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UNDERSTANDING VALUE GENERATION ATTRIBUTES OF THE HEALTHCARE BUILT ENVIRONMENT AND SERVICES

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ABSTRACT

Despite value generation in healthcare being a growing research field, simplistic approaches for transforming user requirements into design solutions are often used in project management. Existing knowledge on value generation in healthcare built-environments (HBE) is fragmented and often limited to narrow perspectives. This study proposes an integrated conceptual approach for value generation that considers both the built environment and healthcare services. Through a synthesis of literature, this investigation explores how users perceive different attributes in terms of value generation, as conceptualised in prior empirical studies. Patterns of recurrence, complementarity, and interrelation between the attributes are identified. Additionally, a hierarchical value map from an empirical study was analysed to compare the attributes and verify the applicability of the constructs identified in the literature. This results in an integrated theoretical contribution that combines HBE and service attributes, reinforcing a multidimensional understanding of value as an interconnected construct. Rather than proposing universal constructs applicable to all healthcare facilities, this research acknowledges the context-specific nature of value generation across healthcare units. The findings offer a theoretical contribution for modelling value generation in empirical studies, supporting strategic decision-making in healthcare facility design and management by aligning physical attributes, service demands, and user value.

KEYWORDS

Value, value generation, healthcare-built environment, constructs, informed decision-making.

INTRODUCTION

In healthcare facility design, understanding value generation is challenging, as healthcare services and the built-environment are inherently interdependent (Hammond et al., 2017). The healthcare built-environment plays a central role in its services, while simultaneously depending on multiple variables, including clinical, technical, and user-related aspects (Jallow et al., 2014). Despite several studies addressing built-environment design parameters (Zhang et al., 2019), attributes that explicitly explore its interconnection with services and acknowledge value generation remain understudied.

Different approaches have been used in the literature to explain the relationships between the HBE and services. Accordingly, different authors have adopted distinct concepts towards

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their research objectives, such as *Atmospherics* (Kotler, 1973), *Servicescape* (Bitner, 1992), and *Healthscape* (Hutton & Richardson, 1995). Originating from the concept of *Atmospherics*, the *Servicescape* approach establishes that the physical environment influences users' perceptions of a service (Bitner, 1992). This model identifies three dimensions that influence user perception: ambient conditions, spatial layout and functionality, and signs, symbols, and artefacts. *Healthscape* later emerged as a specific adaptation of this perspective to the healthcare context (Hutton & Richardson, 1995). These three approaches share a common focus on built-environment attributes as contributors to service experience. However, they do not fully explain value generation by connecting attributes to customer values. Many studies identify attributes associated with satisfaction or perceived quality, but often provide limited insight into how attributes translate into value outcomes.

In the literature on value generation, the definition of value remains predominantly tied to clinical outcomes (Zhang et al., 2019). However, a comprehensive understanding of value generation should also incorporate functional, emotional, social, and psychological aspects, thus adopting a multidimensional approach to value (Sánchez-Fernández & Iniesta-Bonillo, 2007). The Means-End Chain (MEC) approach is a conceptual model that facilitates the understanding of user perception by connecting concrete attributes (the means) to abstract values (the ends) (Reynolds & Olson, 2001). This relationship is often represented through a hierarchical value map (HVM), which is a structured ladder that connects different levels of abstraction (attributes, consequences, and values) (Reynolds & Gutman, 1988).

Based on the MEC approach, the laddering method has designed to elicit the underlying reasons why specific attributes are significant to individuals, by using semi-structured interviews (Reynolds & Gutman, 1988). This method captures interviewees' cognitive reactions to identify meaningful associations between attributes and value. Following the interviews, a rigorous coding process is conducted to categorise data according to levels of abstraction and the relationships between them. This analytical workflow is used to generate a visual device that organises these complex associations into a structured network, a Hierarchical Value Map (HVM), which facilitates the understanding of how value is generated within each context (Reynolds & Gutman, 1988).

Although the application of the MEC model in healthcare research is currently limited (Kumar et al., 2020), its conceptual structure offers a suitable approach for integrating built environment and service attributes across the levels of abstraction. Additionally, there is still a lack of integrative approaches that simultaneously relate built environment and service attributes, acknowledging different levels of abstraction and the context-specific nature of value generation within healthcare facilities (Baldissera et al., 2025).

