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Appropriate and value-based care: towards a transformation of the Belgian healthcare system

From concept to evidence: a bottom-up implementation in hip and knee arthroplasty in a Belgian local-level hospital

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Abstract

Background: The Belgian healthcare system, despite high individual clinical quality, faces an unsustainable trajectory of rising costs and fragmented chronic care. Repeated reforms have altered system parameters without changing the underlying logic: reimbursement by procedure rather than by patient outcome.

Methods: A single-centre observational quality improvement initiative at CHC Waremme Hospital (85 beds, CHC Groupe santé, Liège, Belgium) between 1 February 2025 and 31 January 2026. The reference framework is the ICHOM Hip & Knee Osteoarthritis standard set. The study covers 270 primary arthroplasties (183 TKA + 87 THA) across three measurement dimensions: CROMs, PROMs (KOOS-PS / HOOS-PS) and PREMs.

Results: HSMR was 0 and Potentially Preventable Readmissions were 0% against an expected 0.78% (TKA) and 8.19% (THA). Median orthopedic LOS was 2.20 days (TKA) and 2.24 days (THA). HOOS-PS improved by a mean of +21.3 points in 3 months (78% reaching MCID). Patient satisfaction was 86%, with 92% willing to recommend the service. PROMs collection rates (31% TKA, 37% THA) remain below the 60% ISAR benchmark.

Conclusions: A VBHC transformation can be launched bottom-up, with internal expertise, clinical leadership, and without external consultancy. The key enablers are a virtual Integrated Practice Unit, an external non-manipulable indicator framework, digitised ERAS pathway, and systematic outcome measurement. The major structural limitation is a financing model that rewards volume over value.

Keywords: value-based healthcare, VBHC, hip arthroplasty, knee arthroplasty, PROMs, PREMs, CROMs, ICHOM, Belgium, quality improvement, integrated care

THE BELGIAN PARADOX: WHY CLINICAL EXCELLENCE NO LONGER GUARANTEES SYSTEM SUSTAINABILITY

The Belgian healthcare system enjoys a solid reputation, characterised by broad insurance coverage and the recognised medical expertise of healthcare professionals [1]. However, the current model is no longer suited to the challenges of tomorrow. As the population ages and chronic conditions become the norm, the system faces an unsustainable trajectory of skyrocketing costs [1,2]. This pressure is compounded by an organisational structure that does not handle chronic issues effectively; while individual providers perform their tasks with competence, the lack of an integrated structure prevents the delivery of a coherent care pathway [3,4]. This is Belgium's paradox: high-performing individual care belies heterogeneous results and constantly rising costs [3,5,6].

Our healthcare system was built on the logic of acute disease medicine, where hospitalisations were brief and the objective was to treat a single pathological episode with fee-for-service payment [7]. However, as the population ages, chronic conditions are becoming the norm. In this scenario, the current system leads to fragmented care, repeated tests, poor coordination and outcome variability between facilities [3,4]. This is further aggravated by a lack of integrated and transparent data [8]. If the system continues to operate under this outdated model, both the quality and the affordability of healthcare will be heavily compromised [5,6,8].

For over twenty years, numerous reforms have attempted to alter this trajectory through funding adjustments, tariff regulations, and the development of hospital networks [2,7]. While these measures brought incremental improvements, they failed to address the fundamental structural crisis. Reforms have changed the parameters of the system, but not its underlying logic [2]. The current model remains defined by the question: "Which procedure should be reimbursed?" The relevant question should be: "What outcome is desired for the patient?" [9]. Until this conceptual shift toward value-based healthcare occurs, the contradiction between the organisation of care and contemporary healthcare realities will remain, threatening the viability of the Belgian system [5,6,9].

2. THE STRATEGIC FRAMEWORK OF APPROPRIATE AND VALUE-BASED CARE

The Value-Based Healthcare (VBHC) approach offers a definitive shift from procedural volume to patient-centric outcomes [10]. The core principle is as profound as it is simple: to organise care around the entirety of the patient's journey, measure its value through final health outcomes and pay for value [10]. In this model, the unit of analysis is no longer an isolated medical procedure or a single hospitalisation, but the complete care pathway for a specific pathology [10].

Value is calculated across several complementary dimensions: clinical outcomes, patient experience, total costs incurred, population impact, and equity of access [10,11]. By focusing on what is actually achieved rather than merely on what is done, Appropriate and Value-Based Care fundamentally transforms how teams are organised, how professionals coordinate, and how institutional performance is evaluated [12,13].

