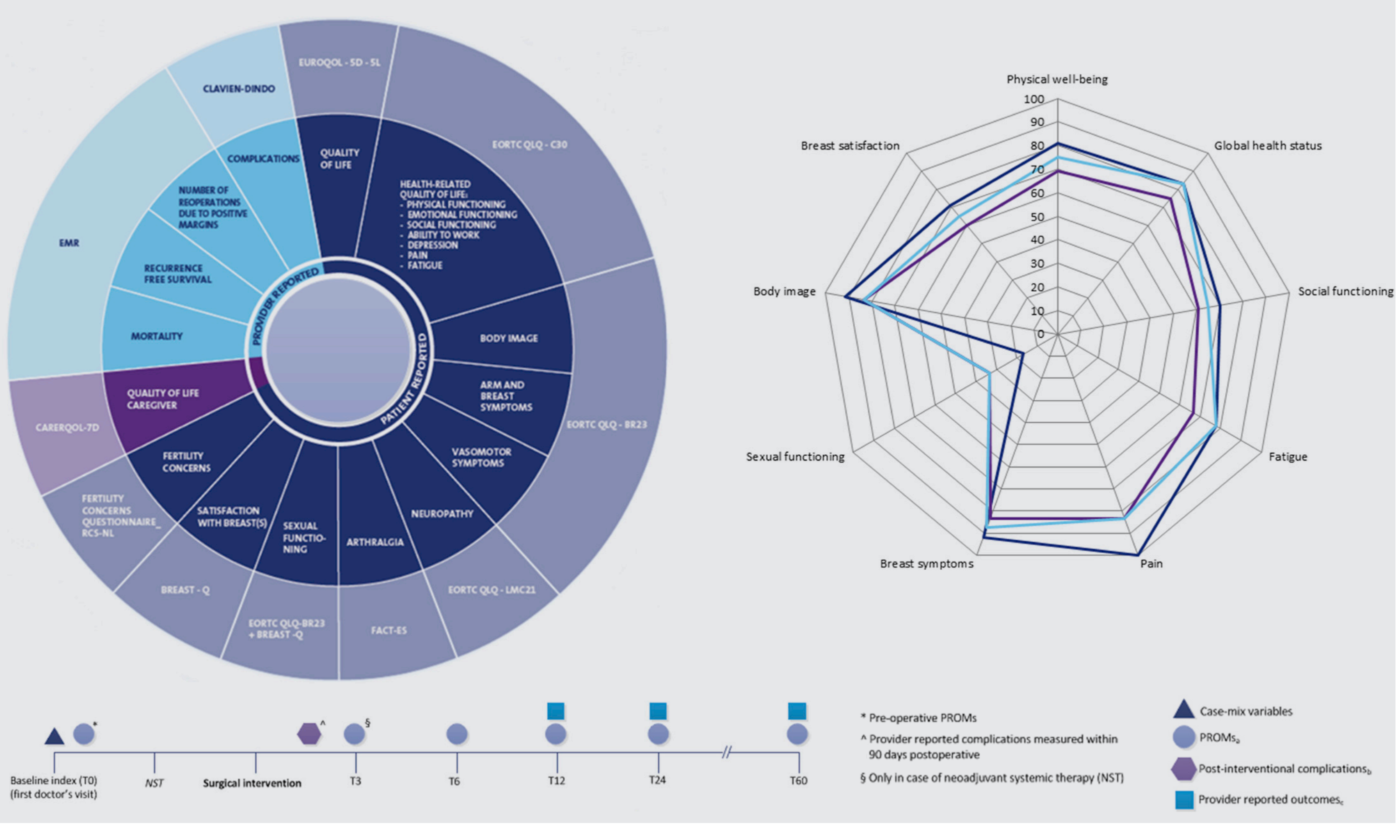
Some patients prefer a printed questionnaire, which requires converting the data to a digital format, risking typos. In France, the Institut Ophtalmologique Sourdille Atlantique, an Elsan private hospital in Nantes, has implemented the digital collection of PROMs prior to consultations for patients with cataracts. Patients complete the questionnaire in the waiting room using a notepad installed on a mobile table-top set, which can be adjusted to the patient's eye-level. Some elderly patients had found it difficult to click and move through the questions because they were using their nail on the touch screen, causing them to click several times in entering an answer, generating mistakes and frustration. To improve the ergonomics, the table-top set was lowered and the angle of the touch screen adjusted to facilitate clicking, which resulted in improved data quality and response rate.

PROMs have clinical value: they should directly inform the care pathway. PROMs are meant to be collected before consultation and discussed by the clinician and the patient in choosing or adapting the care pathway. As they involve patients in clinical decision-making, PROMs are actionable data[45]. They are calibrated instruments that undergo rigorous psychometric and statistical validations, and cannot be changed or combined without affecting their internal coherence. Translations and cultural adaptation of PROM instruments must follow the guidelines adopted by the Professional Society for Health Economics and Outcome Research (ISPOR)[46]. Minor differences in translated versions of these instruments render benchmarks statistically irrelevant and prevent providers from learning from each other[47]. For some conditions, clinicians must choose between several PROM instruments. For cataracts, the European Society of Cataract & Refractive Surgeons uses the Catquest-9SF instrument to measure visual outcomes in daily life across 14 EU countries, whereas the Royal College of Ophthalmologists in the UK uses the Catprom-5, thereby making data comparisons challenging. Choosing a PROM instrument means choosing medical teams to compare with and learn from.

Choosing a PROM instrument means choosing medical teams to compare with and learn from.

Measuring PROMs and CROMs is a challenge, especially since adjusting health outcomes to case-mix variables is essential when analysing variations across patient populations. By 2019, the International Consortium for Health Outcomes Measurement (ICHOM) had published standard sets for 28 conditions through rigorous guiding principles. Developed by panels of experts and patient representatives in relevant fields, each standard set focuses on what matters most to the patient[41]. Every standard set includes PROMs in order to capture burden, functional status and quality of life. Clinical leaders, patient advocacy members, registry experts, and patients jointly define various treatment options and outcomes. Each standard set includes case mix and risk adjustment to facilitate meaningful comparisons. For each condition, a data dictionary clearly defines sources of data and time points for data collection[48]. Published standard sets are continually reviewed, and the updated versions are accessible online for free.

Figure 6:
Outcome measurement for breast cancer[49]



* Pre-operative PROMs
^ Provider reported complications measured within 90 days postoperative
§ Only in case of neoadjuvant systemic therapy (NST)

The wheel diagram in Figure 6 presents CROM and PROM indicators for breast cancer. For this condition, it takes an average of 20 minutes per patient to complete the PROM questionnaire, and time-points measured were as follows: baseline (prior to treatment; T0), following the last course of neoadjuvant systemic therapy (T3), six months after surgery (T6) and annually thereafter (T12-60). An annual follow-up for 10 years was recommended for patients with advanced disease. The radar chart displays PROMs for each dimension of the wheel, and clinicians discuss results with patients to adjust treatment. As with all conditions, outcome measurement (PROMs and CROMs) is the essence of value-based programmes, and as such, this is where most of the initial team efforts should be concentrated.

Image by Humberto Chavez

4. Data platform

VBHC platforms are interfaces that share stakeholder data easily and securely to improve health outcomes. Typically, a person's health information is fragmented across multiple proprietary systems and data repositories (administrative, process, cost, PROMs and CROMs, etc.), which makes it hard to develop a holistic view of the individual's health or the care they have received[50]. There are many solutions to develop a data platform – from paper forms and Microsoft Excel to bespoke web portals and plug-ins for electronic medical records (EMRs). For example, the cleft lip and palate department at the Erasmus Medical Centre in Rotterdam, the Netherlands, decided to build its own electronic data capture tool, where clinical and IT teams worked together to customise ergonomic dashboards that speak to patients, caregivers and hospital managers[51]. Each dashboard features visuals that engage the user and prompt actionable discussions; the cleft department achieved over 95% compliance for PROMs and 100% compliance for CROMs. Erasmus has made its electronic data capture tool available to other cleft departments around the world[52].

For most data platforms, the data integration process is simple: after checking in, patients complete an online PROM survey while waiting for their appointment. The survey results are then made immediately available to both patient and clinician during the consultation and, after the visit, stored along with other patient records in a searchable database. Implementing such a platform should include training sessions with users to minimise additional staff workload[41]. With access to this new data, clinicians and patients can devote more time to discussing best possible care options. The platform must integrate a data dictionary (e.g. ICHOM standard set) that codifies each variable and its data source. Once integrated in the patient EMR, data analysts are able to evaluate gaps and overlaps between the data dictionary and existing databases. This integration enables clinicians to monitor routinely PROMs and CROMs. Connectors facilitate data extractions without duplicated data entries, and developers apply special formats to prevent typos when inputting data. In the early phase, the VBHC team must troubleshoot.

Should a value-based organisation develop an in-house system or outsource its data platform? Build or buy – either makes sense. On one hand, if data platform development is not done in-house, then hospitals and health systems run the risk of becoming reliant on vendors to customise the platform to their needs. On the other hand, for many smaller hospitals and systems, relying on trustworthy vendors and mature external products is likely to be an acceptable and cost-effective solution[53]. For example, IT vendors can charge around €30,000 for a single standard care pathway for 3,000 patients, and development fees are often billed at €900 per day. Building a platform in-house requires time and resources for IT development and this in turn delays data collection. On the other hand, such dashboards are fully customised, don't incur any licence fee, and likely allow more flexible amendments than licensed software.

In its online tech hub, ICHOM centralises nearly 40 affiliated IT vendors offering a range of software as a service (SaaS) solutions. Some vendors propose integrated solutions with libraries of questionnaires for each care pathway including checklists, PROMs, CROMs, alerts, etc. to standardise treatment and learn from improvement cycles. Some clinics, such as Martini-Klinik in Hamburg, Germany, start in-house and then outsource their data platform to a vendor. On the other hand, Vall d'Hebron Hospital initiated its VBHC programme with an IT vendor before deciding to launch its in-house data platform. Diabeter, a Dutch network of outpatient chronic care clinics, developed an in-house ergonomic platform to provide legible data to telemonitored diabetic patients. This electronic system links patients and clinicians to encourage self-management with diabetes care team support (see case study).

In 2018, Microsoft, Amazon, Google, IBM, and Oracle announced a joint commitment to "remove barriers for the adoption of technologies for health care interoperability" and "to unlock the potential in health care data, to deliver better outcomes at lower costs"[54]. This requires embracing emerging standards, such as the Health Level Seven International Fast Health care Interoperability Resources (HL7-FHIR)[55] or the European Health Data and Evidence Network (EHDEN), an EU initiative to create a fully interoperable informatics network for European biomedical research[56]. Beyond this momentum to adopt common standards, some health care providers have started to develop virtual data warehouses. The data remains in its original system and can be drawn upon as necessary via a remote data-harvest by algorithm. The model – which in 2019 was still in development – will minimise the need for health care organisations to manually compile and report their patient outcomes, thereby strengthening patient data security[57].

5. Benchmarks

Providers increasingly face pressure to benchmark their performance against others to demonstrate their value, which requires data transparency[6]. The prejudice against such transparency lies in the fear that providers will discover outcomes they ignored, or outcomes they would prefer to ignore, or outcomes they would prefer others to ignore. From a VBHC perspective, however, the goal of open benchmarks is not about blaming underperformers, but focusing on lessons that can be learned from high performers. Outcome-based benchmarks are conducted internally, between team members, and externally, across multiple teams and providers. In both cases, aligning all participants on a common, risk-adjusted scorecard is a prerequisite to prevent adverse selection of patients and ensure statistically comparable results.

To increase patients' awareness of service quality, the U.S. Government site for Medicare, *Hospital Compare*, benchmarks over 4,000 certified hospitals across the country, comparing outcome indicators such as complications and deaths, unplanned readmissions, and payment and value of care (Figures 7-8). Given that a hospital may either outperform or underperform depending on the specific condition measured, this portal does not compare hospitals directly, but rather medical teams across hospitals. Although the methodology has been challenged, this pioneering effort constitutes a step towards empowering health system users to make informed decisions about where to seek care. Making outcome data public encourages medical teams to improve their value in order to attract more patients, retain staff talent and negotiate health plans with payers[58]. For example, according to Hospital Compare, the 2019 death rate for heart failure patients in Boston is 22% lower at the Massachusetts General Hospital compared to St. Elizabeth's Medical Center, which, despite poorer outcomes, is 19% more expensive. Case-mix adjustments are key to interpreting this variation. However, since the data illustrating this lower value is official and publicly available, St. Elizabeth's Medical Center has to address internal practices to improve its performance and offer higher value to patients.

Several pioneering initiatives are in development across Europe to benchmark outcome data. The European University Hospital Alliance (EUHA) was formed in 2017 with the commitment of nine of the most prominent university hospitals to transform their organisations to a value-driven model. Priority areas for the Alliance are the transition towards more person-centric care, as well as measuring outcomes that matter to patients. As part of the Alliance, a dedicated working group shares best practices and benchmarks outcomes for a selected number of patient pathways. This project aims to establish a shared data platform to facilitate knowledge exchange and improve patient outcomes and experience[59].

International collaborations between health systems are also underway. The Nordic Interoperability Project aims to access, exchange and benchmark health data between Scandinavian countries[60]. In Norway, the Ministry of Health – which finances 51 quality registries – created the Centre on Patient-Reported Outcomes Data to promote PROMs at a national level[61]. In Denmark, the Minister of Health finances 68 quality registries with open benchmarks and no obligation to report outcome data. Every provider reporting at least 90% of patient cases is eligible for financial compensation to cover collection efforts[62]. The Swedish Association of Local Authorities and Regions finances 110 quality registries with an annual budget of SEK 318 million (€30 million). One of

Figure 7:

Death rate for heart failure patients[58]

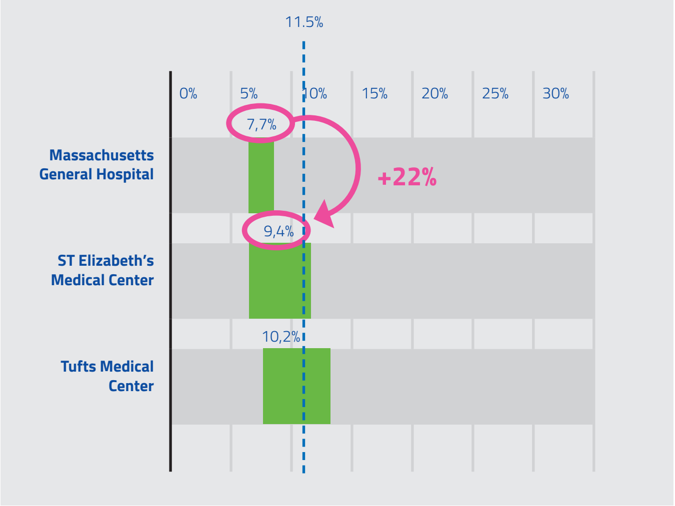
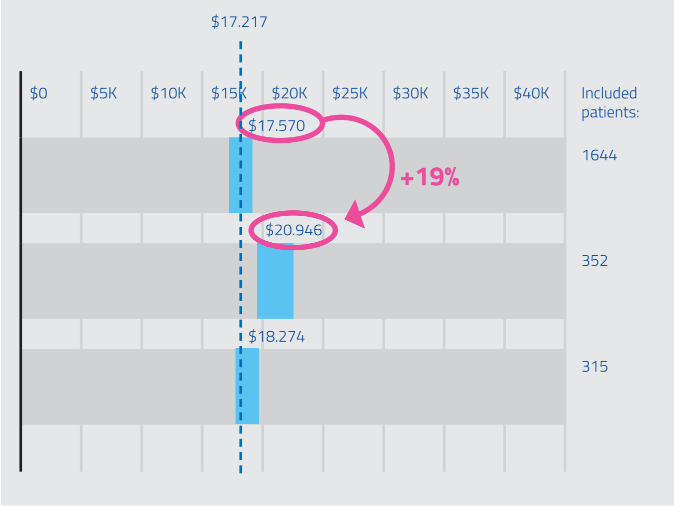


Figure 8:

Payment for heart failure patients[58]



the leading registries, Swedeheart, publishes annual reports on cardiac diseases with robust hospital-level process and outcome data[63]. However, information is presented for an expert audience. In order to increase patient utilisation, Swedish health authorities are working on improving data clarity to empower patients in selecting providers[63].

Several examples also exist at the national level. Launched in 2019 in France, the VBHC Consortium is a non-profit organisation committed to developing outcome benchmarks across public and private providers. As an independent third party, the Consortium facilitates the adoption of outcome indicators among participants, coordinates data collection on a shared IT platform and reports open comparisons. It mobilises patient representatives, health insurers, and life science companies to develop training programmes on VBHC. Finally, the Consortium also works in collaboration with national professional associations, the French national public payer and the French Ministry of Health to design experimental models, specifically one for cataracts, to incentivise outcome transparency and visual improvement in patients' daily activities[64].