Therefore, this study addresses this gap by synthesising how value-generating attributes of HBE and services have been conceptualised in the literature. Rather than mapping all healthcare services comprehensively, this study adopts service attributes as an analytical lens to more accurately interpret the HBE's value-generating role. Hence, this investigation aims to develop a value generation model for healthcare facilities, based on the literature, that may serve as a point of departure for modelling value generation for healthcare units in specific contexts, thereby supporting design and project management decisions aimed at improving value generation in HBEs.

This paper is organised into five main sections. After establishing the contextualization, research gap and objective in this first section, Section 2 provides a description of the research method. Section 3 presents the main results of a case study, followed by a discussion in Section 4. Lastly, Section 5 presents the research conclusion and explores opportunities for further investigations.

RESEARCH METHOD

Design Science Research (DSR) was the methodological approach adopted in this research study. The artefact devised in this investigation was a value generation model for healthcare facilities, as suggested by Van Aken (2004), the research process was divided into three phases: Comprehension, Development, and Assessment (Figure 1). This process was guided by the research question: "*Which are the main healthcare built-environment and service attributes that contribute to value generation*?".

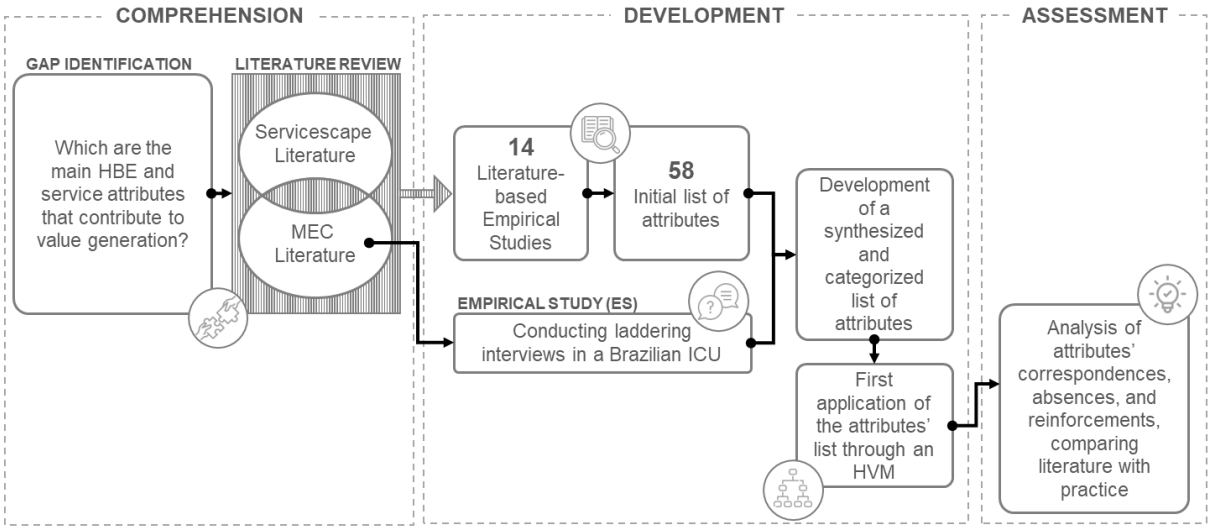

Figure 1: Research design

To understand the main constructs previously explored in the literature, a literature review was conducted in the development phase, focusing on two complementary approaches: Servicescape and the means-end chain. Fourteen papers describing empirical studies were analysed, from which 58 initial attributes were extracted. This synthesis occurred in parallel with a empirical study (ES) conducted in a Brazilian ICU, in which the laddering technique was applied. The final 'synthesized and categorized list of attributes' resulted from the triangulation of these two sources, enabling the identification of context-specific constructs that were not previously pointed out in the literature. This integrated list was then was used to devise a Hierarchical Value Map (HVM). Meanwhile, the higher-level constructs (consequences and values) emerged directly from the primary data gathered during the 38 laddering interviews.

