


## ORIGINAL ARTICLE

**ENVIRONMENTAL FACTORS IN MONITORING  
HOSPITAL CARE EFFECTIVENESS INDICATORS\*****HIGHLIGHTS**

1. Hospital indicators are essential to safety and patient-centered care.
2. Monitoring indicators reveals relevant quality management practices.
3. Indicates factors favoring the monitoring of effectiveness indicators.

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**Objective:** To identify environmental factors that favor monitoring care effectiveness indicators in the dimensions of safety and patient-centered care in hospitals. **Method:** Qualitative research with multiple cases study, carried out in three hospitals in south Brazil, involving 58 participants. Data was collected between June 2020 and December 2021 through questionnaires, interviews, focus groups, and institutional documents subjected to categorical content analysis. **Results:** The following categories were identified: internal and external environmental factors; and subcategories: convergent and non-convergent, namely: internal convergent - strategic planning and management support for quality management, information systems, and institutional strategies, methods and procedures; internal non-convergent: public teaching hospital; and external convergent - public policies and epidemiological factors; and non-convergent - accrediting agency and hospital network. **Conclusion:** Factors favoring the monitoring of effectiveness indicators were found in the dimensions considered, which elucidate good quality management practices that are useful and relevant to Brazilian hospitals.

**KEYWORDS:** Quality Indicators, Healthcare; Health Quality Management; Outcome Assessment (Health Care); Hospital Services; Case Study.

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## INTRODUCTION

Internal and external environmental factors directly affect a hospital's production process and, consequently, its results. Effectiveness indicators measure the impact of desirable or undesirable changes attributed to healthcare<sup>1</sup>.

Patient safety indicators reflect the quality of care<sup>2</sup> and the organizational effort to create and maintain safe environments. Patient-centered care indicators measure how well the hospital responds to people's needs and expectations and make them the core of care<sup>3</sup>.

There is a lack of studies that include effectiveness indicators in the dimensions of quality<sup>2</sup>. Getting to know hospitals recognized for successful institutional efforts in favor of quality monitors and indicators of care effectiveness. It provides essential information for public and private hospitals' quality management and patient safety.

Quality management guarantees hospital services' safety, effectiveness, and efficiency. It involves choosing indicators that justify the need to carry out continuous improvement cycles to achieve excellence in healthcare.

The aim was to identify environmental factors that favor monitoring care effectiveness indicators in the dimensions of safety and patient-centered care in hospitals.

## METHOD

Qualitative research with partial thesis results<sup>4</sup>, developed according to the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist<sup>5</sup>.

The procedural method was the multiple cases study, whose stages of defining, designing, preparing, collecting, and analyzing were adapted from Yin<sup>6</sup>. In the third stage of analysis and conclusion, categorical thematic analysis was carried out<sup>7</sup>.

For Stage 1 - define and design, three hospitals were selected from a list in the southern region of Brazil that met at least six of the seven criteria: 1. Performing surgical care; 2. Be a reference in one or more specialties for the SUS; 3. Serving three or more specialties; 4. Have one or more adult ICUs; 5. High complexity care; 6. To be a teaching hospital; 7. To be accredited at a level of excellence. The hospitals were coded as H1, H2, H3.

The first participants from each hospital were nominated by their respective management, and they selected others according to the Snowball Technique. Inclusion criteria were: age over 18, working at the hospital for more than six months; exclusion: absence due to leave, vacation, or other reasons during the data collection period. Fifty-eight professionals took part (18 from H1, 30 from H2, ten from H3), 13 from the strategic level, 16 from the tactical level, and 29 from the operational level, individually coded by the letter P and the number corresponding to the order in which they signed the ICF.

In Stage 2 - prepare, collect, and analyze, data was collected between June/2020 and December/2022: 144 self-administered online questionnaires (Q); 19 interviews, 12 of which were face-to-face (E) and seven by videoconference (V); three focus groups (FG); as well as information from four structured surveys on websites (SS); 35 documents provided by managers (D); 19 technical visits (TV); six meetings to demonstrate information systems; 120 pages of field diaries were typed up; 349 pages of transcripts of interviews, videoconferences and focus groups.

The indicators of care effectiveness in the dimensions of patient safety and patient-centered care in this study were those validated by Seiffert<sup>8</sup>. In theory, they were those in which the Delphi Technique was applied, through which nursing care effectiveness indicators in the safety dimension were evaluated by a panel of experts, considering the correspondence of each one of them to desirable attributes, based on related literature: namely: "availability, reliability, simplicity, representativeness, sensitivity, comprehensiveness, objectivity, low cost, usefulness, stability and timeliness"<sup>8,9</sup>.

In Stage 3 - analysis and conclusion, categorical content analysis<sup>7</sup> was carried out employing pre-analysis, material exploration, and treatment of the data obtained, with the support of NVivo® software, version Release 1.3 (535) for coding, categorizing, filtering, searching, and questioning the data.