Until 2019, the UK online portal *MyNHS* compared providers across specific conditions based on PROM and CROM data. Despite efforts to make information both relevant and understandable to the layperson, *MyNHS* ceased its activities since the site had not generated a sufficient user-base to justify the operating cost[65]. New initiatives conducted by NHS Digital, the national information and technology division of NHS, are under development to promote transparency and openness of outcome data. In 2015, the British Competition and Markets Authority (CMA) found that patients do not have sufficient information to understand and compare private providers. CMA imposed a duty on private hospitals to submit CROMs and process data to the Private Health care Information Network (PHIN), which has been mandated to publish nominative performance measures for more than 500 private providers to help patients in making informed treatment choices[66].

Implementing open, value-driven benchmarks requires shared metrics, nominative comparisons, comprehensible outcome data and, ultimately, an independent body to coordinate operations in a neutral manner.

In the Netherlands, the Dutch Institute of Clinical Auditing (DICA) – a non-profit organisation funded by the professional boards of medical specialists – has developed 22 condition-specific registries and facilitates national open reporting on a national level[67]. Dutch insurers use DICA's transparent data to steer health system users towards high-value providers who risk losing insurance contracts if they do not participate in DICA activities. DICA's clinical audits boards work in collaboration with hospitals, insurers, patient representatives and scientific bodies in defining outcome indicators and risk-adjustment. A nationwide web-based data collection system facilitates easy and timely registration of patient data. This variety of stakeholders with competing interests are the founding pillars of an independent and transparent environment, enabling DICA to act as a neutral facilitator[68].

Implementing open, value-driven benchmarks requires shared metrics, nominative comparisons and comprehensible outcome data and, ultimately, an independent body to coordinate operations in a neutral manner. First, aligning participants on a common scorecard and risk-adjustment methodology is essential in supporting decision-making for patients, providers and payers[69]. Second, nominative comparisons between clinicians create transparent, actionable environments for sharing best practices. Anonymised benchmarks stifle learning dynamics. Although pseudonymised comparisons are politically easier to validate between participants, they introduce a degree of opacity that may deprive patients of choosing outperforming medical teams. Third, open reports also require didactical explanations and simple layout to make data easy to understand for the layperson. Lastly, an independent third party with clear governance – such as a health authority, scientific body, or non-profit organisation – must be involved to oversee data collection, conduct data audits and publish unbiased results.

6. Investments

The main investments required for launching a VBHC initiative are change management competency, human resources and a data platform. Human resources investments are a key success factor to VBHC initiatives, and it is critical to invest in a small project management team. This team's responsibility is to set the pace of the initiative, develop content for meetings with working groups, synthetise the views of the participants and build shared understanding and alignment around project goals over time. One particularly important responsibility is to ensure participants stay true to the vision of the pilot. In projects involving a complex array of stakeholders, there often exists a tension between ambition and consensus – a tendency by participants to converge on the least ambitious version of a particular goal. Thus, the project-management team must nurture and sustain the project's initial vision and the participants' commitment to it[70].

The leadership of an organisation must also invest in training or hiring staff as patient outcome managers to take responsibility for data collection, quality, and analysis. Data management requires dedicated resources to assure pseudonimisation and compliance with the General Data Protection Regulation (GDPR). Standard operating procedures and internal audits are necessary to comply with statistical frameworks that enable benchmarks across teams and providers.

Another critical investment in a VBHC initiative is the deployment of an integrated IT infrastructure that allows for the easy capture, sharing, and analysis of health information. Infrastructure encompasses not only the hardware and software of health informatics systems, but also the standards governing such systems, and the organisational capabilities required to use them effectively[70]. For instance, a programme enabling real-time access to PROM data can have profound positive influences on shared decision-making, quality improvement, and strategic allocation of institutional resources. However, technological barriers, as well as the perception of prohibitive costs, are part of what impedes the wider adoption of PROMs in clinical settings. These challenges apply to various types of investments, including the time, money and staff required to design a digital solution, as well as staff dedicated to PROM analysis. In the case of a large provider organisation treating a diverse patient population, it may be more cost-effective to invest in a custom-built system, rather than licensing a solution from an IT vendor. The in-house development of a custom-built PROM program offers a number of advantages, including a potentially more seamless integration with current systems, built around the parameters of bundled payment contracts, faster updates, etc. Such in-house development, however, may present challenges with IT and clinical content expertise and maintenance. Table 2 lists the hardware and personnel costs associated with custom-built PROM collection system. Implementation of routine PROM collection is paramount to measuring and maximising value. Although there is understandable concern over the IT costs inherent in incorporating PROMs into the clinical workflow, there is substantial return on investment seen through improvements in such areas as patient engagement, advancement in clinical research, and the ability to influence the health care value equation. And as alternative payment models begin to specify the collection of PROM data, the IT platform will need to be designed to meet this demand [71].

From a value perspective, investments should be analysed with regard to expected return. Cases presented in this handbook show that patient outcomes (i.e. clinical return on investment) may improve after one year. On the other hand, financial investments are less likely to pay off immediately but are critical to mid-term or long-term success. Investment decisions within health care organisations reflect the tension between clinicians' appeal to mission (improving patient outcomes) versus senior management's pursuit of margin (controlling costs)[72]. Strategic VBHC investments find an appropriate balance between mission and margin.

Table 2:

Sample budget of custom-built PROM data platform in a University hospital[71]

Server Infrastructure	**€544/month**
4x Web Servers	€408/month
1x Mobile Device Management Server	€91/month
2x Database Servers	€45/month
Device Costs	**€499/device**
Notepad (life expectancy of 3-4 years)	€363/device
Case	€63/device
Charging Cabinet	€32/device
Mobile Device Management License	€41/device/year
Salary and Benefits	**€553,000/year**
2x Software Engineers	€163,000/year
1x Electronic Health Record Analyst	€86,000/year
1x IT Support	
Part-time Clinician PROM Director	€181,000/year
1x PROM Administrator	€64,000/year

7. Incentives

Recognition and *money* strongly influence human behaviour at both individual and collective levels[73]. Applied to the VBHC context, the combination of these two incentives plays a key role in steering stakeholders towards high-value care. On one hand, VBHC offers economic incentives ranging from outcome-based contracts to value-based procurement. On the other hand, VBHC introduces psychological incentives through transparent benchmarks that impact provider reputation and team recognition. These incentives converge in orienting behaviours towards value-enhancement.

Despite the fact that psychological incentives are cost-effective and are not usually monetised, they receive less consideration and coverage in public fora relative to economic incentives. For instance, nominative benchmarks make value visible, and this visibility is sensitive because it touches upon reputation – a psychological stimulus that generates pride reactions, but also competitive and collaborative behaviours, as illustrated in most case studies in the next chapter. "We must create a good reputation around town," states a health care provider in the Stockholm region. "We now live in a market economy and not a planned economy"[74]. To some degree, outcome ratings determine patients' choices of provider for elective care. They also influence peer recognition that directly affects patient referrals, care volume and revenues. For example, Spire Health care, the largest provider of private health care in the UK, was recognised as "leading the way on outcomes collection" according to PHIN's 2018 press release[75]. Through its digital PROMs platform, Spire collects, on average, 90% of completed baseline patient questionnaires across 39 hospitals. In order to preserve its reputation and maximise high-value care, the Medical Director periodically reviews the following data for 800 hip and knee surgeons: average health gain, average post-operative score and percentage of patients achieving the maximum post-operative score. Based on the Oxford Hip and Knee Score, Spire hospitals benchmark their outcomes against NHS average performance (Figure 9). Outlier underperforming surgeons receive notification from the Medical Director and subject their practice to review. The findings are incorporated into a biennial report of their practice privileges. If their outlier status does not improve, Spire will look to direct patients to surgeons whose practice falls within satisfactory parameters. If outlier surgeons do not improve their outcomes despite being granted the opportunity and time to address practice concerns, the practice may be suspended. In this example, the risk that patients will be directed to higher performing surgeons is a powerful driver for high value care and a discouragement for low-value care.

Image by Bill Oxford

Economic incentives are also efficient in driving behavioural change. Value-based payments generally reward or penalise providers for superior or inferior outcomes. These programmes can be implemented at a national or regional level and take mandatory or voluntary forms. They may comprise the entire reimbursement package (bundled payments) or offer shared savings and base performance on structural, process or outcome indicators. They may focus on a single medical condition or aim to improve patient quality of care more broadly across conditions[76]. Value-based reimbursement encompasses two different payment approaches: capitation and bundled payments. In capitation, the health care organisation receives a fixed payment per year per covered life and must meet the needs of a broad patient population[77]. In a bundle payment system, by contrast, providers are paid for all services, procedures, tests, drugs and devices used to treat a patient across the entire care cycle [78].

Bundled reimbursement compensates the entire care team, in contrast with today's siloed reimbursement for individual services. A single *package price* is allocated for the entire care pathway, often including complications. *Package price* and any quality rewards are adjusted according to the patient case mix and outcomes achieved. Principles underlying bundled payment can be divided into three main components: *package price* (expected cost of routine care), *warranty payment* (expected cost of complications) and *performance compensation* (bonus/penalty based on health outcomes).

Figure 9:

Spire hospitals benchmark their outcomes against NHS average performance

Image by MyClinicalOutcomes©

In 2009, the Stockholm County Council (SLL) introduced two bundled payments for primary hip and knee replacements and, at the same time, allowed citizens to choose freely among accredited private providers ('Patient Choice Programme'). The *package price* was SEK 56,300 (€5,300) for the continuum of care, including diagnostics, surgery with follow-up care, prosthetic costs and the necessary pre-surgical and post-surgical visits. Providers became financially responsible for complications related to the initial surgery over a two-year postoperative period. The contract withheld 3.2% of the contract value as performance compensation, paid out only if providers reached certain targets. Within two years following implementation, the value-driven dialogue with the life-science industry increased when providers searched for better outcomes. The complication rate dropped by 26%, the reoperation rate by 36%, wait-time to surgery by 23% and cost per patient by 14%. One year later, the SLL generated an annual savings of SEK 49 million (€4.6 million)[74].

Critics raise concerns that bundled payments encourage providers to treat only the easiest and healthiest patients. To prevent adverse selection, bundled payments are risk-stratified or risk-adjusted to calculate payment according to patient case mix. In the Stockholm example, the initial bundle covered 75% of patients classified as ASA 1 (normally healthy) or 2 (mild systemic disease); more-complex patients remained in the public hospitals with the old reimbursement system. Careful tracking showed no evidence of bias in the selection of patients. Since 2017, other Swedish County Councils decided to extend bundle payments to both spine and bariatric surgery.

8. Learning community

The key question raised by open comparisons is not "*who* is the best?" but rather "*how* can we improve?" Outcome transparency stimulates active learning that drives improvement at individual and group levels[79]. Joining learning communities – or creating one – is important to establishing a space in which clinicians inspire each other. Common metrics and methods allow open comparisons and stimulate the exploration of underlying practices to develop a better understanding of outcome drivers. For example, in the Santeon case presented in the next chapter, this open comparison allowed breast cancer surgeons to discover that extra wound flushing led to improved outcomes. Notably, Santeon VBHC teams had involved patients in identifying outcomes they see as important. In particular, patients confessed that awaiting the results of mammography at home is a difficult period filled with insecurity. Hence, leadership operationalised same-day mammography results. Similarly, based on patient input, prostate cancer patients are encouraged to bring a companion with them when receiving their results[80].

Improvement cycles

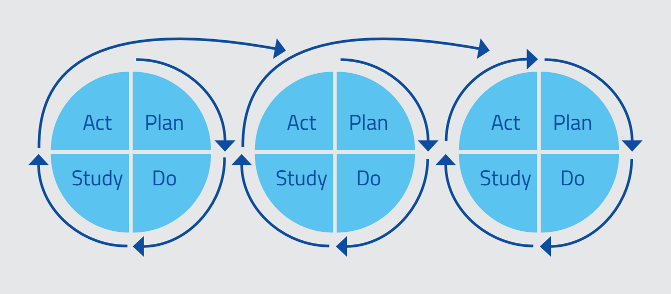
In Sweden, improvement programmes involve multidisciplinary teams such as doctors, nurses, dieticians, and care administrators. The programmes are organised around learning seminars every two months, which include knowledge dissemination, improvement methods and teamwork. In between seminars, teams inventory problems, draw up action plans, test changes and address key learnings from results. Most improvements are carried out as an integrated part of day-to-day activities[81]. This format provides a clear structure to increase competence and motivation.

Building or joining a VBHC learning community brings providers together in the adoption of a common scorecard to develop a better understanding of process and outcome drivers. This direct dialogue between outcome and process data is essential to challenge and change current practices. Clinical teams at Vall d'Hebron and Cruces University Hospitals use an empathy map to improve patient experience over the care cycle, with clinicians analysing how patients react to each step of the care pathway – what they think, see, say, do, feel and hear. This empathy mapping is a valuable tool to ensure that care coordination is organised in a patient-centric way.

Another team approach is the improvement cycle method, also known as the Plan-Do-Study-Act method (PDSA)[82]. This dynamic approach combines four steps: (1) *Plan* is about setting objectives and indicators for an experiment and predicting the results; (2) *Do* is about carrying out the plan while documenting problems and unexpected observations; (3) *Study* is about analysing the results, comparing the data to the original prediction and drawing conclusions; (4) *Act* is about taking action to implement changes, improve the process and prepare the next cycle (Figure 10). Each new cycle leads teams to achieve higher outcomes.

Figure 10:

Improvement cycles



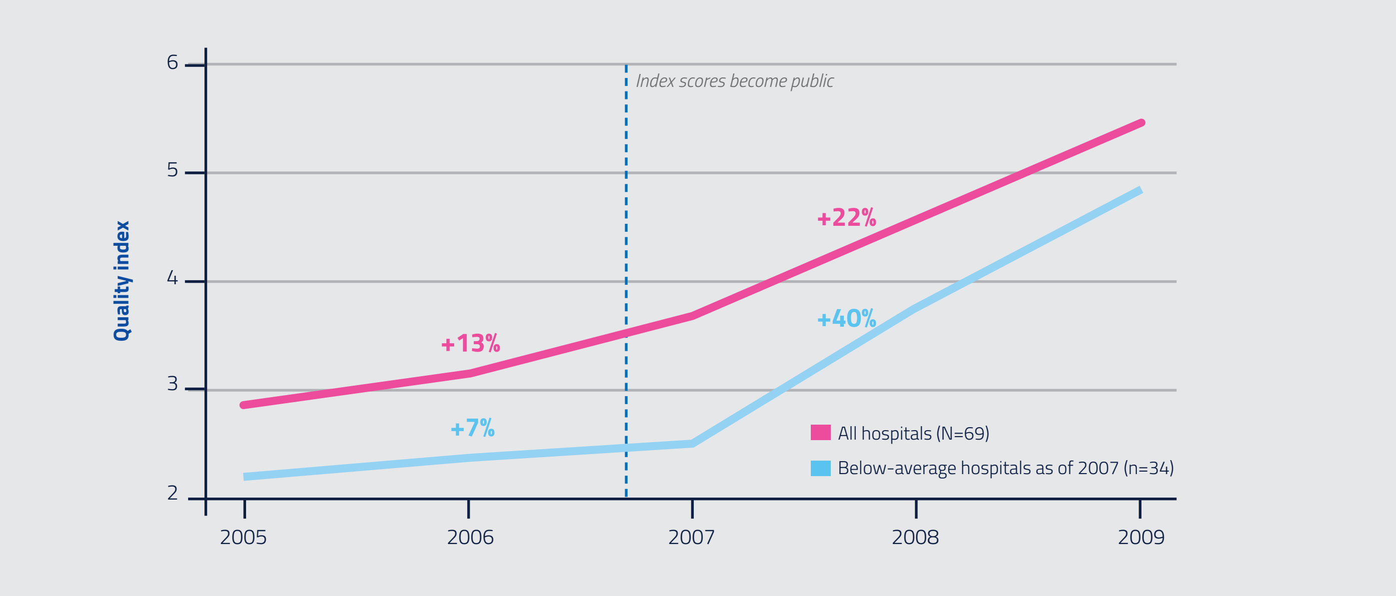
Sustaining routine measurement is a challenge that is often underestimated. Creating a detailed care pathway is essential to establishing baseline data that enables this routine measurement and prepares the foundation of PDSA cycle iterations. A wide variety of data types come into play in cycle evaluations such as outcome data (PROMs, CROMs), pathway management (checklists, alerts, reminders), process management (progress, population statistics) and analytics (dashboards, flow reports, raw data). IT solutions can facilitate the integration of data sources, which may accelerate the frequency of cycle iterations and their impact on medical practice.

> ***This peer-to-peer comparison creates a form of "coopetition" – a mix between competition and cooperation – where team members attempt to outperform individually, but at the same time, understand that they learn faster collectively.***

Clinical guidelines have the laudable aim of reducing unnecessary variability of medical practices, but process inputs are not patient outcomes[83]. Rigid adherence to guidelines does not automatically generate consistent and optimal results, and once cemented, guidelines are difficult to change. Guideline approval is a lengthy process, which sometimes delays the adoption of innovations that can benefit patients. VBHC is a solution to the debate over "guideline tyranny"[83]. Measuring outcomes routinely accelerates adherence to guidelines through an increased focus on high-impact processes. PDSA cycles also make it possible to detect innovative practices that deviate from longstanding guidelines, but which demonstrate superior outcomes compared to the standard of care. In essence,

Figure 11:

Impact of data transparency on practices and outcomes[84]



VBHC can positively contribute to either of the guidelines. The evolution is illustrated in the GLA:D case study in the next chapter.