DATASET AND CONSTRUCT EXTRACTION

The literature review was built upon a prior scoping study (Baldissera et al., 2024), which identified fourteen empirical studies that identified relevant built-environment constructs in healthcare from the perspective of services. 58 HBE and service attributes were identified and grouped into 6 dimensions derived from the Servicescape literature (Baldissera et al., 2024). This study extends that analysis by integrating a second theoretical lens, the MEC approach. However, only three studies that developed hierarchical value maps or explicitly established relationships between concrete attributes and abstract values were identified (Kumar et al., 2020). Despite the limited number of empirical studies used to apply MEC in healthcare contexts, the hierarchical value generation map can serve as a starting point for modelling value in specific contexts, grounded in empirical studies.

Table 1 summarizes the key characteristics of the analysed literature, including the theoretical approach, healthcare unit, and sample size. This analysis reveals a predominant focus on identifying attributes through the service-oriented lens, with limited exploration of how these attributes connect to the user values.

Table 1: Summary of the main characteristics identified in the literature

Research	Lit. Approach		Healthcare unit	Sample of interviewees
	Value	Service		
Gruber & Frugone (2011)	x		Primary Care	38 patients
Lee & Lin (2011)	x		Hospital	50 patients
Vassiliadis et al. (2013)	x		Public Outpatient Clinic	83 staff 79 patients
Azila-Gbettor et al. (2013)		x	Public Hospital	233 patients
Pai & Chary (2013)		x	Teaching Hospital	200 patients
Loureiro (2015)		x	Hospital	332 medical tourists
Sahoo & Ghosh (2016)		x	Private Hospital	378 patients
Sreejesh et al. (2016)		x	Corporate Hospitals	320 patients and relatives
Suess & Mody (2018)		x	Hospital	216 patients
Chun & Nam (2019)		x	Public Geriatric Hospital	45 staff
Dcunha et al. (2019)		x	Hospital	200 patients
Hamed, El-Bassiouny & Ternès (2019)		x	Hospital	372 patients
Batra & Taneja (2022)		x	Private Hospital Chain	220 patients
Martens et al. (2022)		x	Maternity Hospital	39 staff and patients

CONSTRUCT DEFINITION AND CLASSIFICATION

Constructs are concepts that constitute the vocabulary of a specific context. However, given the different studies analysed, overlapping terminologies were used. Hence, a process of construct synthesis was conducted to reduce redundancy while preserving meaning. The criteria for construct inclusion followed a three-step synthesis process to ensure a robust and non-redundant list: (i) terminology normalisation to standardise naming conventions; (ii) aggregation of synonyms, achieved by merging constructs with equivalent meanings; and (iii) distinction of adjacent concepts by retaining constructs with different scope or meaning.

The final list of constructs was then categorized into three sub-levels of attributes, based on the MEC conceptual model (Baldissera et al, 2025; Reynolds & Gutman, 1988):

- **HBE attributes**: the building itself, the physical and spatial characteristics of the facility, its individual elements (e.g., furniture, spaces), and their characteristics (e.g., texture, colour).
- **Service attributes**: operational and interactional characteristics experienced by users during healthcare delivery; and

- **Abstract constructs**: more intangible and interpretive characteristics, with descriptions that go beyond their physical and operational properties.

This classification of attributes enables a clear distinction between constructs related to HBE and services, and explicitly articulates the relationships and connections that can emerge in value generation modelling. This classification was applied in an empirical study through a hierarchical value map (HVM), serving as a practical application of the attribute list and allowing for comparison between the literature and an empirical study.

EMPIRICAL STUDY

To illustrate the application of an attribute list in value modelling, an empirical study was conducted in an Intensive Care Unit (ICU) of a Brazilian hospital. This allowed for a comparison of how the attributes identified in the literature manifest in a real-world context and which ones can be regarded as basic or contextual. This empirical study was an output of a broader research project that proposed a method for modelling value generation that combines the laddering technique from the Means-End Chain approach with triangulation of other data sources (design documents, interviews, observations) (Baldissera et al., 2025). A total of 38 soft-laddering interviews were conducted with a diverse group of users, including medical staff and patients' families, to capture a wide spectrum of value perceptions.

RESULTS

While previous studies identify a wide range of constructs associated with user experience and perceived quality, they often mix different types of constructs, without clearly articulating how value is generated across those levels. A multi-layered classification of constructs was adopted in this investigation, grounded in the MEC levels of abstraction (Gengler & Reynolds, 1995), in order to address the conceptual fragmentation that exists in value generation research in the healthcare sector. The attributes were synthesised into the three categories previously defined in the Research Method section.