A transformation of this magnitude requires a pragmatic, evidence-based implementation rather than an immediate national overhaul [12]. The transition must begin within specific care pathways led by volunteer "clinical champions." These teams define the optimal pathway and measure actual results against predefined benchmarks [13].

Technically, these experimental environments function as "sandboxes" where the organisational and clinical impacts of the model can be observed in real-time [13]. Medical data and digitalisation play a crucial role here, not as an end but as a means of quantifying value [11]. Insights from these sandboxes can gradually expand, transforming the reform into a process of collective learning and scientific evaluation rather than an imposed administrative mandate [13].

For a reform to succeed, it must also address the core concerns of the various actors within the ecosystem by providing clear, value-driven benefits:

Physicians: The model facilitates a return to the essence of the profession. Clinical quality and therapeutic success become the primary criteria for professional recognition, moving medical practice closer to a genuine scientific evaluation based on observed patient outcomes [10].

Hospitals: The traditional culture of constant budgetary negotiation is replaced by differentiation through measured quality. Funding becomes more transparent and more closely aligned with actual clinical performance and efficiency [14,15].

Payors and Public Authorities: VBHC offers a credible path to budgetary sustainability. Cost control is achieved through the clinical appropriateness of care rather than the arbitrary restriction of access [14,15].

Patients: The benefit is direct and tangible: a highly coordinated care pathway, seamless continuity of care, and clear accountability for the overall health outcome [10].

The primary obstacle to this transformation is neither technical nor financial; it is fundamentally human [12]. Any structural shift naturally threatens established habits, institutional balances, and professional statuses. Fears regarding a loss of control or the implications of increased transparency are legitimate and must be managed through the collective learning process of the sandbox model [13].

The alternative to this voluntary evolution is evolution under duress. Without a proactive transition, the convergence of demographic ageing and budgetary pressures will lead to implicit regulation—manifesting as care rationing, longer waiting times, and restricted access [11,15]. This transformation aims to avoid such an imposed decline by building a resilient system that thrives on quality and value [11,14,15].

FROM THE STRATEGIC FRAMEWORK TO CLINICAL IMPLEMENTATION

Translating this strategic framework into clinical practice requires choosing the right entry point. Trimble showed in 2016 that real change in care delivery rarely comes from large-scale restructuring; it comes from small, dedicated multidisciplinary teams that focus on redesigning a single, well-defined pathway [16]. This observation overlaps with Porter's Integrated Practice Unit (IPU) [17] and gives an actionable starting point for any local pilot: pick one pathway, build the team, measure what matters.

Primary total hip (THA) and knee (TKA) arthroplasty fit this template well. Volumes are sufficient, the pathway is standardisable, the ICHOM Hip & Knee Osteoarthritis outcome set is validated [18,19], French-language PROMs are available [20,21], and recent work has refined the MCID thresholds for clinical interpretation [22,23]. Building on this groundwork, we launched a first cycle of VBHC implementation on our THA/TKA pathway at CHC Waremme Hospital (85 beds, CHC Groupe santé, Liège, Belgium) between 1 February 2025 and 31 January 2026, across the three measurement dimensions: CROMs, PROMs and PREMs.

METHODS

This is a single-centre observational continuous quality improvement initiative carried out within the Department of Orthopedic Surgery and reported in line with the SQUIRE 2.0 guidelines [24]. The reference framework is the ICHOM Hip & Knee Osteoarthritis standard set. The population includes consecutive patients who underwent an elective primary THA or TKA during the study period. Revisions were counted separately and excluded from the PROMs denominator.

Virtual Integrated Practice Unit

The IPU brings together orthopedic surgery, anesthesiology, rehabilitation, pre-hospitalisation, pathway coordination, social services, hygiene and medical management, under the leadership of the Head of the Department of Orthopedic Surgery. The unit is virtual: there is no dedicated architectural space, but a functional coordination around the pathway, anchored in a digitalised ERAS protocol, shared governance, a common measurement system and a unified operational language. This model is transposable to most Belgian local-level hospitals.