In 2005, the Swedish Coronary Care Registry created a quality index that tracked how closely hospitals across the country adhered to clinical guidelines. In late 2006, it decided to make both the index scores and the actual patient survival rates public (Figure 11). As soon as the data were public, the average rate of improvement grew by 22%, but below average performers improved by 40% per year, decisively narrowing the gap[84]. This transparency resulted in higher guidelines adherence and lower mortality rates.

> ***Transparent comparison does not impose hard, paternalistic norms, but rather, disseminates soft peer-to-peer signals that may be even more compelling. This positive sum competition aligns behaviour, tightens focus and narrows variation.***

Multiple underlying factors lead to this convergence of process adherence and outcome improvement. Spotlighting medical practices causes clinicians to modify their behaviour in order to avoid personal embarrassment. In other words, disclosing results automatically triggers a pride reaction and subsequent learning traction. It is important to note that transparent comparison does not impose hard, paternalistic norms, but rather, disseminates soft peer-to-peer signals that may be even more compelling. This *positive sum competition* aligns behaviour, tightens focus and narrows variation[83]. Outperformers have a magnetic effect on the entire group, which engenders a learning community. Each group member is competing for reputation and peer recognition. The Martini-Klinik in Germany and the Santeon hospitals in the Netherlands (see next chapter) illustrate this learning community within a team of twelve clinicians (micro level), or across a group of seven hospitals (meso level). This peer-to-peer comparison creates a form of *coopetition* – a mix between competition and cooperation – where team members attempt to outperform individually, but at the same time, understand that they learn faster collectively.

To engage participants, learning communities need to create safe environments with clear rules for data sharing in order to prevent retaliation and preserve trust among participants. Internal reviews, intergroup meetings and training programmes across providers contribute to best practice sharing. Many clinicians and managers in health care lack training and in-depth knowledge regarding quality improvement and value-based care[81]. Only a few medical schools in Europe teach VBHC to medical students as part of their core curriculum (e.g. University of Paris School of Medicine) or to clinicians through continuing education (e.g. NHS Wales, Erasmus Medical Centre). Some European business schools (e.g. Copenhagen University, Esade, Nova, The Decision Group) offer executive education programmes on VBHC to train industry managers.

A focus on improving patient outcomes echoes caregivers' fundamental motivation for embracing their profession. After graduating from many years of intense and selective education, these learning communities bring clinicians back to finding new ways to continue to strive for excellence. There are good reasons to be impatient for health care improvement, but there are also reasons to be humble. Successful outcomes measurement programmes take time, and in order to maintain engagement and momentum, VBHC learning communities should share early successes and celebrate progress along the way.

Transforming clinical research with randomised registry trials

Beyond education and medical training, VBHC is also transforming medical research through a new clinical trial paradigm: registry-based randomised trials. Until now, randomised controlled trials (RCTs) have helped to shape medical practice and clinical guidelines. If well designed and performed, these trials are the gold standard of comparative studies. However, RCTs have limitations, including their increasingly prohibitive costs, excessive regulatory complexity and time required to recruit study participants, as well as inadequate selection of patients that may not represent real-world practice [85]. This impacts RCTs' generalisability to the real world, where drugs and devices are frequently used beyond their approved indication.

A possible solution is condition-specific registries for example, such as those in Denmark, Sweden and the UK, which have some of the most complete national databases[81]. The registry-based randomised clinical trial (RRCT) is disrupting existing standards, procedures and cost structures[86]. The Swedeheart registry was the first implementation of the RRCT, where manual thrombus aspiration was prospectively evaluated as an adjunctive treatment to primary percutaneous coronary intervention (PCI) for acute myocardial infarction, with mortality as primary endpoint (TASTE trial). In total, 7,244 patients were randomly assigned in the study during nearly three years of enrolment across 27 sites in Sweden, Iceland and Denmark[87]. Published in the New England Journal of Medicine in 2014, outcomes showed that a strategy of routine manual thrombus aspiration before PCI, as compared with PCI alone, did not reduce all-cause mortality or the composite of death from any cause, rehospitalisation from myocardial infarction, or stent thrombosis for up to one year[88]. These results not only modified indications, practices and guidelines, but they also generated substantial savings for payers as unnecessary thrombus aspiration is no longer performed routinely.

While the cost of such a trial is subsidised by the existing registry and willingness of investigators to participate for minimal monetary compensation, the additional cost involved in establishing and administering the Swedeheart registry was €360,000 compared with tens of millions of dollars for a study of equivalent size using a traditional industry-funded trial model[85]. With an average cost of €50 for each patient who underwent randomisation, this registry-randomised trial significantly contrasts with RCTs' average costs for acute coronary syndromes, ranging between €4,400 and €9,000 per patient enrolled, with 65% to 78% representing management related expenses. The registry-based randomised trial is still a trial – a rigorous randomised experiment that isolates a causal link (or the absence of one) between a treatment and an outcome – but because the trial is integrated in the routine health care setting, investigators can enroll consecutively large numbers of real-world cases[85].

Overall, embedding a randomised clinical trial into an ongoing registry infrastructure creates unique cost-effective opportunities for efficiency that generate scientific, economic and medical value to patients, clinicians and health systems[89]. Following other successful RRCT trials in Swedeheart, the Uppsala Clinical Research Center is running a series of trials using several other national registries, and in 2019 established the Swedish guidelines for registry-based randomised clinical trials. That same year, Swedeheart applied for clearance from the European Medicine Agency and the US Food and Drug Administration to run phase III clinical trials based on the RRCT concept[90].

Image by Matheus Ferrero

9. External collaborations

VBHC generates new types of relationships between payers and providers (e.g. bundled payments), suppliers and purchasers (e.g. value-based procurement), as well as research alliances and public-private partnerships. These new forms of engagement mobilise providers, insurers, authorities, start-ups and life sciences companies around the evaluation of high value innovations, such as targeted therapies or electronic PROM systems used as prevention devices. These value-driven collaborations accelerate the emergence of outcome-based procurement strategies.

Value-based ecosystems

The EU Directive on public procurement encourages a more holistic approach to product quality and total life-cycle costs, moving from decisions based purely on price to those based on value[91]. This framework has inspired a growing number of life science companies to adopt VBHC and sell outcome based solutions rather than products alone. As such, new forms of negotiations between suppliers and purchasers involve competitive dialogue and closer collaboration during the tendering process. For example, in 2016, the Catalan Agency for Health Information, Assessment and Quality (AQuAS) – a public body from the Catalan Health Ministry – signed the first outcome-based contract in Spain for implantable defibrillators. Following a competitive dialogue, St. Jude Medical (Abbott) and Medtronic applied together and won a €12 million contract over four years. The value-based agreement withholds 3% of the annual contract value until outcome targets, such as patient quality of life and satisfaction, are met. Vendors must realise a threshold of 10% improvement, as reported through PROMs. A monthly report presents outputs and patient outcomes. In 2019, AQuAS launched a €20 million call for pacemakers, with 5% of the evaluation criteria focusing on the care continuum and PROMs[92]. AQuAS is opening its value-based tenders to conditions such as aortic stenosis, rather than a given technology (TAVI), to widen the spectrum of innovations and evaluate outcomes and costs over the full cycle of care[91].

Life science companies are also diversifying their business models to move into care delivery, impact more directly care pathways, improve patient outcomes and take part in the entire value chain.

Although price-based procurement remains the norm at many organisations, others are adopting a value-based approach that incorporates total costs and outcomes into the procurement process. For example, a low-cost IV catheter can break easily, is not user-friendly, requires considerable time to learn to use, and poses safety risks to clinical staff. The lowest price does not necessarily translate into the highest value. The extra costs triggered by a focus on price do not factor into the procurement budget, and are hard to identify and quantify unless there is good communication between clinical and procurement bodies[93]. Bidders should calculate the total cost of care – including costs related to complications – in order to move beyond price and consider cost on a more holistic level. Other examples show that a short evaluation period to assess products on the basis of feedback from clinical staff and patients enables providers to use qualitative criteria as part of the tendering process[93].

In France, UniHA is a procurement cooperative of 870 public hospitals with €4.5 billion in annual purchasing volume. In 2019, UniHA launched a value-based procurement tender on peri-operative warming devices, via a competitive dialogue. Despite the fact that 90% of patients are warmed during surgical procedures, 60% of them suffer from hypothermia, leading to higher risks of coagulation disorders, discomfort, infection and prolonged inpatient stays. The tender sought to remedy this problem. UniHA used patient temperature as a CROM indicator for the competitive dialogue. UniHA selected 3M's offer, with a 4-year contract that sets an outcome target of 80% of patients at normothermic temperature after surgery (T0 >36°C). 3M incurs a penalty if its device fails to achieve this outcome. Thermometer calibration is outsourced to a third-party company to ensure data integrity.

To facilitate value-based negotiations, EY's Health Outcome Platform (HOP) helps life science companies creating and managing outcomes-based contracts with payers[94]. The platform is a contracting framework that includes a catalogue of outcomes, such as clinical measures (short term CROMs), health effects (long term CROMs), quality of life, societal impact, cost of care, performance and efficiency. The platform allows parties to set realistic joint targets, as well as to add appropriate incentives and penalties. The platform standardises data capture and secures data sharing through application programming interfaces (APIs) and blockchain, to comply with GDPR guidelines. Although outcome based contracts are in their infancy, some countries such as Sweden have already reached special agreements with medtech and biopharmaceutical firms to facilitate access to national registry data[81].

Image by Amy Hirschi

Digital biomarkers and e-PROM devices

Beyond traditional biomarkers, VBHC accelerates the emergence of precision medicine. The Israeli start-up Sivan has developed a digital biomarker integrated in an electronic patient reported system (e-PROM) to telemonitor patients in lung cancer remission. A digital biomarker is a physiological or behavioural measure collected digitally through devices that are portable, wearable, implantable, or digestible, which is then used to explain, influence, and/or predict health-related outcomes. Sivan has combined a novel biomarker with an e-PROM device, Moovcare, which has been validated through evidence-based results published in scientific journals such as the American Journal of Clinical Oncology and JAMA. Every week, patients are asked to report on 12 symptoms, such as breathing and sleeping difficulties, using the app. When their health status deteriorates, an automatic alert is sent to a doctor or nurse. Compared to the standard of care, Moovcare increases overall survival by eight months[95].

Given its CE mark and its clinical validation, the French Health Technology Assessment Authority (HTA) ranked the combination of this digital biomarker and its e-PROM solution as one of the most innovative medical devices eligible for reimbursement in 2019[96]. Compared to the traditional care cycle with regular CT scans to monitor early symptoms of lung cancer relapse, Moovcare has demonstrated a €12,127 increase in the cost-effectiveness ratio per life-year gained. This example highlights the role simple and inexpensive technologies can play in delivering high value health care. Leading public and private hospitals in France – Institut Curie, Elsan, CHU de Lille – have forged strategic partnerships with Sivan and changed their care cycles to integrate Moovcare into new patient pathways to improve patient overall survival and reduce unnecessary imaging and hospitalisation costs. This VBHC example illustrates a novel type of relationship between e-PROM companies, providers and a national HTA body. Such approaches to measuring health status allow for observations of disease development that were previously unavailable. Digital biomarkers generate more data points than traditional biomarkers, enabling precise patient stratification. Through real time measures, digital biomarkers hold promise for delivering scalable, time-sensitive, and cost-effective assessments of symptom change, and thus supplement and enhance the conclusions of traditional biomarkers[97].

Life science companies' accountability for outcomes

In this rapidly changing environment, life science companies understand that they can remain competitive only by demonstrating how their products and services help providers and medical teams deliver superior outcomes for patients at lower total costs. However, the promise of better outcomes is different from accepting accountability for those outcomes. The shift from being paid for promises to being paid for outcomes requires the routine measurement of real-world outcomes using digital solutions and registries.

In 2018, Roche launched in Denmark a partnership between the Herlev Gentofte Hospital and its genomic division, Foundation Medicine Inc. (FMI), to compare treatment outcomes and costs for non-clear cell renal cancer patients. Clinicians and researchers investigate the clinical impact of targeted immunotherapy through genetic profiling and personalised medicine. Roche and FMI use gene-profiling technologies, combined with artificial intelligence, to support treatment decision-making. For each patient, measures include quality of life, as well as costs relative to the episode of care. All treatment options – including those not provided by Roche – are evaluated with the same methodology. Through this VBHC approach, medical teams are learning how to compare the holistic value of different treatment options, paving the way for future procurement negotiations on precision medicine.

Image by Headway

In 2016, Amgen launched in Finland the development of a VBHC ecosystem for multiple myeloma in collaboration with hematology units of academic medical centers as well as with other technology partners. The aim was to design innovative pricing schemes, improve real-world data collection and enhance patient support to drive outcomes. This ecosystem is built around a value-partnership for Kyprolis, a targeted therapy approved for patients with relapsed and/or refractory multiple myeloma. Amgen commercialises Kyprolis for an average price of €6,500 per month. Amgen partnered with the distributor Tamro to develop a patient-level pricing platform which enabled the adoption of indication- and outcome-based pricing models. The price reflects the value the medicine is expected to bring to patients when used for the correct treatment line and duration, in combination with other appropriate medicines. If Kyprolis does not deliver the expected outcomes when appropriate administration is applied, Amgen refunds the treatment costs. To collect real-world data and support patients in treatment, Amgen partnered with Kaiku Health, a health data science company, and Turku University hospital to develop an IT platform with an e-PROM tool to track nine patient symptoms, such as numbness, pain and fatigue. Clinicians selected a well-established PROM instrument (QLQ-C30) in combination with a short version of a validated neuropathy questionnaire. This e-PROM solution enables patients and clinicians to detect relapse symptoms early on, and improve treatment outcomes. Amgen participated in the IT development costs and supported the implementation. Hospitals cover the licence costs, so patients can use the e-PROM solution at no charge. Amgen is scaling this initiative to other clinics and disease areas in Finland.

These kind of partnerships are in development in other countries such as the UK, where Novartis is working with partners such as My Clinical Outcomes, a web-based platform that automates the collection and analysis of PROMs to deploy tailored, condition-specific PROM solutions around clinical pathways at various hospital sites in the UK and Ireland. Beyond biopharmaceutical companies, medtech companies are also developing their expertise in clinical care and reimbursement services to demonstrate the clinical and economic value of their devices and services.

Value partner, not siloed supplier

To become a value partner, not simply a siloed device supplier, Medtronic adopted in 2017 operational principles to accelerate value-based projects through a VBHC framework including seven steps (see Table 3). According to this framework, a VBHC project should specify a procedure or condition with a significant and defined population of patients who could be treated more effectively and efficiently through an innovative care model. The condition must have measurable outcomes and Medtronic managers must be able predict the improvements in outcomes and costs from implementing the VBHC project[98]. Medtronic applied this seven-step framework to the TYRX™ absorbable antibacterial envelope, which helped to stabilise device implants and prevent infections associated with pacemakers and defibrillators. Studies indicated that use of TYRX™ led to a 70-100% reduction in infection rates for high-risk patients and lower total costs. Based on this VBHC operational approach, Medtronic developed a shared accountability business model based on the estimated savings from using the device. In 2018, the programme proved successful as nearly 1,000 hospitals began to purchase TYRX™ under the shared accountability programme. A series of Medtronic VBHC projects are being implemented with the same approach – ranging from therapy optimisation, episodic care bundles, as well as chronic care management (see Diabeter case study in Chapter 2).

Table 3:

Medtronic's seven step VBHC framework[98]

Seven step VBHC framework	Product: antibacterial envelope for implantable cardiac devices (TYRX™)
1. Select disease or condition	Cardiac arrhythmia
2. Develop patient cohorts based on risk and protocols	Patients undergoing a cardiac electronic device implant at high risk for infection
3. Define outcome measures that are meaningful to patients	Reduction in device-related infections
4. Define the time frame required to achieve optimal outcomes	6 months, post device implant
5. Quantify baseline outcomes and costs for each patient cohort	3.6% infection rate in high risk patients and average cost of $50,000 per infection
6. Determine prospective performance and cost objectives	0.4% infection rate with TYRX utilised
7. Develop the business model	Shared accountability (risk share) programme with providers

Diversification from consulting services to care delivery

Leading medtech companies such as Siemens Healthineers offer consulting services to support doctors and administrators in implementing VBHC and in transforming their health care organisation from within[90]. Value partnerships are technology-enabled performance-based relationships between providers and medtech organisations to drive clinical excellence, operational efficiency and financial performance. Since the device itself represents only a limited factor behind the outcomes of a cycle of care, the aim of the consulting service is to work with clinical teams to integrate the innovative technology into modified care pathways, thereby realising the full value of the product, and demonstrating its medical and financial impact through real-world evidence (RWE).

