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# Towards Efficient Value-Based Healthcare Measurement Across Hospital Care Pathways – A Scoping Review

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Abstract. Hospitals widely employ value-based healthcare (VBHC) to effectively manage healthcare quality. VBHC aims to maximize patient outcomes while minimizing costs by using quality measurements. The Dutch Erasmus Medical Centre experiences challenges with the time-consuming efforts to collect, evaluate, and present value-based quality measurements. Using similar VBHC measurement indicators across multiple care pathways could reduce these efforts. This study aims to identify such generic indicators for evaluating and monitoring VBHC across care pathways. A scoping review resulted in 33 articles from which indicators for VBHC measurement were extracted, aggregated and categorized using Donabedian's Structure-Process-Outcome model. The results of this study can inform researchers and VBHC practitioners on generic quality measurement indicators for VBHC management and guide future system development to facilitate the inclusion of standardized quality indicators in healthcare information systems.

Keywords. Value-based Healthcare, VBHC, Quality of Care, Quality Indicators

### 1. Introduction

Value-Based Healthcare (VBHC) has been extensively embraced by hospitals globally as a strategic methodology for effectively managing the quality of healthcare. It aims to achieve optimal patient outcomes while minimizing costs [1]. In order to fully tap into the potential of VBHC, it is crucial to adequately measure and report on the quality of healthcare [2]. The Dutch Erasmus Medical Centre (EMC), like other hospitals, experienced issues due to the time-consuming efforts needed for VBHC measurement [3]. Specifically, for collecting, aggregating, synchronizing and presenting VBHC measurement data for the broad variety of different care pathways. To lower effort, EMC considered using the same VBHC measurement indicators across multiple care pathways. However, which indicators could be used for this goal is not clear. This research therefore aims to identify generic quality indicators for measuring and monitoring VBHC performance across care pathways in hospitals.

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## 2. Methods

A scoping review was conducted on PubMed on June 7, 2023 by following the PRISMA-ScR guidelines [4]. The search query combined MeSH terms 'value-based health care', 'quality indicators, health care', 'outcome assessment, health care' and 'process assessment, health care' with 'performance indicators'. Studies describing hospital performance indicators for multiple care pathways were included. Non-English articles and studies undertaken in non-Western nations were excluded due to their different healthcare systems compared to EMC. After screening and selection by two researchers, indicators were aggregated and classified by using Donabedian's Structure-Process-Outcome model in three sessions with EMC VBHC professionals.

## 3. Results

The PRISMA diagram in Figure 1 provides a summary of the literature research.



Figure	1.	PRISMA-diagram
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Table 1. Generic ind	icator list - per	quality of care	domain (	(Donabedian)

Theme	Indicator (examples <sup>*</sup> ) [reference]			
	Donabedian Quality Domain: Structure (n=11)			
Internal setting (n=5)	<ul> <li>Inventory (volume beds, medication) [5-7]</li> <li>Housekeeping/ appropriateness score (mechanical systems, sanitary) [9,10]</li> <li>Staffing (FTEs/bed, overtime, absence, turnover, internal/external ratio) [5-7,11]</li> <li>Culture &amp; leadership scores (% minority groups, patient safety culture) [12-14]</li> <li>Education &amp; skills (skill mix, training status and investment) [5,6,12,15]</li> </ul>			
Patient (n=4)	<ul> <li>Demographic data (age, case-mix index, social status) [6,9,11,15,17-19]</li> <li>Psychosocial characteristics [19]</li> <li>Medical characteristics (clinical findings, medication type) [12, 15-23]</li> <li>Behavioral characteristics (physical activity, diet, smoking/alcohol) [17,19]</li> </ul>			
External setting (n=2)	-Compliance with laws/regulation (JCI, safety) [10] - Benchmarking and hospital contribution to society) [13,15]			
Donabedian Quality Domain: Process $(n=15)$				