Indicators and data sources

External CROMs — Clinician-Reported Outcome Measures: We use four indicators computed by independent third parties or under prospective surveillance: (i) the Hospital Standardised Mortality Ratio (HSMR), provided by the federal Pay for Performance programme of the FPS Public Health [25], computed on DRG 324 (elective hip joint replacement) and DRG 326 (elective knee replacement); (ii) Potentially Preventable Readmissions (PPR) at 15 days, based on the original Goldfield methodology [26] and computed using the Solventum (formerly 3M) PPR Classification System on APR-DRG, with case-mix-adjusted observed and expected values [27]; (iii) nosocomial infections under prospective year-round surveillance by the Hospital Hygiene Team; (iv) surgical revisions and orthopaedic length of stay (LOS). The fact that HSMR and PPR are computed externally and uniformly across all Belgian hospitals matters: the values cannot be tuned by the institution under evaluation.

PROMs — Patient-Reported Outcome Measures: Digital self-administered questionnaires at preoperative baseline and at 6 weeks, 3 months and 6 months after surgery. We used the two ICHOM-recommended validated short-form instruments: KOOS-PS (7 items) for TKA and HOOS-PS (5 items) for THA, in their 0–100 transformed scale where 100 represents the best functional state [18,20,21]. Clinical interpretation relied on the minimal clinically important difference (MCID) threshold of 10 points [22,23].

PREMs — Patient-Reported Experience Measures: A structured questionnaire covering global indicators, the relational pathway, the hospital pathway and discharge preparation. It was distributed during the second half of 2025.

Statistical approach

All analyses are descriptive. Continuous variables are reported as means and/or medians with interquartile range (IQR), categorical variables as counts and percentages. Inter-patient PROMs changes (Δ) and the proportion of patients reaching MCID were computed only on intra-patient paired data, that is, patients who completed both the baseline questionnaire and the follow-up questionnaire at the time point of interest. We did not run any inferential test between operators: the subgroups are too unbalanced (TKA: Surgeon B n=124 vs Surgeon C n=18) and the case-mix differences too pronounced to support that kind of comparison. Inter-operator results are therefore meant for internal formative benchmarking, not for performance ranking, in line with the spirit of VBHC [17] and ISAR guidance [28].

To check the distributional assumption underpinning the use of means, we ran the Shapiro–Wilk test [29] on the patient-level KOOS-PS and HOOS-PS scores. Most distributions are compatible with normality (Shapiro–Wilk $p>0.05$). The single deviation concerns the KOOS-PS at 6 weeks (n=30, $p=0.02$) and reflects an early ceiling effect well documented after primary TKA [30]. Reporting both means and medians is therefore justified, with medians and IQR favoured for the trajectory tables.

Handling of low PROMs response rates

Overall PROMs collection rates were 31% for TKA and 37% for THA. Both fall short of the 60% benchmark recommended by the International Society of Arthroplasty Registries (ISAR) [28,31]. This pattern is well designed for new programmes that operate without an automated reminder system. We address the resulting selection bias through transparency rather than statistical correction: the exact n is reported at

every time point, no imputation is performed, and intra-patient paired analyses bound the interpretation to the subset with both pre- and post-operative observations. The findings should therefore be read as a feasibility-and-trajectory signal, not as a generalisable population estimate.

Acknowledged gaps against the ICHOM standard

The first cycle does not yet cover the full ICHOM set. The gaps planned for closure in the next cycle: a generic health-related quality of life instrument (EQ-5D-3L, SF-12 or VR-12); pain on the 0–10 NRS scale across the five articular sites; and Time-Driven Activity-Based Costing (TDABC) [33].

Ethical considerations

This work is a continuous quality improvement initiative within the Department of Orthopedic Surgery, carried out under the VBHC approach. It is not a research project as defined by EU Regulation 536/2014. The study is non-interventional and does not modify clinical practice beyond existing institutional standards. All data were extracted in anonymised form from the hospital information systems of the CHC Groupe santé, in compliance with the EU General Data Protection Regulation (Regulation 2016/679). Patient information regarding the anonymised statistical use of routine care data for quality improvement is included in the patient welcome booklet and the hospitalisation pathway. Participation in PROMs and PREMs collection is voluntary; patients may decline at any time, with no consequence on their care.

RESULTS

Activity and population

Total activity over the period: 270 primary arthroplasties (183 TKA + 87 THA) and 16 revisions (13 TKA + 3 THA). TKA: mean age 67.5 years, mean BMI 30.0 kg/m², ASA 2 73.0%, ASA 3 9.5%, hypertension 62.8%, diabetes 25.0%. THA: mean age 70.7 years, mean BMI 28.2 kg/m², ASA 2 77.3%, hypertension 52.0%, diabetes 26.7%.

Table 1. Surgical activity and analysis population, CHC Groupe santé, 1 February 2025 – 31 January 2026.