Value measurement takes medtech companies substantially beyond their traditional product-based business through the acquisition of value-based health care service centres. For example, in 2015, Medtronic acquired Diabeter, a private network of Dutch medical centres that develops personalised approaches to treat children and young adults suffering from type 1 diabetes. Medtronic is considering expanding Diabeter's value-based model to type 2 diabetes. To this end, the company has also acquired the Dutch obesity centre, the Netherlands Obesitas Klinik, in order to address metabolic syndrome which is one of the main factors involved in type 2 diabetes. Medtronic is working on replicating the Diabeter model in other markets in Europe and the Middle East[100]. Other life science companies are also diversifying their business models to move into care delivery, impact more directly care pathways, improve patient outcomes, and take part in the entire value chain. For example, the medtech company Fresenius acquired Helios and Quirónsalud, two large private hospital operators in Germany and Spain[101]. In Denmark, the Novo Nordisk Foundation has made a total of approximately DKK 6 billion (€800 million) in grants to develop Steno Diabetes Centers across the country[102].

VBHC can't happen in isolation. Over the coming years, growing numbers of collaborations will emerge between life science companies, providers, payers, and IT companies. These new types of partnerships will likely focus on accessing and processing real-life outcome data with the objective of sharing accountability on patient outcomes. Each stakeholder is increasingly facing pressure to demonstrate its value through real-world evidence. Without outcome data, it is difficult to find actionable ways to improve. This major shift creates existential challenges that require a new way of thinking, operating, collaborating and competing with non-traditional players to lead the way to higher-value care.

Image by Owen Beard

Case Studies

This chapter presents a series of ten case studies from different types of VBHC leading organisations operating in Europe, such as private and public hospitals, condition specific providers, outpatient chronic care clinics, networks of independent caregivers, health systems, third party quality registries and private payers. These cases have been gathered using a method for identification and criteria for selection. The identification method relied on a systematic review from the literature, 32 site visits over a period of ten months and 246 semi-structured interviews conducted with local, regional and national VBHC experts across 22 EU countries. The selection criteria included parameters such as origin (European countries), diversity (variety of stakeholder profiles), maturity (routine collection of patient outcome data, value-based incentives), learning community (improvement cycles, benchmarks, lessons learned), and novelty (untapped initiative, unprecedented implementation). Based on the identification method and selection criteria, we created a shortlist of cases and met with leadership to analyse how the Matrix framework has been applied to their roadmap. These case studies represent a sampling that is not fully representative of the growing number of VBHC leaders or the diversity of stakeholders in the health care sector, but rather offers highlights of some pioneers in the field.

Image by NHS Wales

Private hospitals

Santeon

Context

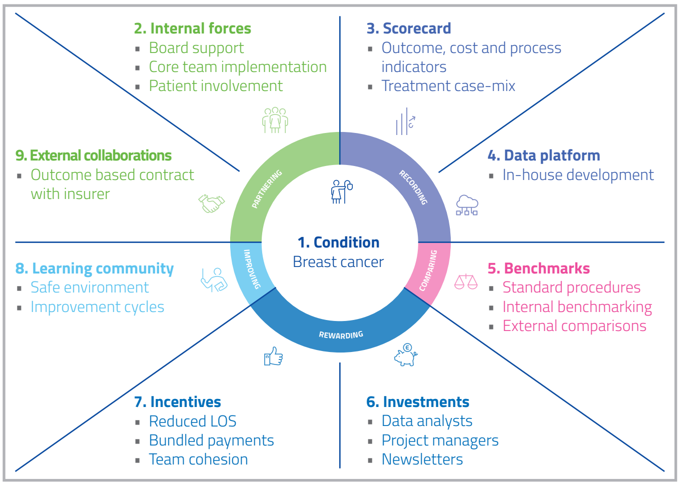
Santeon is a Dutch group of seven private teaching hospitals. With a staff of 29,000 employees, Santeon delivers 11% of the nation's hospital care volume. Starting in 2016, the seven locations began working together to measure and compare outcomes, costs and relevant process indicators across five patient disease groups, including breast cancer[103].

Achievements

In the 18 months after implementing its VBHC plan for breast cancer, Santeon reduced reoperations due to complications by up to 74% at some locations, and unnecessary inpatient stays by nearly 30% across the seven hospitals[35]. Santeon achieved these results in just one and a half years by following clinical guidelines while also emphasising transparency and open benchmarks across medical teams[80].

Implementation

Santeon adopted the same VBHC model in all seven of its hospitals to enable benchmarking and leverage the network's combined expertise efficiently. Santeon's Implementation Matrix is presented below.



Internal forces

At the group level, Santeon gathered a core team of three members to work on hospital alignment across the seven sites: a programme manager to direct the operation, a medical lead to head the development of the content and metrics, and a data analyst to work on data quality. At hospital level, Santeon established similar multi-disciplinary teams involving patient representatives to lead priorities and programme implementation onsite.

Scorecard

Multidisciplinary clinical teams selected 19 metrics that define value (see Table 1 in the first chapter). Each team involved patients in defining key outcomes and processes. Improvement cycles of six months established a strict, simultaneous cadence for the teams in each hospital[103]. The scorecard also provided researchers with a structured outcomes database that they could use to publish scientifically and statistically significant results over time.

Investments

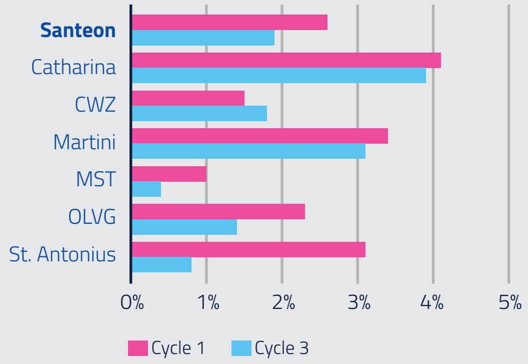
Beyond financial investments, Santeon appointed central data analysts to align collection standards across hospitals, perform analyses and present outcome variation for Santeon-wide discussion. The core team developed a handbook to codify the model, ensure uniformity through standard operating procedures (SOPs) and provide harmonised guidance across the seven hospitals. The handbook described the purpose of each step in the improvement cycle, participants' roles and responsibilities, and strict rules regarding the quality and sharing of data.

Benchmarks

Following cross-hospital meetings, hospital-level multidisciplinary teams met to discuss possible drivers of observed variation in outcomes relative to other Santeon hospitals. They asked whether variation is due to differences in data collection, patient mix or treatment choice. Medical professionals from the different hospitals would frequently reach out to each other to share best practices. The medical lead would discuss practices with the team and manage implementation of one action per cycle. The cycle then began anew[80]. Repeat operations due to complications (e.g. post-operative bleeding and wound infections) are challenging for patients and often mean that follow-up therapy, such as radiotherapy, must be postponed. Though the percentage of repeat operations due to complication was low at all Santeon hospitals (less than 4%), there was a 400% variation between the highest and lowest scoring hospitals. Improvement teams resolved to explore the reason for this variance. Thanks to the safe, non-retaliatory nature of the data sharing environment they had created, they were able to look directly at the clinician level, and they found that the clinician with the lowest complication rate used more highly augmented wound flushing. After other surgeons adopted this methodology, reoperations due to complications fell by 27% across Santeon Hospitals, and by 258% at the St. Antonius hospital in particular, after just one and a half years. This improvement is a direct consequence of comparing each other's figures and methods[35] (Figure 12).

Figure 12:

Reoperations due to complications[35]



Cycle 1: Patients diagnosed in 2014/2015
Cycle 3: Patients diagnosed in 2016
Source: Patient selection on the basis of NBCA from IKNL, repeat operations based on DBC, manual reason for the repeat operation

Learning community

The existence of a safe learning environment was critical to discovering the drivers behind outcome variation. Fear of negative reactions to poor results would stifle the incentive to promote transparency and share data. Teams took a collaborative approach and used data not to judge one another, but to develop best practices based on observed, clinically relevant differences. Confidential sharing also helped teams to gain familiarity with the value-driven nature of their work and to highlight areas where improvement was possible. Three Santeon hospitals investigated what could be done to treat a higher percentage of breast cancer lumpectomy patients in the outpatient setting in order to both improve patient experience and minimise unnecessary costs. After an initial improvement cycle, teams tested several hypotheses and concluded that two main factors were responsible for preventing the patient from returning home. First, patients were often not informed that they would be returning home the day of surgery. When patients were informed in advance, they were able to make the necessary arrangements. Second, teams at St. Antonius found that postoperative morphine prevented a large number of patients from going home the day of surgery. Morphine-induced nausea prolongs hospital stay. Now, patients receive a nerve block before an operation so that the patient is pain free for the first 24 hours following surgery. Prioritising the use of a locoregional anaesthesia combined with paracetamol helped to improve the percentage of patients able to return home the same day, without affecting patient outcomes. Changes in these two areas led to an 18% increase in outpatient surgeries after one year.

Highlights

Santeon succeeded in creating a learning community of hospitals where clinician-level data could be shared transparently without fear of punishment or retaliation, making value-based improvement possible.

Image by Joshua Rodriguez

Condition specific provider

Martini-Klinik

Context

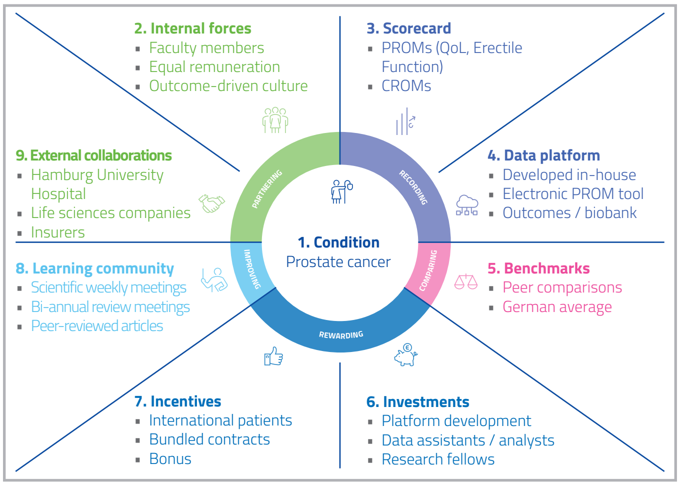
Founded in 2005 and with profits of €3.4 million in 2018, Martini-Klinik (MK) is a private centre exclusively focusing on prostate cancer care, with a structure entirely organised around patient outcomes. MK is a private clinic situated on the Hamburg University Hospital campus and works in close collaboration with onsite academic departments and services[104, 105]. MK's 5,000 outpatients annually, 250 staff members and 2,600 radical prostatectomies performed in 2019 (11% of prostatectomies in Germany) makes it the leading prostate cancer treatment centre worldwide, in both volume and outcomes.

Achievements

Compared with the German average, severe incontinence rates are 11 times lower, whereas full continence is 45% higher, at MK[14]. One year following surgery, severe erectile dysfunction is 55% lower at MK, as compared to the German average, and further, MK complication rates are 15 times lower for ureteral injury and 62 times lower for sepsis. These achievements result from the unique *integrated practice unit* (IPU) organisational structure[4, 106], and a strategy centred on outcome measurement, team cohesion and continuous improvement – also known as the "Martini Principle"[107].

Implementation

A particularly unique feature of MK's implementation is a constant focus on the cornerstone building block – mobilising internal forces. Notable elements of the implementation Matrix are presented here.



Internal forces

All faculty members train in a specialty, and each one of them is considered to be a critical piece of this finely tuned operation – no one is considered more or less valuable than the others. Junior faculty members trained at MK can achieve full-faculty status after only two to three years with full voting rights.

Scorecard

MK's scorecard includes risk-adjusted PROM and CROM data. PROMs include calibrated surveys that measure functional results and general health. Following surgery, analysts collect surveys at regular intervals over the patient's lifespan, and then combine PROMs with CROMs to complete the scorecard. In 2019, MK documented approximately 30,000 cases in its data system. PROM data are combined with the biobank, which contains more than 20,000 blood, tissue and urine specimens.

Data platform

In 2005, MK developed its data platform with FileMaker Pro, applying a series of technical updates over the years[105]. The team supporting data collection consists of two database technicians, three documentation assistants and two research fellows. It sends annual PROM surveys by letter or via web-based questionnaires following treatment, and from 2020 onwards, patients will be able to enter their data online via a vendor PROM system, which offers interoperability with EMRs.

Benchmarks

Every six months, faculty members receive their individual outcomes, as well as those of their colleagues. Reports include basic information such as case volume per surgeon, patients' average age and tumour stage. Also included are surgical data such as average blood loss, positive surgical margins, lymph node removal, and nerve-sparing. Analysts make comparisons such as outcomes from open- versus robot-assisted surgery. MK publishes its annual report online with outcomes such as average disease-specific survival, continence rate, potency, and biochemical recurrence per age group and cancer stage (Figure 13).

Incentives

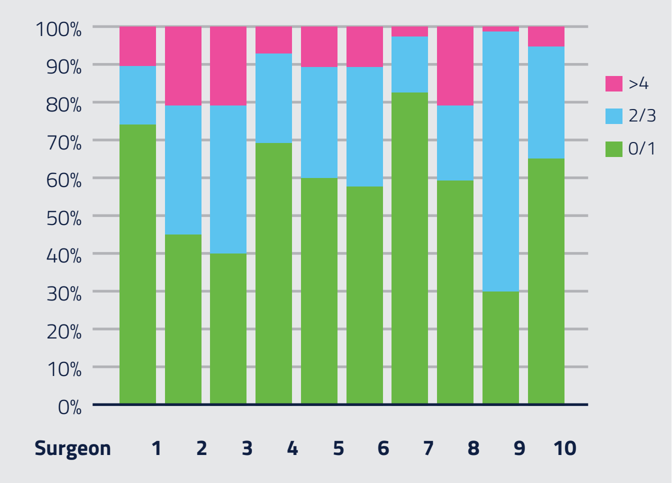
MK applies a unique compensation system that incentivises both outcomes and team cohesion. Salaries are equal for all faculty members, and include a bonus based on quality targets and total scientific output. The bonus is pooled and distributed equally among clinicians, which strengthens group dynamics[107].

Image by Axel Kirchhof

Learning community

Embedded in the MK team culture is the imperative to continually improve – a belief that you never reach the top of your game. This belief had an equalising effect among the senior and junior faculty members, which solidified team dynamics. Dr. Hartwig Huland himself, founder of the MK and a senior faculty member, acknowledges that he learned from a junior colleague how to improve patient outcomes through innovative surgical techniques. MK clinicians follow a dedicated schedule of meetings bringing senior and junior faculty together to discuss new and complex cases as well as research findings. Bi-annual meetings include a Martini conference and quality reviews in which outcome data are discussed, and MK clinicians engage in a reading-rotation, enabling them to cover 27 leading medical journals over nine weeks[104].

Figure 13:
Early continence rates after prostate cancer at Martini Klinik



External collaborations

MK has negotiated multiple bundled payment contracts starting with the five largest German insurers. Contracts require MK to treat any complication within three months after surgery at no additional charge. The health plans and MK agreed to quality targets of >95% for urinary continence and >97% for erectile function. Postoperative complications like infections or thrombolysis were capped at no more than 1% of cases[104], and failure to meet these outcome targets could lead to contract cancellation. In 2012, MK added to the bundle an agreement with a nearby hotel to offer out-of-town patients the option to stay at a reduced rate while waiting for the removal of their catheter following surgery[105]. The collaboration helped to reduce the average length of stay and increase case volume with the same number of beds. In 2013, MK signed a contract with a leading private Swiss health insurer to treat its prostate cancer patients at MK facilities in Hamburg, over 700 kilometres from the Swiss border with Germany[104], and MK created a care bundle for international prostate cancer patients, including surgery, inpatient stays and travel expenses. As a result of these developments, the number of MK patients coming from abroad had quadrupled in the five years prior to 2019.

Highlights

Through its exclusive prostate cancer focus, MK has succeeded in creating a unique outcome-driven culture that mobilises team cohesion. MK's demonstrated outperformance has led to strategic partnerships with private insurers, bundle payment contracts and a growing attractiveness to international patients.

Outpatient chronic care clinic

Diabeter

Context

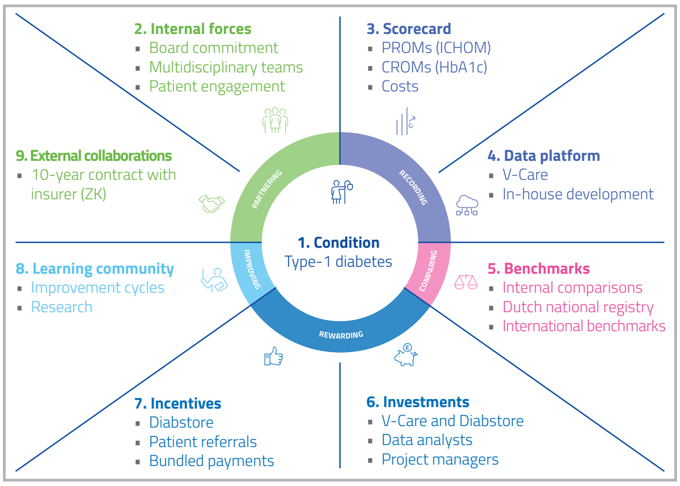
Acquired in 2015 by Medtronic, Diabeter is a Dutch group of certified clinics that specialise in providing comprehensive and individualised care for children and young adults with type 1 diabetes. This acquisition marks Medtronic's first entry into an integrated care model focused on diabetes. This strategy offers more than pumps and sensors, but rather a holistic diabetes management solution focused on patient outcomes and costs[108]. In 2019, Diabeter cared for more than 2,400 patients in their five locations across the Netherlands. The Diabeter outpatient care model includes four visits per year, virtual consultations, clinical and administrative staff services, a 24-hour medical hotline, lab costs, data platform and sensor equipment. Diabeter operates as part of Medtronic, but maintains its professional autonomy and independence in clinical decision making, therapy and brand choice, to ensure that patient care and patient data remain in the hands of clinicians.