Workflow (n=6)	<ul> <li>Processing time(boarding, time to next appointment) [24,25]</li> <li>Waiting list (first visit within 30 days, admitting process performance) [11-13,26]</li> <li>Turnaround time [10,17,20,21,27,28]</li> <li>Radiology diagnostics (turn-around time) [30]</li> <li>Discharge and bed occupancy (timely discharge rate, bed occupancy rate) [6,12,24]</li> <li>Operating room occupancy[5,10,31]</li> </ul>			
Patient-centered (n=5)	<ul> <li>Patient transfer [9,27]</li> <li>Medication use [20,21,29]</li> <li>Therapy adherence[12]</li> <li>Patient screening related metrics (patient activation, follow up %) [9,15,16,19-21]</li> <li>Education (lifestyle change, counseling) [19,20]</li> </ul>			
Process management (n=4)	<ul> <li>Patient safety indicators (risk falls, risk skin, AHRQ score) [9,14,29,33]</li> <li>Guideline adherence (medication, trauma guideline) [5,6,8-10,15,21,23,27,32]</li> <li>System Standardization Utilization (%missing data, timely notes) [22,23,25]</li> <li>Patient involvement (shared decision making) [16, 19]</li> </ul>			
Donabedian Quality Domain: Outcome (n=19)				
Clinical/functional health status (n=10)	<ul> <li>Patient pain level (scores, visual analog scale)[7,9,16,23,25,27]</li> <li>Vital values (maintained weight, malnutrition score) [12,25,27,29]</li> <li>Mortality (30-day rate, observed/ expected, STAT 5) [5,8,9,14,19,20-23,33,34]</li> <li>Readmission (after day surgery, 48 hours, 30-days) [5,8,9,12,14,18,19,22,23,33]</li> <li>Reoperations [27]</li> <li>Patient reported Quality of Life (disease impact scale) [5,16-19,25,27)</li> <li>Adverse events (falls, complications) [5,6,8,9,12,14-18,20-22,27,29,33]</li> <li>Physical complaints (bleeding, nausea, agitation) [17,35]</li> <li>Complication calls [6, 17, 29]</li> <li>Infections (general or specific, infection scales) [6,8,9,12,14,18,27,33,34]</li> </ul>			
Satisfaction (n=3)	<ul> <li>Employee satisfaction (educational path, overall score) [12,13,22]</li> <li>Patient satisfaction (care rating, hospital rating) [5,6,9,12-14,16,17, 19, 35]</li> <li>Satisfaction with healthcare provider (physician rating) [9,12,19]</li> </ul>			
Operational performance (n=4)	<ul> <li>Clinical productivity (number of interventions) [10-13,16,17,37,21,22,25,26]</li> <li>Number of outpatient visits [12,13,19]</li> <li>Length of stay [5-9,11-14,16,17,20,21,24,30,33,34]</li> <li>Cancellations &amp; delays (postponed procedures) [5,10,24,25,27,31,33,37]</li> </ul>			
Financial per- formance (n=2)	<ul> <li>Cost drivers (expenses per unit, cost per patient day, supply expenses) [9,11,13]</li> <li>Reimbursement/revenue (inpatient/outpatient, per physician, market share) [9,11]</li> </ul>			
*A complete list with all examples from the included articles is available in the study data repository [38].				

From the 33 articles identified in the scoping review, 45 unique indicators were identified and mapped onto Donabedian's model as presented in Table 1. Details on the articles and indicators are available in the study data repository [38].

#### 4. Discussion

The generic indicator list resulting from this study provides a starting point for VBHC practitioners to save time by selecting and implementing a set of quality indicators to be used across multiple care pathways. For instance, while following the approach from Veen et al. (2023) [40] findings of this study can replace the steps related to conducting a literature search. When selecting generic indicators, healthcare professionals' perspectives on indicator relevance should be considered, preferably by conducting a Delphi study, as this method is widely acknowledged as a highly appropriate and effective method for selecting quality indicators in healthcare [39].

Further, VBHC indicator selection depends on data availability and ease of collection. The indicator list therefore is relevant input for system developers to include standardized quality indicators in healthcare information systems. Future studies can examine effectiveness and optimization of generic indicator use. For example, by grouping care pathways like in- and outpatient pathways into clusters that could use similar indicators. Even though further research and analysis is needed before hospitals can use generic VBHC indicators across care pathways, the results of this study provides a solid starting point for selecting a shared set of indicators which can be implemented and used with limited effort to support VBHC management.

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