Surgeon	A	B	C	Total
TKA — total activity (cases)	**39**	**124**	**18**	**183**
TKA primary	36	112	18	166
TKA revisions	3	10	0	13
THA — total activity (cases)	**68**	**0**	**19**	**87**
THA primary	64	0	19	83
THA revisions	3	0	0	3

CROMs

HSMR (P4P, FPS Public Health): 0 across 2025 orthopaedic activity (observed below expected). PPR (Solventum, 15-day window): 0% observed against an expected value of 0.78% (TKA) and 8.19% (THA). Nosocomial infections: 1% (TKA), 2% (THA). Revisions: 13 for TKA (A: 3; B: 10; C: 0) and 3 for THA (Surgeon A). Orthopaedic LOS: median 2.20 days (TKA, IQR 2.11–2.39) and 2.24 days (THA, IQR 1.39–3.21). The inter-operator dispersion is limited, which suggests that the ERAS pathway is genuinely standardised across the team despite case-mix differences.

These values are unusually favourable, and they need to be read in context. Three points matter. First, they cover a single 12-month period in a relatively small surgical volume (270 procedures). An absolute zero on HSMR or PPR partly reflects sample size and the elective, primary-only nature of the population, not just care quality. Second, both indicators are computed by independent third parties on case-mix-adjusted methodologies applied uniformly across all Belgian hospitals; this protects against self-certification but does not eliminate the year-to-year noise that affects rare events. Third, the figures concern standardisable elective procedures inside a structured ERAS pathway and cannot be extrapolated to broader hospital activity. The right reading is therefore that the dashboard is consistent with effective pathway standardisation and with the absence of detectable major adverse events during the period, not a causal demonstration of superior performance.

PROMs

Overall collection rates were 31% for TKA and 37% for THA, below the 60% ISAR target [28,32]. Inter-operator coverage ranged from 26.3% to 44.4%.

Table 2. PROMs trajectories (medians) and proportion of patients reaching MCID (intra-patient paired analysis).

	Baseline	6 weeks	3 months	6 months
KOOS-PS (TKA), median	57.0 (n=44)	62.2 (n=30)	63.9 (n=18)	63.0 (n=10)
Mean Δ / % reaching MCID	—	+4.3 / 40%	+8.7 / 38%	+5.6 / 33%
HOOS-PS (THA), median	53.9 (n=31)	74.8 (n=12)	76.6 (n=9)	87.3 (n=3)
Mean Δ / % reaching MCID	—	+13.7 / 50%	+21.3 / 78%	+27.1 / 67%

0–100 scale, 100 = best function. MCID = Δ ≥ 10 points [22,23].

For Surgeon A in THA, the HOOS-PS trajectory reached +24.4 points at 3 months (88% of patients reaching MCID) and +37.0 points at 6 months (100% MCID), in line with the international literature [30].

These PROMs results need to be read with caution because of the limited response rate. Patients who complete both the baseline and a follow-up questionnaire probably differ from non-responders, typically more motivated, with better functional trajectories, or simply more comfortable with digital tools [32]. The MCID proportions reported here are therefore likely above what we would observe at a 60% coverage rate. To keep the reader on the right side of this risk, we report the exact n at each time point, never impute missing data, and benchmark our magnitudes against published cohorts [22,23,30] rather than presenting them as institutional truth.

PREMs

Second half of 2025, n=38 respondents (response rate 35%). On the global indicators: 86% of patients reported being very satisfied, 92% would recommend the service, and 86% felt fully like partners in their own care. The surgical team scored 100% on courtesy, listening, respect for privacy and quality of answers to questions; medical care, operating-theatre care and pain management each scored 97%. Two areas stand out as needing attention: room and meals (50% each), which point to the hotel-side infrastructure (an institutional lever); and identification of nursing staff (52%), which is a team-level level.

DISCUSSION

A bottom-up field initiative

This work shows that a VBHC transformation can start without external consultancy. It was launched in the wake of the BVZD/ABDH white paper of 2024 [9], driven by the orthopedic clinicians and medical management, and supported by the Executive Board and the Medical Council of the CHC Groupe santé. Operational leadership was given to the Head of the Department of Orthopaedic Surgery as the clinical lead. This bottom-up setup—local initiative, internal expertise, clinical leadership—is what distinguishes it from top-down rollouts that need substantial upfront investment and outside support.

A small dedicated team working like a Formula One crew

Trimble's observation [16] applies almost word for word here. The Formula One metaphor is fitting: the surgeon drives, but the result depends on the pit crew—anaesthesia, physiotherapy, the nurse coordinator, hygiene, social services, medical management. Shifting attention from the individual procedure to coordinated team performance is, in our experience, the most decisive cultural change carried by VBHC.