Achievements

The key outcome measure for type 1 diabetes is glycemic control (HbA1c levels). Above a threshold of 7.5% correlates with an increase in avoidable death. At Diabeter, 55% of pediatric patients are below this threshold, compared to only 28% of the Dutch paediatric population. Diabeter also has 3% hospitalisation rates versus an average of 8% in the Netherlands. Diabeter has achieved these results without increasing costs.

Implementation

Diabeter achieved superior outcomes through the rigorous pursuit of outcome measurement for type 1 diabetes patients. The in-house design of digital solutions ensures outpatient monitoring and access to products in real-time. Diabeter's implementation Matrix is presented here.



Data platform

Beyond providing care, Diabeter created Diabstore, a digital retail solution to give patients ready access to prescribed devices and consumables such as insulin pumps, glucose meters, strips, and insulin. Patients can access Diabstore virtually or at point of care. All products are fully reimbursed and invoices are sent from the distributor directly to the insurance company. Diabeter services and Diabstore represent 74% of the bundle price. The other 26% is made up of other devices, care providers and pharmacies. To make care easier for both patients and caregivers, Diabeter developed and manages the VCare electronic platform, which uploads data from a patient's insulin pump or glucose meter to a Diabeter server that displays the patient's real-time health status on a central dashboard, allowing for direct extraction of CROM data. Colour codes reflect glucose data. An extended report is then sent on for analysis by a nurse, and subsequently emailed to the patient with information on trends, target settings, treatment plans, and follow-on appointments with Diabeter. If there are large deviations in the data uploaded by the patient, an alert is automatically sent to one of the medical doctors for immediate action. *"We didn't want to step out of the hospital setting,"* said Dr. Henk-Jan Aanstoot, *"But we understood that building a new and efficient IT system was not possible inside a regular hospital, so we decided to create our own."* Now outside the hospital setting, Diabeter has partnered with an independent IT company to build a web portal and patient app for collecting PROMs, where the response rate is 95%. In terms of metrics and scorecards, Diabeter has also begun to align its practice with the ICHOM Diabetes Standard Set, released in April 2019, in order to enable statistical comparison on both national and international levels.

Investments

A care manager is assigned to each individual patient to coordinate care between the patient and the multidisciplinary team – clinicians, nurses, behavioural specialists, dieticians and administrative staff. Working together, the team invests in an initial period of intense care, since the outcomes in the first year determine those for the next fifteen years. Patient glycemic levels are reported through remote technology and patients can react and self-adjust their insulin doses accordingly. Remote consultations enable quick check-ins – in between appointments, Diabeter averages 24 points of contact, compared with the nationwide average of two. Patients also have access to a round-the-clock emergency hotline. Diabeter's communications with its patients include sharing extensive data analysis. Dr. Henk Veeze, co-founder of Diabeter, notes that *"sharing real-time data makes the levers actionable. The goal is to integrate this evaluation in the current care plan,"* and this real-time data is used to empower patients further in contributing to their own outcomes.

Learning community

Diabeter has created a unique working environment through expertise-centered policies for its medical staff and an appealing interior design of its facilities, acting on a body of evidence between work environment and patient outcomes[99]. When teams are empowered to apply their expertise to improve results, stress and burnout at work decline while patient satisfaction rises. Leadership at Diabeter enacted a policy of removing the administrative burden on doctors and nurses to make sure they devote 100% of their time to patients, leading to Diabeter clinicians treating an average of twice as many patients relative to the national average. This dedication to a pleasant working environment permeates the physical as well as social environment at Diabeter. Diabeter facilities are conveniently located in city centres, with easy access to public transportation. Sterile medical surroundings have been replaced with cheerful, architectural design. No white coats. Natural light and bright colours abound with round tables in consultation rooms. It's a place where patients and staff are happy to spend their time. As Dr. Veeze concludes, *"Now 10% of Dutch hospitals have handed their patients to Diabeter, including two out of seven university hospitals."*

External collaborations

Diabeter signed a 10-year bundled payment partnership with Zilveren Kruis (ZK), the largest insurance company in the Netherlands. ZK refers type 1 diabetic patients to a Diabeter centre, where treatment and follow-up are covered by a fixed fee, including costs associated with hospitalisations or complications (e.g. blindness, vascular diseases and kidney replacement therapy). If costs are lower than the bundle price, or if outcomes achieved are higher than the target, then value is financially rewarded. In general, the Dutch health system sets a limit to the number of patients that a provider may have covered by an insurer, but based on Diabeter's superior outcomes, ZK covers all Diabeter patients without budget limits. This partnership is exceptional in the Netherlands, where insurers usually sign only one-year contracts with providers. As part of the contract terms, Diabeter's performance is based on patient glycemic levels. According to improvements in these results, individual patients are allocated a score between +2 and -2 points, and thus, Diabeter incurs bonuses or penalties. Dr. Veeze recalls that, "*When we launched Diabeter, the goal was never to reduce costs. Our goal was to improve outcomes. For example, we gave nurses twice as much time to take care of patients. But through focusing on the highest quality care, we have achieved more with reduced costs.*"

Highlights

The single condition focus and the commitment to employee satisfaction empowers Diabeter clinicians to remain concentrated on the full spectrum of patient needs, leading the group to consistently outpace the national averages for outcome data.

This case was written with contributions from Veeze H. and Aanstoot H.J., co-founders of Diabeter.

Image by Diabeter

Public hospital

Basel University Hospital

Context

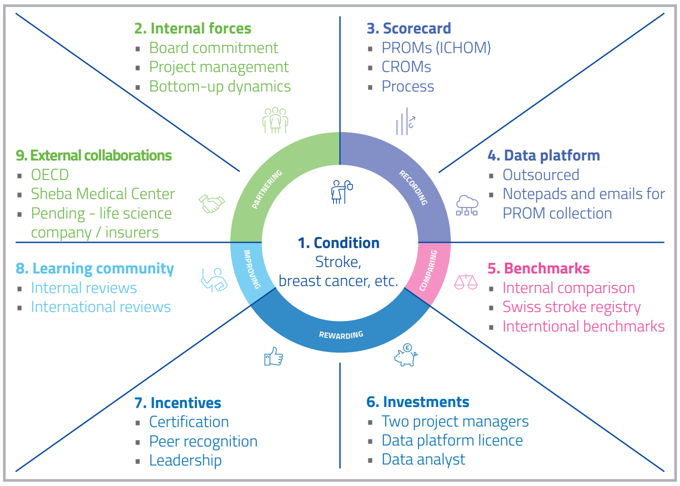
As one of five Swiss university hospitals in the country, Basel University Hospital (USB) was the first to implement VBHC in 2016. With a staff of 7,200 employees and a budget of €1 billion in 2018, USB treats nearly 38,000 inpatients and one million outpatients every year. As a tertiary care facility, USB offers prolific translational research activities in partnership with leading life science companies.

Achievements

Only one year after implementing a VBHC pilot, the USB stroke department improved by 14% the median time from symptom to treatment onset, which is of particular importance for stroke patient outcomes[110]. For breast cancer, PROMs are routinely assessed and discussed with patients during consultations, leading to improved patient engagement and satisfaction. Two years after PROM implementation, the OECD Health at a Glance Report 2019 ranked USB third out of nine leading university hospitals across seven countries for crude PROM scores for reconstruction following mastectomy[17].

Implementation

To achieve these results, USB organised its VBHC implementation around three key strategies. First, top management clearly endorsed the value-based approach and offered strong support to clinical teams. Second, USB invested in a dedicated VBHC project management team coordinating the implementation across departments. Finally, USB was strategic in choosing conditions with motivated clinical champions where quick wins could mobilise teams and scale VBHC programmes in nine other conditions. USB's implementation Matrix is presented here.



Internal forces

From the outset, the board's endorsement was clear. *"We do not only want to preach excellence, but demonstrate it,"* asserted Professor Christoph Meier, Chief Medical Officer. The first challenge to implement VBHC successfully is to co-create this vision and roadmap with clinical champions and medical teams. *"We succeeded to some degree to not be perceived as pure top-down management imposing yet another strategy on our medical staff, but as an ally trying to foster best medical care"*, stated Meier.

Data platform

USB outsourced the development of a data platform to an IT supplier, while involving clinical teams directly, and in 2017, USB introduced outcome measurement for breast cancer. Since then, patients have entered PROMs on notepads at the clinic or via automated e-mails. The data platform provides a graphical display of PROM results. The scorecard features CROMs and PROMs, including the Breast Q suite of tools for breast cancer surgery[111]. Clinicians have real-time access to PROMs during consultations to support decision-making with patients. *"We can identify problems of each patient early on through these discussions and treat in a more targeted way. What the patient reports has direct consequences on the care pathway"*, explains Professor Walter Weber, Head of Breast Surgery at USB. Patients perceive an immediate benefit. *"I would not have dared to speak about my sexuality to my treating clinician"*, a patient noted. *"Now, the discussion has become more empathic and insightful because clinicians are actively addressing these topics."*

Benchmarks

Every year, Swiss health authorities require all stroke centres to submit standardised clinical outcomes data to the national stroke registry in order to be certified and therefore able to treat stroke patients. Each hospital receives a report on its benchmarked results on an annual basis. Data that are significantly below average may trigger a review process that could lead to certification withdrawal. With a below average score of 162 minutes from symptom to treatment in 2017, USB improved its performance by 14% in just one year, reaching the national average. USB pioneered PROMs collection for stroke, leading the way among the 22 certified stroke hospitals in Switzerland[110]. In time, median PROM scores will be publicly reported and trigger a constructive outcome-based competition among certified stroke units. Being ahead of the game will create a competitive edge, improving visibility, attractiveness and eventually cement USB's outcome-based reputation.

Image by University Hospital Basel

Investments

In 2016, USB invested in a dedicated VBHC team. This team included a project manager, a quality and patient-centred manager, a data analyst and an information and communication technology coordinator. For cost measurement, the finance department created a TDABC working group with two clinicians and an economist. By 2017, USB implemented the first ICHOM standard set for breast cancer in daily clinical practice. Based on a successful use case, USB adopted a clear road map for implementing VBHC in nine additional conditions. Working in close collaboration with medical teams, the project manager oversaw data quality and inclusion rates. Following a series of quarterly review meetings, the department appointed a leader to coordinate PROM collection.

External collaborations

As few hospitals in Switzerland measure outcomes as of 2019, USB is benchmarked against leaders abroad such as Sheba Medical Center in Israel. Insurers have shown interest in entering into outcome- and value-based payment contracts with USB. In addition, world-class life science companies have also shown interest in value-based programmes that evaluate patient outcomes associated with their drugs and devices.

Highlights

Through combined top-down and bottom-up efforts, USB medical teams began their VBHC journey with two conditions and expanded to nine within two years. They are pioneering outcome-based competition among Swiss providers. Being ahead of the game creates opportunities to demonstrate excellence at national and international levels, as well as fostering collective pride.

This case report was written in collaboration with Bilger S, Gaensbacher S, Mueller A, Wyss A, Ernst S, and Rueter F from Basel University Hospital.

Public hospital

New Karolinska Hospital

Image by White Arkitekter

Context

The New Karolinska Hospital (NKS) is an ambitious project to establish one of the most advanced and specialised hospitals in Europe. The project involved new state of the art buildings and later a VBHC patient-oriented organisation, conceptualised and constructed as a way to address the fragmentation of specialty silos. With 15,000 employees and 1,300+ beds, the NKS project was publicly funded and managed by the Stockholm county council, among other large complex projects. With a cost of SEK 22.8 billion (€2.19 billion) in 2019 – twice the original budget – NKS is described as the most expensive hospital ever built[112]. The strategic health care plan for the region sought to clearly differentiate between highly specialised and generalist hospitals, as well as to expand the role of primary care and community care centres. Furthermore, the new hospital buildings are smaller than those of the previous facility, which generated confusion with respect to which patients were to be moved and which would be directed to other hospitals.

Implementation

The NKS overhaul of its operational and managerial models ran in parallel with the creation of new buildings and patient flows, and the necessary new IT systems lagged in their development. Several notable elements of the VBHC implementation Matrix suffered from this 360° transformation.

Conditions

The VBHC initiative coincided with the development of novel hospital operating processes and infrastructure. *"Rather than medical specialties, NKS' new model focused on patient groups arranged by themes and coordinated by a patient flow manager"*, explained Melvin Samsom, former NKS CEO. *"This approach aims to increase emphasis on quality and outcomes, with a stronger focus on what patients see as important"*[112]. An organisational model was created with seven medical themes (e.g. heart and vascular) and five functions (e.g. emergency medicine), with diagnostic-driven patient care flows. New management roles were created, in particular the Patient Flow Captain (PFC) responsible for designing, managing and continuously evaluating each flow.

Scorecard

Interprofessional and interdisciplinary teams met patient representatives, comptrollers and researchers around "oval tables" to select relevant outcomes and cost indicators, develop scorecards using business intelligence software and drive continual improvement. Institutional integration already existing within the Karolinska Institute and the Medical University aimed to improve care quality, research and education.

Internal forces

The VBHC initiative began with ten pilots testing patient care pathways including process mapping. Consultants from strategy consulting firms became heavily involved in the hospital reorganisation, and were perceived as having been granted undue leadership roles side-lining clinicians[112]. Staff felt they were engaged as data sources without inclusion in the decision-making process, something that was often described as difficult to understand[113]. While patients were positive about the increased influence they had on care through this VBHC initiative, staff became more sceptical and critical over time. Interpretations of the PFC role varied, particularly regarding the associated financial responsibility and executive mandate. The new patient flows broke up traditional specialty structures. In addition, the infrastructure of the new hospital building exhibited serious problems leading to frustration and difficulties performing health care activities. Investigative reporting led to negative press which dogged the process as it was debated in public and professional fora.

Learning community

Educational needs were not adequately addressed in the new organisation, creating serious concerns about future competency. The VBHC efforts at Karolinska built heavily on Lean, but lacked the learning organisation needed for knowledge sharing. The hospital CEO departed in 2019, and the project has entered into a process of re-evaluation and organisational redirection.

Highlights

This case illustrates that VBHC implementation is a winding road. The number of transformational programmes launched simultaneously at NKS created noise that had a detrimental impact on the VBHC implementation. Despite these difficulties, NKS is a pioneer in the implementation of VBHC and many aspects of its programme remain relevant. NKS is applying lessons learned to rebuild a new Matrix implementation model as noise dissipates.

This case was written with contributions from Savage C., Amer-Wåhlin I., Ramos P., Mazzocato P. and Ingvar M., from the Karolinska Institutet.

Image by CDC

Public Hospital

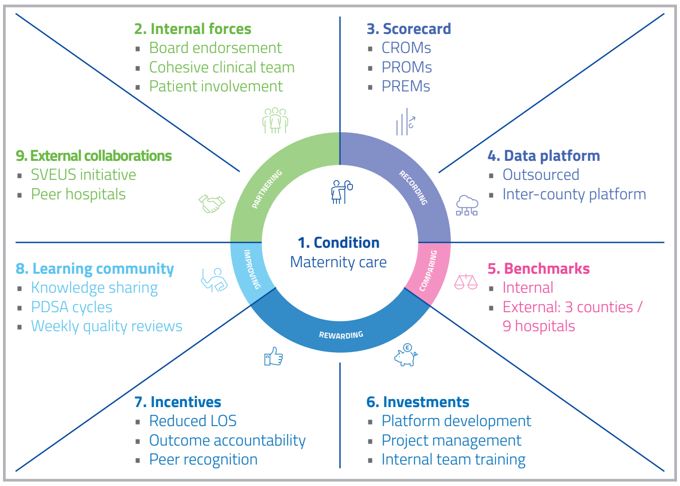
Uppsala Academic Hospital

Context

Uppsala University Hospital is a large academic hospital in Sweden. With 8,300 employees and nearly 360,000 outpatient visits annually[114], it provides highly specialised care for complex and rare pathologies in a catchment area of over 2.2 million Swedes (20% of the population). In 2013, Uppsala launched its VBHC transformation plan. *"With the implementation of quality registries, we've had outcome data for twenty years, but to achieve an in-depth, value-driven transformation, you also need process,"* said Professor Morten Kildal, Lead for VBHC. This dialogue between process and outcomes empowers teams to lead change across a broad array of departments such as maternity, ambulance and surgery.

Achievements

Two years after launching its VBHC programme, the ambulance unit succeeded in reducing the number of unnecessary dispatches by 17% and time to dispatch by nearly 19% without affecting patient outcomes. Furthermore, the maternity care unit reduced the number of induced births by 26% and, with unchanged patient outcomes, it saved 850 bed days per year. Lastly, surgery department nurses designed a digital tool to optimise, in real-time, the allocation of staff resources according to the evolution of patient status.