Therefore, the identified constructs were organised into three distinct tables: HBE Attributes (Table 2), Abstract Attributes (Table 3), and Service Attributes (Table 4). These tables provide general definitions and organize the constructs employed in different categories. Constructs were also related to the research field in which they were identified (value generation or healthcare services).

The categorization of attributes into three distinct sub-levels of abstraction revealed a noteworthy pattern: service attributes are more frequently cited in MEC-focused studies. In contrast, HBE attributes are predominantly derived from the service literature. Abstract values, however, feature across both research fields.

Table 2: HBE attributes

Construct	Brief description	Source	
		Value	Service
Amenities	Features that provide positive distraction and comfort.	✓	✓
Equipment and Resources	Clinical equipment and technological resources.	✓	✓
Assistance Area	Spaces where core patient care activities occur, including assessment, triage, treatment and clinical support.	✓	✓
Décor	Decorative elements and interior design style.	✓	x
Different Access Points	Multiple entrances and exits designed for specific user profiles.	✓	x
Accessibility	Environment that complies with accessibility standards, allowing unobstructed movement for all users.	x	✓
Support and Administration	Spaces dedicated to administrative activities and staff work.	x	✓
External Area	Elements that form the building façade and its integration with the surrounding environment.	x	✓
Restrooms	Sanitary facilities for different user groups.	x	✓
Dimension	Appropriate sizing of spaces.	x	✓
Space for Companion	Area designated for family members or companions during their stay.	x	✓
Parking	Areas providing vehicle and bicycle parking.	x	✓
Windows	Openings providing contact with the exterior.	x	✓
Furniture	Essential furnishings required to support planned activities.	x	✓
Reception and Waiting Area	Space where end users are welcomed, registered and accommodated while waiting.	x	✓
Signage	Orientation system to assist users with location and movement throughout the facility.	x	✓

Table 3: Abstract attributes

Construct	Brief description	Source	
		Value	Service
Environmental conditions	Physical environmental parameters such as air-conditioning, acoustics, lighting, temperature, air quality, noise, music, odour and humidity.	✓	✓
Aesthetics	Visual attractiveness of the environment and staff appearance.	✓	✓
Layout	Spatial organisation.	✓	✓
Maintenance and hygiene	Condition of cleanliness, sanitation and upkeep facilities.	✓	✓
Organisation and control	Structuring and coordination of human, material and technological resources.	✓	✓
Sustainability	Practices and materials that minimise environmental impact.	✓	✓
Staff profile	Individual characteristics and behaviours of team members.	✓	x
Hospital profile	Institutional characteristics.	✓	x
Patient profile	Demographic, clinical and social characteristics of patients.	✓	x
Family experience	Possibility for relatives or companion to remain close to the patient during care and throughout visiting periods.	x	✓
Flexibility	Capacity of the built environment to adapt to different use scenarios, processes and demands.	x	✓
Number of patients	Quantity of patients being attended to, including capacity and occupancy.	x	✓

Table 4: Service attributes

Construct	Brief description	Source	
		Value	Service
Scheduling	Process of booking and organising appointments, examinations or procedures.	✓	x
Clinical Care	Set of activities that constitute patient care.	✓	x
Waiting	Period during which the user waits for the next stage of care.	✓	x
Reception	Point at which patients are welcomed, registered, given initial guidance, and provided with initial guidance.	✓	x
Training	Continuous professional development to enhance competencies.	✓	x
Community service	Initiatives addressing local community needs through healthcare, education and disease prevention.	x	✓

Based on the analysis of constructs derived from the literature, different attributes and relationships were observed in the empirical study. To define the HVM attributes, the constructs listed in tables 2, 3, and 4 were used as a baseline to ensure consistency with the literature. Figure 1 illustrates the final hierarchical value map generated for the empirical study, comprising 42 constructs - 18 of those constructs can be classified as attributes. This structured approach enabled an analysis of correspondences, absences, and reinforcements, highlighting the logic of attribute classification in practice. While lower-level constructs (attributes) largely reflect the literature-based constructs, the higher-level ones (consequences and value) represent empirical findings unique to the ICU context.