It should be noted that construct validity tests and case conclusions were carried out separately. At least three validation stages were used with the participants, individually and in the focus group, with multiple data sources, allowing several facets to be explored<sup>10</sup>. In each hospital, a focus group finalized the data collection to validate, complement, and correct the respective individual reports with data compiled from the sources and procedures.

The study was approved by the Ethics and Research Committees of the proposing institution (Opinion No. 3.598.996) and the co-participating institutions (which issued three other approval opinions).

## RESULTS

The data characterizing the general environment of hospitals H1, H2, and H3 are described together, highlighting their similarities and differences.

Hospital H2 is a public hospital with the capacity to operate more than 500 beds, and the others are large, so their structure and productivity differ. Although they all belong to the Unified Health System (SUS), H1 and H3 are part of the Supplementary Health System, which has an interface with the SUS. All of them are highly complex hospitals, with Intensive Care Units (ICU), surgical admissions, Emergency Departments, and more than 45 medical specialties.

H1 is the most complex hospital in the far-western region of the state of Paraná and a regional reference for high-risk pregnancies, cardiology, oncology, and neonatology. H2 is the largest and most complex hospital in the state and a reference for the SUS in several specialties: high-risk pregnancy, obstetric emergency, chest pain, stroke, victims of sexual violence, and internationally for bone marrow transplantation, neonatology, hemato-oncology, adult and child neurology, and bariatric surgery. H3 is a reference for the Vale do Itajaí in cardiology, psychiatry, adult and pediatric cardiac surgery, oncology, pediatric clinical hospitalization, adult, pediatric, and neonatal intensive care. It belongs to the Sentinel Hospitals Network.

H2 is a teaching hospital, and although it once had level 1 National Accreditation certification from the ONA, it does not currently have hospital accreditation certification. H1 and H3 are accredited by the National Accreditation Organization (ONA), level 3 (of excellence), and H3 is also accredited by the *Joint Commission Accreditation* (JCI). ONA Level 3 certification requires proof of the hospital's managerial maturity, mediated by rational strategies strictly aligned with continuously evaluated results.

All three hospitals have a history of striving for certification, investing in structure and processes, and pursuing improvement cycles. The sector responsible for quality in all three is at the strategic level and has hospital information systems with specific modules for monitoring quality indicators. Hospitals H1, H2, and H3 monitor the indicators listed in Chart 1, validated by Seffert<sup>8,9</sup>.

**Chart 1** - Care effectiveness indicators monitored in the patient safety dimension of patient-centered care in hospitals H1, H2, and H3. Curitiba, PR, Brazil, 2022.

| <b>Patient Safety Dimension</b>  | <b>H1</b>      | <b>H2</b> | <b>H3</b>      |
|--|----------------|-----------|----------------|
| I.1 Surgery in the wrong place on the patient's body.  | X              | X         | X <sup>1</sup> |
| I.2 Surgery performed on the wrong patient.  | X              | X         | X <sup>1</sup> |
| I.3 Foreign material left in the body during a procedure.  | X              | X         | X <sup>1</sup> |
| I.4 Postoperative wound dehiscence.  | X              | ---       | X <sup>1</sup> |
| I.5 Pulmonary embolism or post-operative deep vein thrombosis.   | X              | ---       | X <sup>2</sup> |
| I.6 Hip fractures due to falls in hospitalized patients.   | ---            | ---       | ---            |
| I.7 Post-operative hip fractures due to falls in hospitalized patients.                                    | ---            | ---       | ---            |
| I.8 Serious incidents related to equipment.  | X              | X         | X <sup>3</sup> |
| I.9 Incidents due to faulty patient identification.  | X              | X         | X              |
| I.10 Post-operative hemorrhage or hematoma in major surgery.   | ---            | ---       | X <sup>1</sup> |
| I.11 Surgical site infection in clean surgeries.   | X              | X         | X              |
| I.12 Falls with harm in hospitalized patients.   | X              | ---       | X <sup>4</sup> |
| I.13 Pressure injuries.  | X <sup>5</sup> | X         | X              |
| I.14 Density of primary bloodstream infection in patients using a central venous catheter in an adult ICU. | X              | X         | X              |
| I.15 Density of Urinary Tract Infection associated with indwelling bladder catheters in ICU patients.      | X              | X         | X              |
| I.16 Transfusion reaction grades II, III, and IV.  | X              | X         | X <sup>6</sup> |
| I.17 Hemolytic reactions due to blood incompatibility.   | X              | X         | X <sup>6</sup> |
| <b>Patient-Centered Care Dimension</b>   |                |           |                |
| I.18 Patient satisfaction.   | X              | X         | X              |
| I.19 Surgeries canceled on the scheduled day.  | X              | X         | ---            |
| I.20 Recommendation of the hospital by the patient.  | X              | X         | X <sup>7</sup> |
| I.21 Patient involvement in their care.  | ---            | ---       | ---            |

Source: Survey data (2022).