Implementation

With a clear long-term endorsement from the board, Uppsala decided to implement its VBHC transformation plan by focusing on 43 of 230 care pathways across the hospital. "Departments are vertical silos, but if you move everything to processes, you create horizontal silos," asserted Kildal. To increase efficiency, pathway coordinators were appointed to manage patient flows across departments with interprofessional teams focused on improvements within units. Uppsala's plan-do-study-act approach and breakthrough programmes are now integral to a culture of organisational change. Uppsala's implementation Matrix is presented on the left.

Internal forces

In 2015, Per Andersson, an Uppsala nurse, headed the ambulance unit and took over the dispatch centre, which had been outsourced to a private company. Andersson worked with his team to take full advantage of the control they now had over their unit in order to improve performance through a new software they designed in-house. For example, teams have 90 seconds from alarm to dispatch for top priority missions. To improve efficiency, the team modified the dispatch process so that the ambulance received information on the way to the emergency site. In this way, they succeeded in reducing response times by 19%. They further reduced the total number of ambulances dispatched by 17% through replacing non-clinical phone operators with nurses, whose clinical training enabled them to understand when an ambulance was truly necessary. To ensure these changes added value, they monitored 1,000 patients to whom ambulances were not dispatched under this new process, and verified that none experienced negative outcomes. This PDSA approach validated the implementation of these new operational processes and engaged the team in successive improvement cycles.

Data platform

Early patient discharge from the maternity ward is valuable when longer hospital stays do not improve outcomes. To achieve this goal, the maternity unit designed an early discharge pathway including midwife homecare visits for 30% of non-complex cases. Compared to the standard care cycle, the new pathway showed equal patient outcomes with 850 bed days saved per year. The Uppsala maternity unit also succeeded in reducing induced births from 23% to 17% (below the national average). To accomplish this, each week, the team analyses data, stratifying the population, assessing individual risk and adjusting care accordingly. They also developed a new tool populated with EMR data – a series of connected wheels displaying the patient profile, medical procedure, patient outcomes and experience six hours after giving birth. This segmentation of patient profiles and outcomes enables the team to tailor pathways to maximise results. With an estimated development cost of SEK 527,000 (€50,000), they then had this digital wheel custom-made for internal benchmarking[115] (Figure 14).

Figure 14:

Maternity case mix segmentation tool at Uppsala Academic Hospital

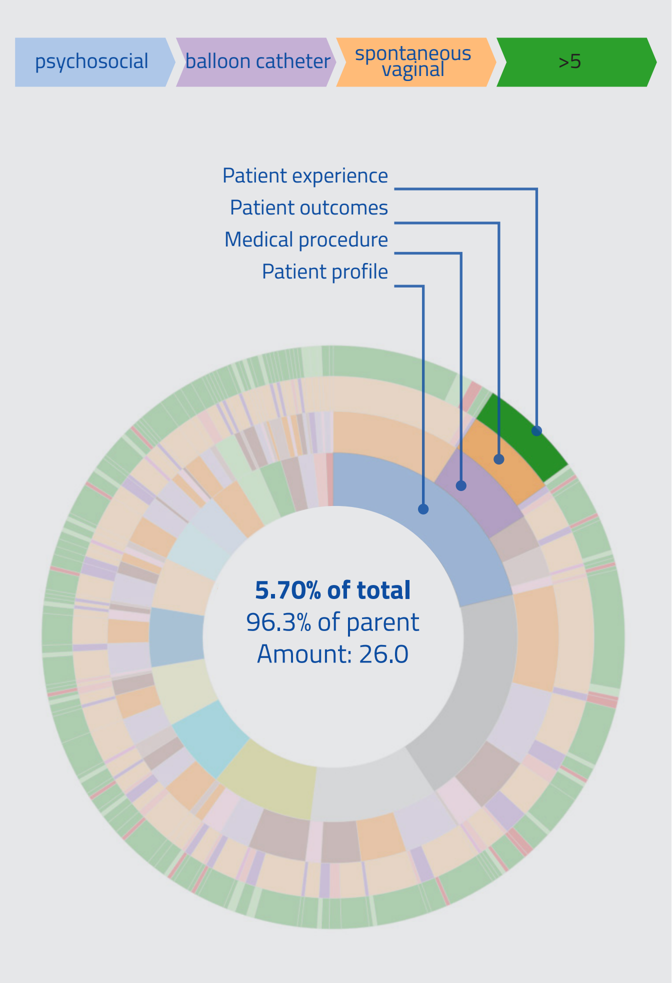


Image by Steffan Claesson

Investments

In 2018, surgery followed the example of the burn unit who had earlier pioneered a colour-coded magnet board detailing patient status, the care schedule and nurses in charge. Every morning, during the five-minute team meeting, the magnet board enabled nurses and practitioners to visualise workload, detect bottlenecks, optimise team communication and allocate resources according to patient needs. Inspired by this device and the outcomes achieved, the surgery unit initiated the in-house development of a digital tool to adjust nurse resources according to care intensity. The interactive flat screen facilitates flexible assignments, so that the most experienced nurses can manage the most complex cases. It also increases team adaptability, defuses stress, schedules breaks, and distributes appropriate resources according to patients' evolving needs.

Learning community

For external benchmarks, the Uppsala team compares its outcomes to eight other obstetric departments using a common scorecard. Data are shared on an open source data platform financed by the Swedish National Collaboration for Value-Based Reimbursement and Monitoring of Health Care (SVEUS). In 2017, the maternity unit at Gothenburg University Hospital contacted Uppsala's colleagues to understand how they succeeded in achieving lower post-delivery infection rates. For other quality indicators, the Uppsala team contacted Malmö and Lund University Hospitals, which demonstrated superior outcomes in 2019. This peer-to-peer dialogue is the result of the SVEUS platform that publishes nominative aggregated data across the nine hospitals. In this way, they form a learning community that establishes baseline data and fosters competitive collaboration.

Highlights

"Dissemination of quality management is greatly facilitated if you connect with people and with the support of reliable and transparent quality data", says Kildal. *"VBHC is about empowering teams to take change by the hand."* Uppsala's commitment to incremental change and PDSA culture stimulates team inspiration, leadership and outcome accountability.

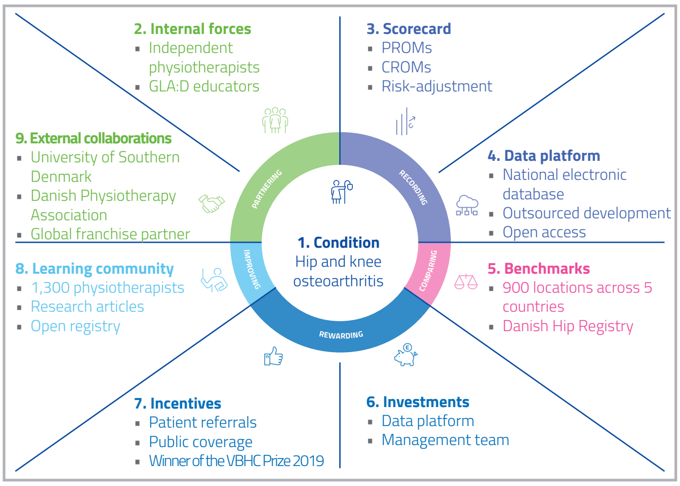
This case was written with contributions from Kildal M, Hallberg G, Wærnér H and Andersson P, from Uppsala University Department.

Network of independent caregivers

GLA:D

Context

Founded in 2013 by a research team from the University of Southern Denmark, Good Life with osteoArthritis in Denmark (GLA:D) is a non-profit organisation training and certifying physiotherapists to deliver neuromuscular exercise to patients with osteoarthritis. With more than 800 sites and 1,300 certified caregivers across five countries in 2019, the GLA:D initiative has helped 50,000 patients to maximise outcomes[116]. GLA:D supports the application of exercise as first line treatment. It has built an outcome-based registry, enabling a learning community of caregivers around the design of non-invasive care pathways engaging patients and reducing unnecessary surgeries and imaging. For all these achievements, GLA:D won the VBHC Prize 2019[117].



Achievements

Immediately after undergoing GLA:D training, patients' walking speed increases by 10%, while pain intensity decreases by 25%, on average. Only three months after programme start, knee patients reduce their intake of painkiller medications by 29%, on average. After one year, hip patients' quality of life improves by 20% and sick leave for knee patients drops by 42%. With a fee of DKK 3,700 (€495) and costs for total knee or hip replacement of DKK 50,800 (€6,880), GLA:D generates value for patients and health systems by improving outcomes while reducing overmedicalisation.

Implementation

GLA:D was launched by academic entrepreneurs. *"Over the years, sitting on different guideline committees and seeing lots of health care money being spent, I witnessed the stagnation of clinical practice, and I got increasingly frustrated"*, explains Professor Ewa Roos, co-founder of GLA:D. *"Professor Søren Thorgaard Skou and I said, let's do it ourselves!"* Based on close dialogue with referring general practitioners, orthopaedic surgeons, patients and the health care region of Southern Denmark, the GLA:D initiative illustrates a paradigm shift towards early, cost-effective treatment of a chronic disease. Notable elements of the VBHC Implementation Matrix are presented on the right.

Scorecard

GLA:D is a standardised, but individualised, treatment plan consisting of two patient education sessions and 12 neuromuscular exercise therapy sessions supervised by a certified clinician. GLA:D's scorecard includes outcome data with condition-specific metrics and a risk-adjusted methodology. A national electronic database collects information such as patient symptoms (pain intensity), functional outcomes (walking speed), quality of life, and other indicators with economic impact such as consumption of painkiller medications and duration of sick leave.

Investments

In 2019, the founders invested in a management team consisting of a clinical specialist, a medical laboratory technician, a database manager and a manager of business development. With the support of the Danish physiotherapy association, GLA:D raised €150,000 and entered into a contract with a Danish IT-provider to build the GLA:D registry. As a non-profit initiative, GLA:D fees that are generated from a course offered to physiotherapists are reinvested in the maintenance of the registry. GLA:D has otherwise struggled to find investors willing to financially support their aim and the infrastructure necessary to accomplish it. Founders made an additional investment in the GLA:D brand. *"The fact that GLA:D is still run out of a university gives credibility and therefore was an important asset when talking to clinicians,"* explains Professor Roos. However, GLA:D's success in delivering better outcomes has not yet materialised in an outcome-based payment. At present, most patients pay 60-100% of the treatment cost out of pocket, which limits patient access[119].

Learning community

Data are published online enabling therapists to assess and benchmark their results against the GLA:D community on both national and international levels. GLA:D has created a franchise and expanded the brand to Canada, Australia, Switzerland and China. To deepen the learning experience, the team launched GLA:D back in 2018, a programme of nine courses more than 500 clinicians at the University of Southern Denmark. Beyond education, a series of scientific articles has been published describing the development of the concept and the initial findings[118].

Image by Jorn Ungstrup - GLA:D

External collaborations

The rapid expansion of GLA:D requires the development of collaborations around the world. Through its franchise, GLA:D exported its methodology overseas and, as such, established the relationships necessary to build this global network of caregivers operating in different health systems, applying the same medical approach with replicable results. *"GLA:D is spreading fast,"* declared Professor Eva Roos, co-founder of GLA:D. *"Certified physiotherapists adapt rapidly. They are very motivated and feel a strong sense of ownership. This allows for relatively quick organic growth – especially when there is no governmental support."* The decision to register as a trademark was the only way to ensure the high quality of care provided by the trained physiotherapists, since they are obliged to follow the principles of GLA:D and contribute data to the registry.

Highlights

GLA:D is an entrepreneurial non-profit initiative. The programme has become a trademarked protocol adopted by a global community of independent caregivers, benchmarking and improving through an outcome-based registry. This case illustrates the importance of both preventative and curative care for functional recovery after surgery. It further demonstrates the value of process guidelines, and the relevance of refining guidelines, using patient outcome data.

Health system

NHS Wales

Context

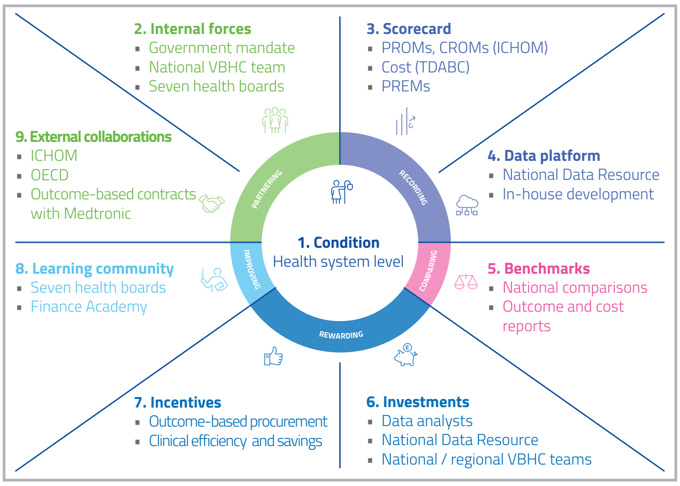
The National Health Service (NHS) Wales delivers universal health care for 3.1 million Welsh residents with a 2019 budget of £7 billion (€8.2 billion). In 2014, the Welsh Minister for Health and Social Services launched a policy called Prudent Health care, focusing on co-production with patients, equity, reducing over-medicalisation and unwarranted variation in care. Subsequently, value-based health care has become a vehicle for delivering Prudent Health care under the overarching policy of '*A Healthier Wales*'[120]. To implement this plan, NHS Wales created a national VBHC team led by Dr. Sally Lewis, with the ambition *"to improve the health outcomes that matter most to the people in Wales."*

Achievements

In 2017, NHS Wales developed a portal for standardised PROM collection for 31 care pathways, with questionnaires available in English and validated Welsh translations. Aneurin Bevan University Health Board (ABUHB) has been a pioneer in collecting PROMS for over 20 conditions with a 77% response rate through the use of smartphones. NHS Wales is also building the National Data Resource – an interoperability hub with an open application programming interface (API) – as well as national disease reporting dashboards to increase transparency with Welsh citizens by letting them compare providers and outcomes. Lastly, NHS Wales has signed outcome-based contracts where life science vendors receive payments when target outcomes are met.

Implementation

Through dialogue with practitioners and medical associations, NHS Wales reaches clinical consensus on outcome sets and PROM tools, often using ICHOM standard sets for specific conditions. Costs are measured either with TDABC or, at hospitals, with patient level costing. To accelerate VBHC implementation across seven Welsh health boards, the national VBHC team works to support local teams in embedding VBHC activity. *"The plan-then-do approach is obsolete – even dangerous"*[121], says Professor Alan Brace, NHS Wales' Director of Finance. *"Today's successful organisations close the strategy-to-implementation gap with a new approach best described as* 'Decide-Do/Refine-Do'[121]. This agile test-and-learn approach fuels NHS Wales' entrepreneurial implementation at health system level.



Data platform

In terms of digital transformation, NHS Wales is developing the National Data Resource (NDR) – a multi-provider benchmarking hub that enables open reporting, research, as well as clinical and operational support across Wales[122]. Cost-effective solutions are developed in-house to improve data visualisation for patients and caregivers. With national terminology standards, *"The NDR is a set of national and local servers holding and linking data produced by Welsh health care organisations, with strict information governance standards and a federated approach"*, said Helen Thomas, Director of Information.

Learning community

NHS Wales is developing a VBHC learning community at national and regional levels through various initiatives. For example, it has developed a year-long programme across the seven health boards – the Finance Academy – where finance and clinical participants work in pairs to devise and implement value-based projects locally. Another example is the national costing exercise, which analyses the variation in cataract patient pathways across Wales. In 2018, health boards collected PROM data (ICHOM cataract standard set) from patients before and after cataract surgery. Using a TDABC approach, the cataract patient pathway was mapped and the cost of each step calculated (£615 per surgery on average). Approximately 70% of patients referred for surgery have the operation. *"If we can identify early in the process most of the 30% that do not have surgery and the 20% that do not improve after surgery, these patients would be placed in an alternative pathway that can meet their needs with improved outcomes at a lower cost"*, asserts Dr. Chris Blyth, Clinical Lead, Ophthalmology. The key learning is that pre-operative PROMs could enable earlier triage to the most appropriate and high value pathway[23].

Image by Carlo Navarro

External collaborations

NHS Wales negotiated with Medtronic a first value-based contract in colorectal cancer, using a new care cycle based on enhanced recovery after surgery (ERAS). Reduced length of stay and cost per bed days are the two process indicators measured, with the payment to Medtronic being a percentage of the savings generated. The second outcome-based contract was for Medtronic's sacral nerve stimulation technology to treat faecal incontinence. This agreement involves an outcome-based payment model where the company is paid 12 months following implantation if it meets pre-agreed parameters upon benchmarks. *"Given the societal costs for this chronic disease, the expected savings between current and new care cycles are £38,000 (€45,000) per patient"*, estimates Adele Cahill, National Lead Value-Based Procurement[123].

Highlights

NHS Wales is developing a nationwide VBHC plan to measure patient outcomes and analyse them through a centralised data platform. PROMs are expected to be applied for triage in order to orient patients towards appropriate and high value care pathways. NHS Wales rolls out its implementation roadmap through VBHC training at the crossroads of financial and medical expertise to disseminate a cultural shift at health system level.

This case was written with the contribution of Lewis S, Cahill A and Brace A, from NHS Wales.