Beyond the ICU's central role of clinical care, which is directly linked to the HBE attribute 'Assistance Area', the staff's responses also addressed the service attribute 'break', connected to 'Support and Administrative Areas'. This highlights the interdependence between the physical space and specific activities: the facility supports the performance of these activities while simultaneously influencing the interviewees' responses. When a service activity was mentioned, perceptions regarding the HBE naturally emerged. Similarly, if a response began with perceptions of the HBE, service-related information was used to justify those perceptions, demonstrating how spatial and service constructs are inextricably linked in value generation.

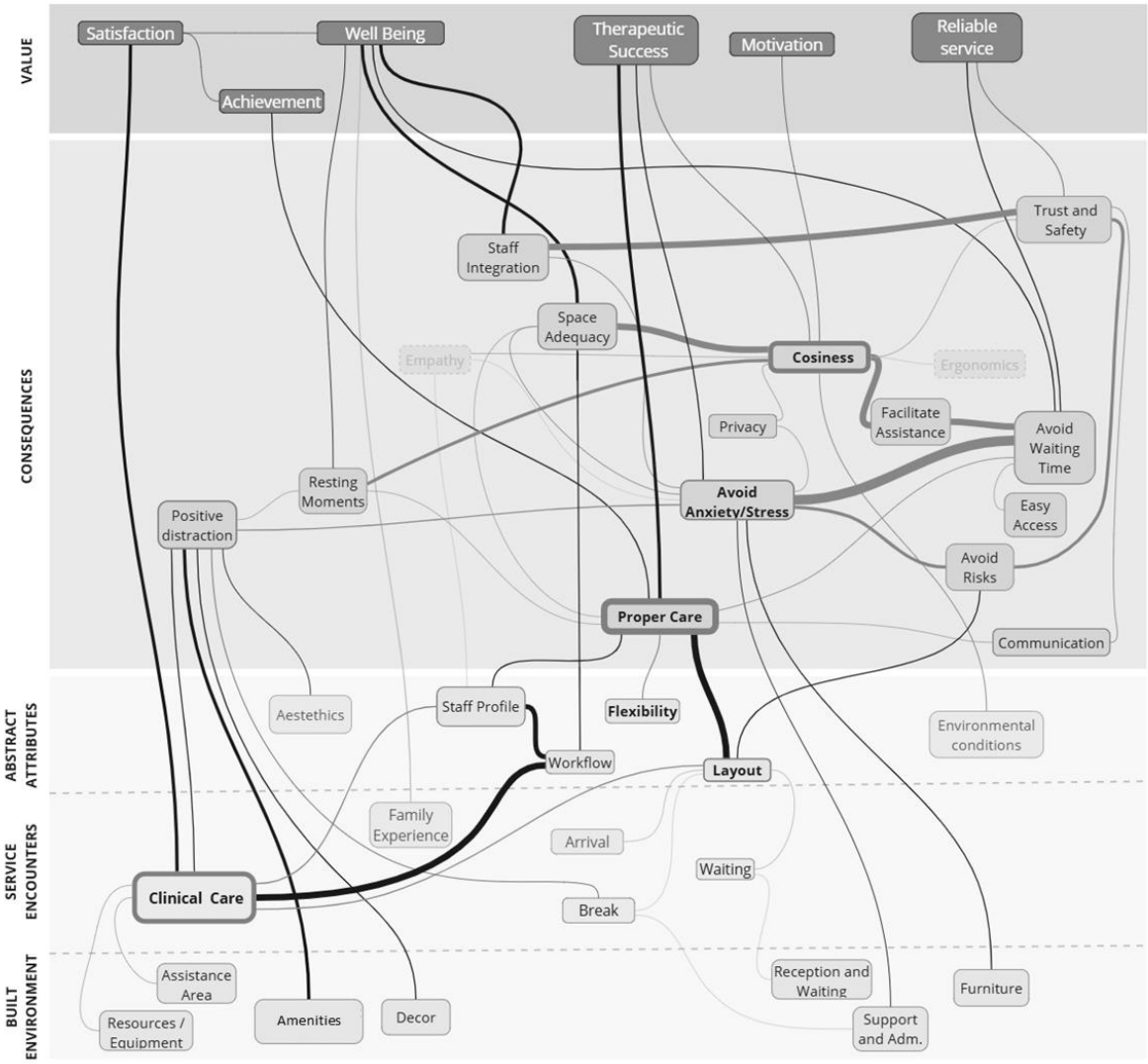

Figure 2: Hierarchical value map from the empirical study in an ICU

DISCUSSION

This research study has identified patterns of recurrence and omission across research studies, suggesting that attributes play different roles in value generation. The findings confirm that no universal list of attributes exists for HBEs. Instead, they can be distinguished into attributes that function as basic conditions for a user experience within a given healthcare service, and others that are highly context-dependent, becoming relevant only under specific conditions.

Attributes that show high recurrence, are frequently mentioned across multiple studies, indicating a broad agreement in the literature. Lighting and sound/noise (environmental conditions), for example, are mentioned in 13 out of 14 studies. By contrast, attributes with low recurrence or omission are typically associated with context-specific characteristics of specific facilities. To illustrate, it is possible to compare two of the analysed research studies: some emerging attributes of a geriatric long-term care hospital (Chun & Nam, 2019) differ from those of a maternity ward (Martens et al., 2022). Privacy, for instance, was one of the most discussed constructs for maternity wards, due to patients' concerns regarding exposure during childbirth. (Martens et al., 2022) However, despite mentioned, it was not a prominent concern for elderly patients in the long-term care study (Chun & Nam, 2019). Meanwhile, the community

dimension was highly emphasized for the geriatric context, reflecting the importance of the continuum of care, whereas it was absent in the maternity ward study, due to the shorter nature of the inpatient stay.

Therefore, this investigation has identified patterns that suggest that attributes play distinct roles in value generation, which may be categorised as **basic** or **contextual**. Basic attributes represent the minimum expected conditions for functionality and user acceptability. Although they are not always explicitly reported as value-generating, they stabilise the experience by preventing negative perceptions, since their absence or failure is often noted as a weakness. Meanwhile, contextual attributes act as catalysts for value, they represent opportunities for differentiation, improving value generation for a specific type of facility. However, when a contextual attribute is not relevant to a given care context, its absence is not necessarily considered a threat to value generation. Thus, basic and contextual attributes should be understood as categories for the attributes, defined by their role within a specific care context rather than by their level of abstraction.