A virtual IPU adapted to the Belgian local-level hospital

Our IPU is not a dedicated architectural unit. It is a functional coordination, anchored in the digitalised ERAS pathway, in shared governance, in an integrated measurement system and in a unified language. This virtual setup is more fragile than a physical IPU. It depends on continuous clinical leadership and on solid digital integration. The digital backbone, the integrated database of the CHC Groupe santé (Xline, Infohos, Omnipro, Wish), the digital PROMs/PREMs collection—is what makes it work day to day.

External, non-manipulable indicators

Using external CROMs is a deliberate methodological choice. HSMR is computed by the FPS Public Health within the federal P4P programme [25]; PPR is computed using the Goldfield methodology [26] and the Solventum PPR Classification System [27], with case-mix adjustment applied uniformly across all Belgian hospitals. The institution under evaluation cannot influence the result. This satisfies an explicit requirement of Porter's framework [17] and removes the self-certification objection by construction. Prospective surveillance of nosocomial infections adds a third independent source.

The structural limitation of the low-variability care flat fee

Beyond the results themselves, this experience puts a finger on a structural limit of current Belgian hospital financing for sustaining a VBHC approach. The "soins à basse variabilité" flat fee covers standardisable interventions like THA and TKA but does not differentiate providers by the value they produce. An operator with weak quality indicators is paid like an operator with excellent ones. The system pays for volume, not for the value created for the patient, and there is no built-in incentive to invest in outcome measurement or in continuous improvement.

Double-loop learning and the general practitioner (GP) as partner

Two levers will determine whether the approach becomes durable. The first is double-loop learning [34]: beyond adjusting practices within an unchanged frame, the team needs to use systematic outcome measurement to challenge its own assumptions, share per-operator data openly and adjust protocols collectively. This is what Martini Klinik [35] and the Santeon network [36] have built. The second lever is the integration of the general practitioner (GP) as a structural partner. Value is created across the full pathway, from the healthy patient to the recovered patient, not just within the hospital walls. Preoperative preparation, postoperative follow-up and rehabilitation at home all rely on a GP who is informed. The GP remains the pivot of care for chronic patients.

Limitations

Several limitations need to be acknowledged. (i) Single-centre design: an observational pilot in a single 85-bed peripheral hospital, three orthopaedic surgeons, 12-month period; the absence of a pre-implementation comparator and control arm, which is consistent with SQUIRE 2.0 [24] for quality improvement work, precludes causal inference. (ii) Low PROMs response rates (31% TKA, 37% THA), below the ISAR 60% benchmark [28], with operator coverage heterogeneity (26.3%–44.4%); this matches the literature, where Cöster et al. report follow-up rates of 32%–88% across five major Swedish orthopaedic registers, only three of which reach the 60% threshold [32]. (iii) Absence of cost analysis: no Time-Driven Activity-Based Costing has been performed; the value denominator is approached only through length of stay and broad MHD-derived cost groupings, which is the largest methodological gap and the next major step.

CONCLUSION & EXECUTIVE SUMMARY

Reforming an existing healthcare system requires convincing decision-makers of the benefits of change. Building consensus on a transformation method that suits all stakeholders is essential.

A “top-down” implementation requires either convincing all stakeholders to change or imposing this change upon them. The alternative “bottom-up” method proposed here involves co-constructing an optimal care pathway for each pathology, measuring indicators across the five dimensions of the framework, validating the results through peer review, and establishing a consensus on the identified non-values.

The Gaussian curve of the value of care per pathology for all hospitals involved, using the top-down method, appears to confirm a flattening of the curve, while eliminating non-value-added activities shifts the curve to the right, confirming the automatic improvement in the system’s value. Tests at CHC Groupe santé Liège validated the feasibility of the process, the relevance of the results obtained, and the buy-in of the stakeholders involved. This also confirmed that the social status of the actors and the management of the human element are essential conditions for success.

And as Elizabeth Teisberg advocated, we “stopped talking and started doing.”

DECLARATIONS

The authors have declared no conflicts of interest. This study is a continuous quality improvement initiative and was not subject to ethics committee review under EU Regulation 536/2014. All data were processed in compliance with EU GDPR (Regulation 2016/679). Patient information and voluntary participation in PROMs/PREMs collection are described in the patient welcome booklet and hospitalisation pathway.

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