Third party quality registry

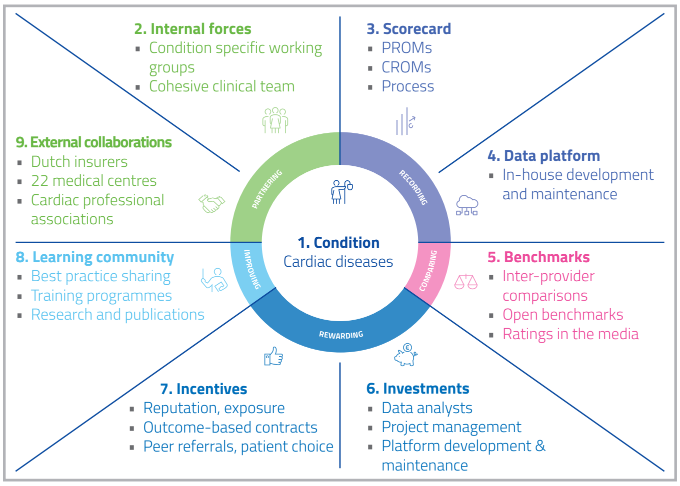
The Netherlands Heart Registry

Context

The Netherlands Heart Registry (NHR) is a non-profit organisation facilitating a VBHC programme for cardiac diseases across 22 Dutch heart centres. This registry was established in 2012 under the name of Meetbaar Beter ('Measure Better') and merged into the NHR, a third party connected to the national associations of cardiologists and cardiothoracic surgeons, ensuring a clinician-driven perspective. With a budget of €1.7 million, NHR is committed to serving clinicians' needs to benchmark performance against a standard and compete effectively in the market. Through public reporting, NHR serves cardiac patients and health system users in making outcome data visible and patient choice possible[124].

Achievements

As of 2018, NHR had collected data across five conditions and 12 treatment options, representing 85% of complex heart care in the Netherlands. Between 2015 and 2017, the 120-day mortality rate for the Transcatheter Aortic Valve Implantation (TAVI) dropped by 17%. For combined aortic valve disease and coronary artery disease, the 120-day mortality dropped by 38%[125]. Completeness of published data is 99% on average, with more than 500 quality checks performed annually on 600,000 endpoints for patient relevant outcomes. The registry covers over 1.3 million cardiac procedures across the Netherlands, with an increase of 80,000 per year. It has been recognised and accepted as a public utility, with mandatory hospital interventional cardiology and cardiac surgery license registrations embedded in the database.



Implementation

NHR implements its organisational strategy with an eye towards the VBHC plan of the institutions it serves, aiming to support hospitals and heart centres in their Matrix implementation. NHR assists medical centres with an implementation handbook, standard operating procedures and guidelines for data collection. The NHR support of the Hospital Implementation Matrix is presented on the left.

Scorecard

For each cardiac condition covered in the registry, NHR builds registration committees to select, define and maintain the most relevant scorecards. Registration committees collaborate in a multidisciplinary way, including both cardiologists and cardiothoracic surgeons from participating heart centres, and are organised around specific cardiac conditions. Further solidifying and maintaining clinician buy-in is a rigorous validation process conducted by NHR statisticians and experts in medical decision-making. NHR also works with independent organisations in data validation, including through the international academic advisory council (IAAC), and councils on methodology, data management and statistics.

Internal forces

NHR assembled an expert panel to ensure the involvement of health insurers, as well as patient and government organisations. *"Our main focus is that hospitals send good quality data,"* says Dennis van Veghel, Director and co-founder of NHR. *"We are here to help them. It's a collaboration based on trust"*[126]. The NHR database is critical to hospitals in catalysing internal dynamics focused on data, benchmarking, and improvement, and the trust in the data quality enables clinical leadership to point the team in the direction of a concrete target. The public data also creates a competitive market place, with a common objective between the teams, which further sharpens the focus of cardiac departments on achieving higher quality outcomes.

Data platform

In addition to these processes to validate the data, NHR implements safeguards to minimise errors and give clinicians the opportunity to verify data before reports are made public. For one, the reporting process is programmed to reject the upload of data documents that include errors into the system. In addition, providers receive initial reports and have the opportunity to make corrections. NHR also requires that 90% of the data reported is complete. Finally, clinicians review a dashboard with uncorrected average data, and get the opportunity to examine outliers and advocate for changes that may be necessary.

Image by Ani Kolleshi

Investments

To participate in the registry, institutions sign contracts which obligate them to full data disclosure. To have their data analysed, audited and published, medical centres pay an annual fee of €10,000, on top of the regular fee, which depends on their cardiac procedures (pacemaker = €3,000; percutaneous coronary intervention = €30,000; cardiac surgery = €70,000). The clear incentive for medical centres, besides the ambition to improve quality, is that non-participation could send a worrying signal to patients and insurers regarding the reasons why the hospital has chosen not to make their data transparent.

Learning community

NHR is a learning ecosystem where providers are enabled to improve thanks to outcome sharing and collective performance. Several centres have implemented improvement projects that were directly inspired by NHR outcome-data published. In a separate learning opportunity in 2014, another medical centre showed higher mortality rates than predicted, and did not want to release their data, citing allegations that the data were biased. Following a series of quality checks, NHR data analysts verified that the data were sound and valid. NHR proposed (i) the hospital to exit the programme and have this pullback disclosed to the media, which could affect its reputation and its capacity to contract with insurers, or (ii) to publish transparently and provide space for the hospital in the publication to explain their improvement plan. The provider accepted to proceed with data publication and, the year after, their outcome data improved and reached the national average. This example illustrates the direct influence of NHR's learning community to leverage performance across providers.

External collaborations

The NHR data registry also serves as the infrastructure necessary for insurers and providers to pilot bundled payment arrangements that involve a financial bonus to clinicians for quality outcomes. NHR creates the rules around which market players compete – a framework that did not exist prior to NHR, and one that stimulates a data-driven, value-based dynamics across providers. NHR also makes participating providers visible in the media. *"We manage the media every year. Network, newspaper, TV. Providers deserve visibility and a safe environment based on trust,"* says Veghel.

Highlights

The NHR case illustrates the power of data transparency. As an independent third party, NHR has succeeded in acting as a neutral facilitator to create a value driven competition across cardiac medical centres in the Netherlands. Involving cardiac medical societies, patient representatives, health insurers and the media has been instrumental to establish NHR's leadership role.

Private payer

Menzis

Context

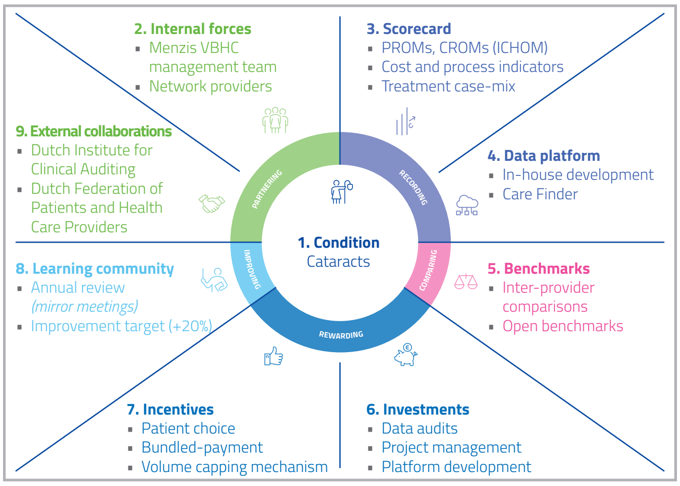
A leading insurer in the Netherlands, Menzis covers approximately 13% of the population. Through its VBHC strategy, Menzis offers Dutch providers bundled payment contracts based on outcome and cost measurements.

Achievements

Since the first value-based contracts with Santeon hospitals in 2017, Menzis has offered bundled payments for breast cancer, hip and knee replacement (HKR), cataract surgery, rheumatoid arthritis, cardiac failure, depression and bariatric surgery. Bundled payment contracts are publicly available and can be downloaded via the Menzis portal[127]. For each provider under a bundled agreement, outcome average scores are also public.

Implementation

Bundled prices combine base price per care unit (adjusted to patient case-mix), medical products used along the care pathway, and outcomes achieved. For HKR, the three-year contract measures outcome indicators (e.g. infection, revision, PROMs) and costs (e.g. hospital days, treatment case mix). *"We use ICHOM sets and quality standards from the Dutch Institute for Clinical Auditing (DICA). Were we to use other standards, health professionals would probably not adhere"*, asserts Dr. Wija Starting, Health Manager. For HKR, Menzis requires a minimum response rate of 60% for pre- and postoperative PROMs. For each condition, providers' annual performances are benchmarked during *mirror meetings* (see below) and published online with the support of the Dutch Federation of Patients and health care providers.



Benchmarks

Value achieved by each provider is compared during *mirror meetings* under the supervision of an independent third party. The purpose of *mirror meetings* is to inspire participants to raise the value of care they deliver to patients. They are also an opportunity to learn and improve from other providers. The third-party audits data quality and checks the appropriateness of medical indications to prevent unnecessary treatment. Through its *Care Finder* online portal, Menzis shares each provider's average outcomes performance with its customers. Although Menzis does not pronounce value judgements on the care itself, it makes clear distinctions between providers so customers can make informed choices regarding where to seek care. PROM comparisons trigger competition among providers and impact the bundled payment terms for the coming year. *Mirror meetings* also stimulate the exploration of underlying practices to develop a better understanding of outcome drivers.

Learning community

During *mirror meetings*, Menzis presents improvement potential illustrated through the difference between a provider's performance and the best-in class provider. Improvement is considered to have been achieved only if the results from the previous year have been enhanced by at least 20%. This performance serves as the baseline for the following year. In the first contract year, patient volume is unlimited and fully covered by the insurer. In the following years, the number of reimbursed cases depends on the degree of value improvement achieved relative to the previous year. Volume is capped if the provider does not improve.

Highlights

Mirror meetings set economic and psychological incentives for providers to cooperate in order to preserve agreements with the payer. Menzis benefits from this learning community that incrementally improves value over time, thus reducing complications and incurring costs.

Image by JC

Conclusion

Today in Europe, clinician leaders and providers are taking bold action to measure, compare and improve their outcomes. This momentum is building from the bottom up, through entrepreneurial initiatives such as those presented in this report. To date, more attention has been directed towards *why* VBHC matters to patients and health systems, than *how* it should be implemented.

Through the Implementation Matrix tool, this handbook provides a structured roadmap to orient efforts and resources towards transformation. This transition moves beyond measuring processes only, to measuring outcomes that matter to patients. PROMs are clearly the cornerstone of this transformation, since they align teams around what patients consider to be important and mobilise internal forces to drive organisational change.

> ***PROMs are powerful because they use risk-adjusted instruments to turn qualitative symptoms (« how do you feel ») into a numerical score (« how much do you feel »). This makes them actionable for triage to orient patients towards the most appropriate care pathway.***

Patient outcomes have the potential to introduce a universal language that stakeholders may share to evaluate the success of health care. PROMs are powerful because they use risk-adjusted instruments to turn qualitative symptoms ("how do you feel") into a numerical score ("how *much* do you feel"). This makes them actionable for triage to orient patients towards the most appropriate care pathway.

Beyond the myriad of process indicators routinely used as proxies for performance, PROMs measure quality of life, which is the very reason patients seek care. As care results vary tremendously between therapeutic approaches and providers, outcome benchmarks enable detection of inappropriate treatments and reduction of unnecessary care. As care volume escalates, a value focus prevents clinician burnout and puts inspiration back into their practice.

VBHC extends beyond measuring outcomes to applying them to more fulsome involvement of patients in treatment decisions. From our site visits and interviews, we found various types of outcome transparency, with the greatest impact occurring within a safe environment that allows non-punitive nominative benchmarks across participants – not to name and shame – but rather to stimulate peer-to-peer dialogue, knowledge sharing and learning traction.

Making value visible affects reputation and triggers a psychological response to leverage both competitive and collaborative behaviours, as illustrated in the case studies. Economic incentives are also emerging in some European countries, especially through outcome registries facilitating a transparent competitive marketplace for insurers and providers to pilot bundled payment arrangements. On a separate level, we found examples where value-based procurement is reshaping commercial relationships to move beyond price and allow holistic appraisal of medical products through real-world evidence.

Some life science companies are also entering the care delivery domain, steering away from a product-centric business, and moving towards integrated health care solutions with enhanced value to patients. Across health systems, services and products, outcome reporting is being adopted and will soon become a requirement. Becoming a VBHC early adopter opens the opportunity to learn proactively and spearhead high-value care, rather than hold out with the status quo until outcome transparency cements reputational gaps.

This work offers a set of recommendations for "how to start" mobilising internal forces around a condition and a scorecard. Investing in a data platform facilitates the emergence of benchmarks and improvement cycles along with economic and psychological incentives. But VBHC doesn't happen in isolation. Over the coming years, a growing number of collaborations will emerge between life science companies, providers, payers, and IT companies. These new types of partnerships will likely focus on accessing and processing real-life outcome data with the objective of demonstrating high-value care and sharing accountability on patient outcomes.

> ***Becoming a VBHC early adopter opens the opportunity to learn proactively and spearhead high-value care, rather than hold out with the status quo until outcome transparency cements reputational gaps.***

Of the 22 EU countries analysed in this work, only a handful are leading the way. The lessons learned from these pioneers create leapfrogging opportunities for others. There are good reasons to be impatient for improving health care through VBHC, but there are also reasons to be humble. VBHC is still in its infancy, and successful implementation of outcome measurement programmes takes time. Given today's hyper-fragmentation of care, the only way to overcome barriers is to empower clinical teams, make them accountable for patient outcomes, and encourage them to drive this cultural shift.


Image by Luis Melendez

Next Steps for EIT Health

With this Handbook for Pioneers we hope to have shown you the myriad benefits that can be gained from focusing on outcomes that truly matter to patients.

Today, the core principles of value-based health care are reflected in EIT Health's work across our three pillars: Innovation, where we aim to support our partners in implementing value-based health care solutions in pan-European partnerships; Education, because setting up learning communities and educating patients and health care professionals alike is one crucial ingredient for success; and thirdly, Business Creation, because a shift to outcomes-based payments will provide small businesses with opportunities to find their niche in the health care system (and thus contribute to economic growth), whilst creating opportunities for cost savings at the provider side and thereby contributing to health care system sustainability overall.

Throughout the development of this report, we learned that the engagement of all relevant stakeholders in a goal-oriented change process is an enormous challenge. Creating a level playing field amongst actors who have not traditionally collaborated on achieving better outcomes is fundamental and ultimately the key to being successful. EIT Health has an important role to play in this collaboration.

As more organisations undertake their journey along this road, EIT Health will act as a catalyst for the implementation of VBHC principles across the continent – connecting VBHC pioneers from institutions across Europe and abroad to foster the exchange of best practices and outcomes, and act as an ambassador and connection point for everyone interested in joining value-based health care.

With this in mind we will soon be publishing a "living" library of cases of successful VBHC implementation, as well as materials for hands-on workshops, which will be available online. We urge you to get in touch with us via the link on the website if you have an interesting case which you would like to share with the community.

We look forward to hearing from you!