Within the HVM, the abstract attribute "environmental conditions" was pointed out in the literature. By contrast, the service constructs ‘Clinical Care’ and 'Family Experience' emerged as context-specific reinforcements. 'Clinical Care' was considered as a fundamental construct in the empirical study (evidenced by its visual prominence in the HVM). Similarly, 'Family Experience' was mentioned as essential for the recovery process and stakeholder reassurance. This analysis demonstrates the applicability of the attribute list derived from the literature and its use as an analytical tool for interpreting real healthcare contexts. Furthermore, it indicates that omissions in the literature arise not only from contextual specificity but also from methodological prioritization: some previous studies only considered the perspective of a single user, inevitably limiting the range of attributes considered.

CONCLUSION

This paper provides a theoretical contribution on the categorization of constructs related to value generation of healthcare facilities, offering an integrated perspective on built-environment and services. Additionally, this research emphasises the importance of considering healthcare service attributes in the evaluation of HBE. By acknowledging that users experience the HBE has a close interaction with service encounters, it is reinforced that value generation in healthcare cannot be fully understood based only on spatial or physical attributes alone.

Another significant outcome of this approach is the distinction between 'basic' and 'contextual' attributes. This categorization suggests that while a set of attributes may be common across multiple healthcare facilities, value generation is highly sensitive to the context specificities of each unit, necessitating empirical validation.

As a practical contribution, the identified constructs offer concrete implications for healthcare design and project management practice. These implications can guide decision-makers in prioritizing interventions that generate value, as exemplified in the HVM from the empirical study.

The next steps for this ongoing research include the development of this proposal for categorizing attributes, with the possibility of investigating the contextual adaptations of these constructs in greater depth. This will require an analysis of the relevance and variation of each category in different types of healthcare units.

An important limitation of this investigation is that the empirical study was limited to a single healthcare unit in Brazil and sample. Therefore, the 'context-specific' constructs identified may vary across different healthcare systems, cultural settings, or medical specialties.

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