Engineering Value-Based Healthcare: From Patient-Generated Data to Dynamic Decision Support

- Tamara Alabbadi

FACTS & FIGURES

Start date:	1 December 2023
End date:	30 November 2028
IHI funding:	10 313 760 €
Industry in kind:	8 446 040 €
Total Cost:	18 759 800 €
Project website:	www.ihi-improve.eu
Social media:	linkedin.com/showcase/ihi-improve

CHALLENGE

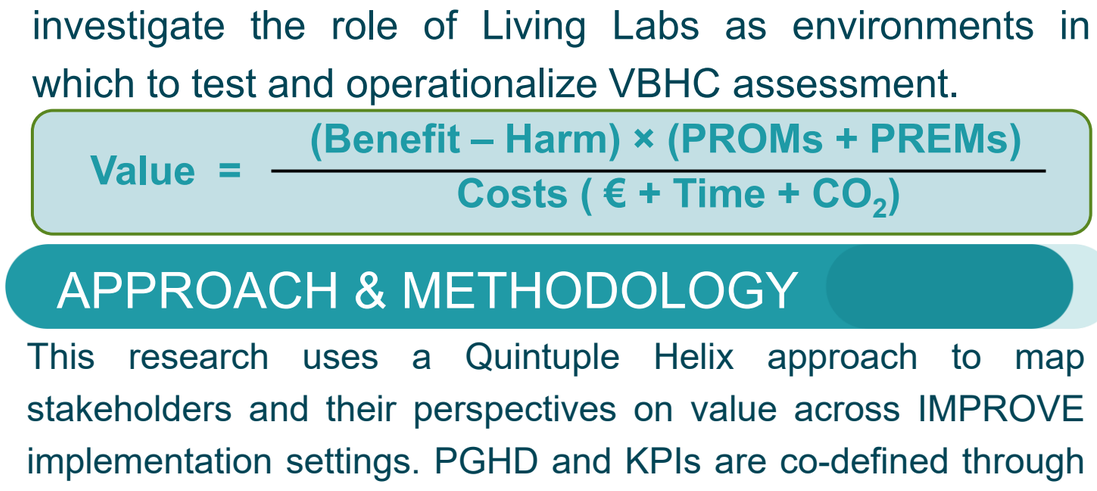
The Value-Based Healthcare (VBHC) paradigm assesses care by relating outcomes and costs while incorporating patients' perspectives and experiences. However, Europe still lacks a standardized and scalable approach to operationalize this assessment in real-world settings. IMPROVE explores how Patient-Generated Health Data (PGHD) can support sustainable implementation of VBHC. This real-world challenge motivates my PhD in Biomedical Engineering at Universidad Politécnica de Madrid, where I investigate the role of Living Labs as environments in which to test and operationalize VBHC assessment.

$$\text{Value} = \frac{(\text{Benefit} - \text{Harm}) \times (\text{PROMs} + \text{PREMs})}{\text{Costs}\ (€ + \text{Time} + CO_2)}$$

APPROACH & METHODOLOGY

This research uses a Quintuple Helix approach to map stakeholders and their perspectives on value across IMPROVE implementation settings. PGHD and KPIs are co-defined through Living Lab workshops, combining stakeholder perspectives with biomedical knowledge and process modelling to dynamically adapt the value equation. These measures are then embedded into care pathways and formally modelled and digitalized in the Clinical Knowledge Platform (CKP, Dedalus), creating a value-based decision support system based on a shared interoperable data model supporting FHIR and openEHR standards.

1 · VALUE MAPPED WITH FIVE ACTORS



2 · MEASURES AGREED IN WORKSHOPS

PGHD to assess VBHC

PROMs · PREMs · PPIs · € · Time · CO_2

Three levels of KPIs
- Project overall
- UC common
- UC-related

3 · Clinical guidelines and protocols
Clinical guidelines, protocols and scientific evidence

4 · Patient pathway process modelling
9 UCs, a measure at each step

5 · Clinical Knowledge Platform CKP
A guided digital protocol implementing VBHC

PROMs: patient-reported outcome measures · PREMs: patient-reported experience measures
PPI: patient preference information · CO_2: carbon footprint of care
FHIR: Fast Healthcare Interoperability Resources
·openEHR: open standard for electronic health records

RESULTS

1 · WHO VALUE IS DEFINED BY

Clinician & Patient · Academia · Health system · Industry · Environment

VALUE is defined by each actor according to what matters to them

2 · HOW VALUE IS MEASURED AND IT'S IMPACT

Guideline adherence	Timeliness across pathway	Patient-reported outcomes	Outcome to cost
clinical pathway deviation	Time to disease control	PROMs, PREMs, PPIs	cost per treatment, carbon footprint
better informed decisions	earlier time to effective care	care that matches patient preference	resources where they add most value