Experts Interviewed

Henk-Jan Aanstoot (Co-Founder Board Member and Diabetologist Diabeter), Dr. Christian Abshagen (Head of TDABC Team, University Hospital Basel), David Adams (Patient Representative, European Coalition for Vision), Rossana Alessandrello (Coordinator of Innovation and Value-Based Procurement, Agency for Health Quality and Assessment (AQuAS)), Jean-Philippe Alosi (Director of Public & Governmental Affairs, Amgen France), Isis Amer-Whalin (Professor, Department of Learning, Informatics & Management, Karolinska Institute), Per Andersson (Head of the Ambulance Department, Uppsala University Hospital), Dr. Bogdan Andreescu (Former Manager of Colentina University Hospital in Bucharest, Plastic Surgeon), Anne-Marie Armanteras-de Saxcé (Présidente de la Commission de Certification des Etablissements de Santé, Haute Autorité de Santé), Hans Aubauer (Director, SVA), Clemens Auer (Director General, Austrian Federal Ministry of Social Affairs, Health and Consumer Protection), Marie-Josée Augé-Caumon (President, Consortium VBHC France; Counselor Union des Syndicats de Pharmaciens d'Officine), Dr. Neil Bacon (Former CEO, ICHOM), Dr. Cristian Baicus (University Professor "Carol Davila"; Internal Medicine Doctor, Colentina University Hospital), Ran Balicer (Chair, Israel Society for Quality in Healthcare, Director of Clalit Research Institute), Dr. Giuseppe Banfi (General Director, Fondazione Centro San Raffaele), Ricardo Baptista Leite (Member Portuguese Parliament), Nick Batey (President, EUREGHA), Guido Beccaguti (Value, Access & Policy Director, Medtronic Italy), Nicola Bedlington (Special Advisor, European Patients' Forum), Dr. Gilbert Bejjani (CMO Basilique Clinic; President of ABSYM Bruxelles), Dr. Burkhard Beyer (Surgeon, Martini Klinik Hamburg), Ward Bijlsma (Manager Health Care, Menzis), Prof. Leo Bonati (Head of Stroke Unit, University Hospital Basel), Marina Borges (Head of Management and Planning Service, Instituto Português de Oncologia do Porto), Prof. Willem Jan Bos (Nephrologist, San Antonius Hospital), Alan Brace (National Director of Finance, NHS Wales, Health & Social Services, Welsh Government), Daniel Brath (Senior Global Pricing Manager, Novo Nordisk), Adele Cahill (Programmed Director Value-Based Health Care, Aneurin Bevan University Health Board), Bruno Carriere (General Manager, UniHA), Alain-Michel Ceretti (Administrateur, France Assos Santé), Dr. Claire Chabloz (Medical Director, Johnson&Johnson Medical Devices France), Jennifer Clawson (Associate Director, Boston Consulting Group), Irina Cleemput (Senior Expert in Economics Analytics, KCE), Prof. Beatrice Cochener (Head of the Ophtalmology Unit, Brest University Hospital, President Comité National des Professionnels d'Ophtalmologie), Toby Colegate-Stone (Consultant, Department of Orthopedic Surgery, King's College Hospital), Laurence Comte-Arassus (CEO, Medtronic France), Dr. Yolima Cossio (Associate Director Evaluation and Data Management, Vall d'Hebron Hospital), Filipe Costa (VBHC - Project Manager, Deputy Director Operations, Luz Saude), Madalena D´Orey (Founder Associação Terra dos Sonhos, Patient Organization), Prof. Marcel Dahan (Professor of Thoracic Surgery at Toulouse University Hospital, Founder of the EpiThor Registry), Lars Dahl Allerup (Strategic Procurement Consultant, Region Hovedstaden), Pieter de Bey (CEO, Santeon), Prof. Jean-Louise de Brux (Professor of Cardio-Thoracic Surgery, Angers University Hospital), Dr. Jean-Jacques de Gorter (CMO, Spire Healthcare), Dr. Francisco de Paula (Strategy Director, Medtronic Iberica), Dr. Jens Deerberg-Wittram (CEO, RoMed Kliniken; Former President of ICHOM), Lisanne Dejong-Verweij (Head Quality Advisor, Erasmus MC), Dr. Ingel Demedts (Pulmonologist-Thoracic Oncologist, AZ Delta Roeselare Belgium), Dr. Fabrice Denis (Oncologist, Clinique Victor Hugo), Charles-Henri des Villettes (President, Fédération des Prestataires de Santé à Domicile (PSAD); Vice-President, Air Liquide), Kobus Dijkhorst (CEO, Netherlands Obesity Klinik), Menne Dijkstra (E-health Consultant, Martini Hospital), Prof. Gerardine Doyle (Professor of Accounting and Taxation, Associate Dean of the UCD College of Business), Dr. Rupert Dunbar-Rees (CEO of Outcome Based Healthcare), Dr. Eric Hans Eddes (Director-Founder, DICA), Jonathan Evans (Communications and External Affairs Manager, PHIN), Niilo Färkkilä (Country Director, Amgen Finland and Baltics), Joana Feijoo (Business Development, Health Cluster Portugal), Dr. Jon Fistein (CMO, PHIN), Tom Foley (Senior Clinical Lead for Data, NHS Digital), Peter Fontaine (CEO – Afgevaardigd Bestuurder at Cliniques de l'Europe), Kenneth Forsstrom Jensen (Strategic Market Access Manager, Roche Denmark), Prof. Małgorzata Gałązka-Sobotka (Director of the Institute of Healthcare Management, Lazarski University), Ines Gallego Camiña (Vice-Director of Innovation and Quality, Cruces University Hospital), Prof. Detlev Ganten (President, World Health Summit; Professor, Charité University Berlin), Dr. Poul Geertsen (Oncologist, Herlev og Gentofte Hospital; Clinical leader, Roche), Goetz Gerecke (Managing Director & Senior Partner, Boston Consulting Group), Cedric Giroud (General Manager, Johnson&Johson Vision France), Elisa Gómez Inhiesto (Finance Director, Cruces University Hospital), Jonathan Goodfellow (National Clinical Lead, Wales Cardiac Network), Giulia Goretti (Lean Manager, Healthcare Process Improvement, Istituto Clinico Humanitas), Iulian Grasu (Software Developer & Business Analyst at Arcadia Hospital), Claire Green (Assistant Director, NHS Wales Finance Unit), Dr. Catherine Grenier (Directrice de l'amélioration de la qualité et de la sécurité des soins, Haute Autorité de Santé), German Gutierrez (Integrated Health Solutions Business Director, Medtronic Iberica), Maria Gutierrez San Miguel (Process Engineer, Nurse and Clinical Pathway Project Manager, Vall d'Hebron Hospital), Marlene Gyldmark (Global Head Outcomes Research, Health Economics and Health Policy, Roche), Dr. Nasrin Hafezparast (Co- Founder and CTO of Outcomes Based Healthcare), Unto Hakkinen (Research Professor, National Institute for Health and Welfare (THL)), Ziona Haklai (Director, Health Information Division, Ministry of Health), Prof. Jan Hazelzet (Professor of Quality and Outcomes, ErasmusMC), Dr. Aldemar Hegewald (Surgeon, Ostseeklinik Damp), Marcel Hentz (Patient Centered Management, University Hospital Basel), Prof. Christoph Herborn (CMO, Asklepios Kliniken), Lisse-Lotte Hermansson (Director of Real World Data Strategy and Business Development, BCB Medical), Matt Hickey (CEO, Intacare), Dr. Jens Hillingsø (Surgeon, Rigshospitalet), Jeppe Hoejholt (Director, Medtronic Denmark), Dr. Werner Hosewinckel Christie (CEO and Founder, World Health Connections Ltd; Former Minister of Health (1992-95)), Paul Howells (Program Lead for Applications, NHS Wales Informatics Services), Robbie Hughes (CEO, LUMEON), Henk Hutink Program Manager, Nictiz), Prof. Martin Ingvar (Co-Founder of ICHOM, Professor of Integrative Medicine, Karolinska Institute), Julian Isla (Founder, Foundation 29 – Patient Association; Data and Artificial Intelligence Resource Manager, Microsoft), Prof. Michael Jacobs (Executive Director Heart and Vascular Center, Maastricht University Medical Center), Matt James (CEO, PHIN), Prof. Stefan James (Senior Interventional Cardiologist, Uppsala University Hospital, Scientific Director of the Uppsala Clinical Research Center), Ines Joaquim (Reimbursement & Health Economics Analyst, Medtronic Portugal), Anne- Sophie Joly (Présidente du Collectif National des Association d'Obèses), Günther Jonitz (Former President of the German Medical Association, Berlin Chamber of Physicians), Prof. Dipak Kalra (President of the European Institute for Innovation through Health Data, Professor of Health Informatics, University College London), Dr. Sanjith Kamath (Executive Medical Director, St Andrew's Healthcare), Bernhard Kardlec (Financial Director of the Hospital St. Pölten-Lilienfeld), Mona Khalid (Vice-President, ICHOM), Prof. Morten Kildal (Lead for Value-Based Health Care, Uppsala University Hospital), Anji Kingman (Clinical Outcomes Manager, Northumbria Healthcare NHS), Dr. Valerie Kirchberger (Head of Value-Based Healthcare in the Department of Strategic Development, Charité University Hospital), Petri Kivinen (Chief Medical Officer, Siun SOTE), Prof. Jakob Kjellberg (Researcher Health Economics, Cost of illness, Lecturer at VBHC Summer University), Arne Köhler (Head of Quality and Development, Esperi Care Oy), Stefan Krojer (Head of Strategic Procurement, Johanniter; Founder, Future of Hospital Procurement), Prof. Ralf Kuhlen (CMO, Helios Health), Prof. Hamish Laing (Professor of Enhanced Innovation, Engagement and Outcomes, School of Management, Swansea University), Jana Lapiksone (Research & Health Statistics Department, Centre for Disease Prevention & Control), Poul Larsen (Sales Manager Imaging, GE Health Denmark), Dr. Stefan Larsson (Senior Partner & Managing Director, BCG), Prof. Christine Lasset (Head of Prevention and Public Health Department, Centre Leon Bernard), Sophie Le Lann (Director of Quality, Risk Management and Organization, Institut de Cancerology de l'Ouest), João Leal (Clinical Information and Business Intelligence Lead, Josede Mello Saude), Giorgia Leoni (Director, EY Life Sciences), Prof. Sally Lewis (National Clinical Director for Value-Based Healthcare, Honorary Professor at Swansea School of Medicine), Dr. Ronald Liem (Bariatric and Trauma Surgeon, Gouda and NOK), Dr. FrançoisLignereux (Ophthalmologist, Surgeon, Institut Ophtalmologique, Sourdille Atlantique, Elsan), Ronald Logt (Senior Enterprise Account manager, Population Health Management, Philips VitalHealth), Detlef Loppow (CEO, Martini Klinik Hamburg), Dr. Christoph Löschmann (CEO, Gesundes Kinzigtal), Prof. Mats Lundström (Professor of Ophtalmology, Department of Clinical Science, Lund University), Luis Magalhaes (Co-founder, Promptly), Manuel Mandler (CDO and Head of Health Services department, Gothaer KV GmbH), Sophie Marie (Director Market Access & Economic Policies, MedTech Europe), Dr. Giuseppe Marinari (Chief of Bariatric Surgery, Instituto Clinico Humanitas), Prof. João Marques Gomes (Chair of NovaHealth, Assistant Professor, Nova Business School), Prof. Ana Marusic (Chair, Department of Research in Biomedicine, University of Split School of Medicine), Ramon Maspons (Chief Innovation Officer, Agency for Health Quality and Assessment (AQuAS)), Filipa Matos Baptista (Enterprise Services Manager, Siemens Healthineers), Prof. Christoph A. Meier (CMO, University Hospital Basel), Vlad Mixich (Member of the Romanian Health Observatory), Dr. Carlos Molina (Director of Stroke Unit and Brain Hemodynamics, Vall d'Hebron Hospital), Dr. Thierry Mourgues (Ophthalmologist, Surgeon, Chénieux Ophthalmology, Polyclinique de Limoges), Istvan Mucsi (PROMIS Delegate for Hungary; Division of Nephrology, University Health Network (UHN)), Annabell Müller (Quality Management, University Hospital Basel), Maria Dolores Navarro Rubio (Director Patient and Family Empowerment, Saint Joan de Deu Hospital), Silvia Nicht (Head of Center of Excellence for Innovation Nordics, Takeda Pharma AB), Charlotta Norgaard (Chairwoman, EUPATI Denmark), Simon Nørregaard Jensen (Senior Consultant at Danish Regions, Manager for Danish VBHC Program), Jerôme Nouzarède (Chairman of the Board, Elsan), Prof. Sabina Nuti (Professor, Scuola Superiore Sant'Anna), Suzanne Oostvogels (Region Director North Menzis), Prof. Holger Paff (Head of Institute for Medical Sociology and Health Service Research, University Cologne), Annie Pannelay (Principal, The Economist Intelligence Unit, Health Care Practice, Member of the Romanian Health Observatory), Dr. Helle Pappot (Oncologist, Rigshospitalet), Oscar Pérez Algaba (Vice-Director of Organization and Information Systems, Cruces University Hospital), Prof. Patrick Pessaux (Professor of Digestive and Endocrinological Surgery, Institut Universitaire Hospitalier, Strasbourg), Leighton Philipps (Deputy Director for Research and Innovation, Hywel Dda University Health Board), Philippe Presles (Directeur de la Recherche, AXA France), Dr. Christoph Pross (Director, Market Access & Health Economics, Stryker; Senior Research Fellow, TU Berlin), Dr. Santiago Rabanal Retolaza (Managing Director, Cruces University Hospital), Justin Rautenberg (Senior Manager Business Development, OptiMedis AG), Candy Ravenscroft (Head of Provider Strategy, AXA PPP Healthcare), Gerard Raymond (President, France Assos Santé), Ines Ribeiro (Director Government Affairs, Gilead Portugal), Filomena Ribeiro (Professor of Ophthalmology, University Hospital of Lisbon), Francisco Rocha Gonçalves (Director Healthcare Technologies Management at Luz Saúde, Former Executive Board Member of IPO Porto), Helen Rocheford-Brennan (Chair, European Working Group, Alzheimer Europe), Prof. Olav Røise (Research Manager and Professor, Division of Orthopedic Surgery, Oslo University Hospital), Prof. Ewa Roos (Head/Founder of GLA:D), Thomas Rosenfeldt (Senior Manager & Co-Founder, Data Saves Lives Denmark), Dr. Florian Rüter (Head of Quality Management, University Hospital Basel), Ester Sanchez (Nurse Stroke Unit, Vall d'Hebron Hospital), Dr. Simona Sancini (Clinician, Ospedale San Raffaelle), Nicolas Schippel (Partner Management, m.Doc GmbH), Prof. Thorsten Schlomm (Professor and Head of Urology Department, Charité University Hospital), Prof. Jochen Schmitt (Head of "Zentrum für evidenzbasierte Gesundheitsversorgung" (ZEGV)), Quentin Schoonvaere (Data and Improvement Officer, PAQS ASBL), Yannik Schreckenberger (CEO & Founder, Heartbeat Medical), Stijn Schretlen (Managing Consultant, Integrated Health Solutions, Medtronic Netherlands), Regis Senegou (President, Docapost), Selina Simone Bilger (Quality Management, University Hospital Basel), Wim Smit (CEO , Value2Health), Prof. Tanja Stamm (Professor for Outcomes Research, MedUni Vienna), Johannes Strotbek (Senior Project Manager, Weisse Liste), Dr. Ayden Tajahmady (Deputy Director of Strategy & Statistics, Caisse Nationale d'Assurance Maladie), Laure Tharel (Adjointe au directeur Direction du pilotage de la transformation, Assistance Public Hôpitaux de Paris), Helen Thomas (Director of Information Services, NHS Wales Informatics Services), Matt Todman (Director, Six- Physio), Aude Vaandering (Quality Manager, Saint-Luc Hospital), Prof. Finn Valentin (Professor CPH Business School Strategy and Innovation, Lecturer at VBHC Course at CBS), Frank Valk (Medical Consultant, Philips VitalHealth), Andrew Vallance-Owen (PHIN Chairman, NHS Administrator), Gerbrand van de Beek (Global Solution Lead, Philips VitalHealth), Paul van der Nat (Senior Advisor, St Antonius Hospital), Jeroen van der Wolk (Senior Manager for Healthcare Procurement, Zilveren Kruis), Prof. Fred van Eenennaam (President, VBHC Center Europe, CEO Decision Group), Wouter van Leeuwen (Partner and Managing Director, Boston Consulting Group), Prof. Jan van Meerbeeck (Professor of Thoracic Oncology, Antwerp University Hospital), Hedy van Oers (Project Leader, Emma Children's Hospital Amsterdam UMC Outcome Portal), Prof. Erik van Raaij (Professor Purchasing & Supply Management in Healthcare, Erasmus University), Marc van Uyten (Director at Antares Consulting), Dr. Dennis van Veghel (Founder and CEO, Netherlands Heart Registry), Thomas van de Casteele (CEO, Awell), Dr. Jordi Varela (Assistant Professor at ESADE Business School, Editor of Advances in Clinical Management), Dr. Carolina Varela (Planning Manager, Hospital 12 Octubre Madrid), Dr. Henk Veeze (Co-Founder and Medical Director, Diabeter), Dr. Christof Veit (Head, IQTIG), Yves Verboven (Director of Market Access & Economic Policies, MedTech), Dr Zoltan Voko (Medical Director, Syreon Research Institute; Professor of Epidemiology,Eötvös Loránd University), Hanna Waernér (Midwife at the Maternity Care Department, Uppsala University Hospital), Suzanne Wait (Managing Director, Health Policy Partnership Ltd.), Dr. Carolina Watson (Value-Based Healthcare Outcome Manager, Vall d'Hebron Hospital), Prof. Walter Weber (Head of Breast Surgery Department, University Hospital Basel), Prof. Rene Westhovens (Professor of Rheumatology, University Hospital of Leuven), Amanda Willacot (Assistant Directorate Manager for Trauma and Orthopedics at CVUHB), Tim Williams (CEO, My Clinical Outcomes), Paula Williamson (Chair of the Core Outcome Measures in Effectiveness Trials (COMET)), Jens Winther Jensen (Director, Regionernes Kliniske Kvalitetsudviklingsprogram rkkp), Kathleen Withers (Principle Evaluation Scientist, CEDAR), Jonas Wohlin (Founder, IVBAR), Dr. Werner Wyrwich (Manager of Contract Department, AOK Nordost), Klara Zalatnai (President, Hungarian Osteoporosis Patient Association), Prof. Andreas Zielke (Chief Physician for Endocrine surgery, Diakonieklinik Stuttgart), Nico Zijnstra (Workstream Lead, Dutch Ministry of Welfare, Welfare and Sports – Outcome Based Healthcare Programmme 2018 – 2022), Eyal Zimlichman (Deputy General Manager, Chief Medical Officer, Sheba Medical Centre, Tel Hashomer), Dayenne Zwaagman (Communication Specialist Hartcentrum, AMC).

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V.i.S.d.P. Jan-Philipp Beck

EIT Health e.V.
Mies-van-der-Rohe Str. 1C
80807 Munich
Germany

Email: info@eithealth.eu

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