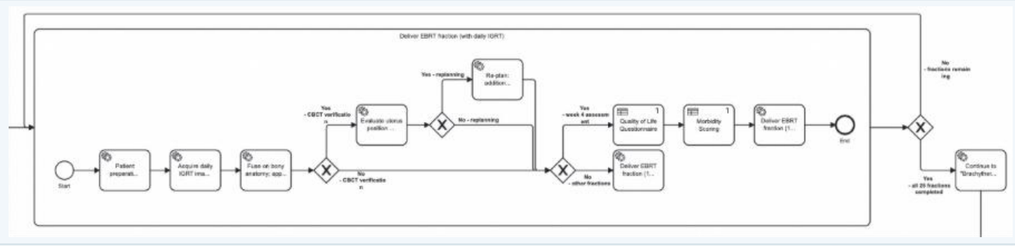
3 · WHAT MADE THIS POSSIBLE

9 protocols **25+** guidelines **489** papers → Building on an established evidence and knowledge base to advance VBHC research and implementation.

4 · PATIENT PATHWAY FROM THE CLINICAL GUIDELINES (cervical cancer UC)

Prevention & screening	Diagnosis & staging	Therapy decision	Therapy	Follow-up
Smear test	Oncology centre	MDT decision	Surgery	Assessment
Gynaecologist	MRI, CT, PET-CT		Radiotherapy	Monitoring
Colposcopy	Pathology		Chemotherapy	

5 · THE SAME PATHWAY AS A DIGITAL CLINICAL PROTOCOL

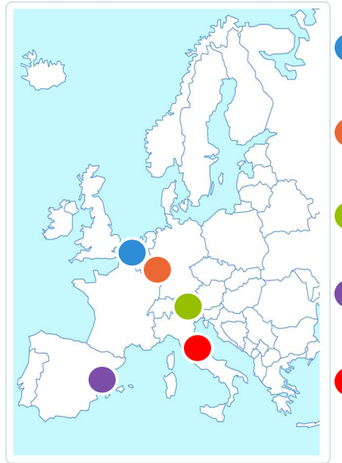


VALUE OF IHI COLLABORATION

WHY PUBLIC–PRIVATE COLLABORATION?

Bringing these sectors together enabled the operationalization and testing of VBHC: clinical sites provided real-world care and patient-generated health data; academia provided evidence; industry contributed specialized expertise in digitalization, devices, medicines, modelling and KPI design; while ethics, data protection and communication supported effective implementation.

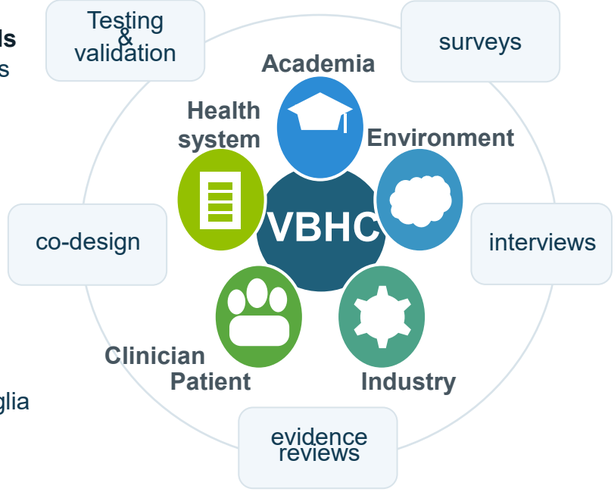
WHAT THE COLLABORATION BRINGS



- **Netherlands** NKI · Philips
- **Germany** UDUS Düsseldorf Better
- **Slovenia** GH Celje Better
- **Spain** VHIR Medtronic
- **Italy** AReSS Puglia Dedalus

26 partners · 10 countries

VALUE WAS DEFINED TOGETHER



FIELDS I WOULD NOT OTHERWISE HAVE WORKED WITH

- **Healthcare innovation** which outcomes count when a new solution reaches care
- **Service management research** how care services are designed and organized
- **Health systems research** how systems work, and which rules shape implementation
- **Public health research** evidence-based research to improve population health
- **Communication and cognition** involving stakeholders, running workshops
- **AI and data science** AI-assisted screening for systematic reviews

CAREER IMPACT

CAREER PATH

How can VBHC be implemented? → Learning the ecosystem → Designing the measures → Building the tools → Value feeding real decisions

WHAT THE PARTNERSHIP TAUGHT ME

Living lab approach
Value cannot be defined from one point of view

Biomedical engineering
Measurement that supports better decisions

Digitalisation
Digital protocols on one data model

SKILLS DEVELOPED

Stakeholder engagement · Co-creation workshops · Guidelines into processes · Requirements into measures · Cross-sector partnership

This project is supported by the Innovative Health Initiative Joint Undertaking and its members.