Caption:

X<sup>1</sup> Not individually monitored. The incident is part of the composite indicator of adverse events in the Surgical Center.

X<sup>2</sup> Monitored to evaluate the effectiveness of the institutional Protocol for preventing VTE/TEP in hospitalized patients.

--- Not systematically monitored, as information on degrees of damage is not always available. Difficulties include the unavailability of information and records on the degree of damage and the consequences of the incident.

X<sup>3</sup> Not monitored individually. Serious equipment-related incidents are rare, and when they do occur, they form part of the composite indicator of sentinel serious adverse events.

X<sup>4</sup> Monitors the indicator of "patient falls" and "injuries due to falls".

X<sup>5</sup> The pressure injury indicator is not monitored, but the rate of effectiveness of the Pressure Prevention Protocol.

X<sup>6</sup> Not monitored as a specific indicator because it is rare. Incidents are monitored within the "transfusion reaction grades II, III, and IV" indicator.

X<sup>7</sup> Not monitored as a specific indicator because it is rare. Incidents are monitored within the "transfusion reaction grades II, III, and IV" indicator.

The factors in the internal environment of the three hospitals that the participants considered to be conducive to monitoring the indicators considered in this study were organized into two categories: internal and external factors, and two subcategories each: **Convergent internal factors** - strategic planning and management support for quality management, information systems, and institutional strategies, methods and procedures; non-convergent: public teaching hospital. **Convergent external environmental factors** - public policies and epidemiological factors; non-convergent - accrediting agency and hospital network.

In particular, **hospital management support** is essential for the indicators; [...] it provides the conditions to implement them, and managers are committed to measuring them, monitoring them, and correcting any deviations in performance detected (Q.P13.H2). Above all, Management [...] guides and aligns with the institution's strategy and monitors the strategic indicators, especially when reviewing and drawing up the Strategic Plan (Q.P2.H1).

The **information systems (IS)**, in which the [...] basis for recording the indicators is built, the formula, the parameters, everything is in software [...] (V.P2.H1), allowing monitoring of [...] the hospital's strategic objectives, analysis of critical factors, monitoring of action plans, periodic evaluation of results, management reports and visual management charts (FG.H1).

Different **strategies, methods, and procedures** contribute to the monitoring of indicators, such as the Lean Methodology, which enables [...] understanding and organization of the main processes (Q.P10.H3); and Mapping, which enables [...] understanding of processes, suppression or simplification of those that require changes, and [...] systematized rethinking of practice, as well as improvement of services (FG.H1). All three hospitals have Risk Management with an emphasis on adverse events and sentinel events (never events), with incident notifications, an active search of medical records, phoned search after discharge, review of randomized medical records, use of the Trigger tool, process management reports, notifications, root cause analysis, and audits.

Those responsible for monitoring each indicator (H1 and H2) and groups of representatives from different units (H3) are defined. Monitoring care effectiveness indicators in hospital information systems aligns with the actions and targets in the Patient Safety Plan, such as patient safety protocols, hemovigilance, and technovigilance. Although they carry out activities aimed at patient-centered care, the only measurement of indicators in this dimension comes from patient satisfaction surveys (H1, H2, H3).

There is a schedule of meetings to monitor the indicators. At H2, there are meetings of the PSC, the Quality Committee (Internal Quality Groups of the care and administrative units), the Hospital Infection Control Commission, and the Transfusion Committee. At H1, there are Gambas; [...] the Director and the quality area and department and division managers discuss the indicators for that specific area (V.P10.H1; FG.H1).

The nature of a **public teaching hospital** influences the monitoring of indicators, while [...] the demands of the care network of a highly complex, large hospital are diverse; [...] its operations are exclusively for the SUS, under contract with the municipal manager, an agreement that defines the care outcome indicators that will monitor care (Q.P13.H2), and the [...] most evaluated are from the contract with the Manager, with the Secretariat, which involves quantitative and qualitative, for example, a timely response from the ombudsman, PSC meetings [...] how much I produce, attend new consultations, perform procedures [...] the hospital's financial sustainability (FG.H2).



## Factors and actors in the external operating environment

In compliance with **public policies** on patient safety and patient-centered care, the hospitals have a structured PSC and risk management; they are part of the Health Surveillance Sentinel Network, meeting the demands of regulatory bodies such as the National Health Surveillance Agency (ANVISA) and the State Health Department, which [...] *monitor, follow up and even analyze the institution according to the results (V.P2.H1); [...] there are indicators required by specific legislation (E.P17.H1).*

Regarding **epidemiological factors**, the COVID-19 pandemic has brought adaptations and consequences to hospitals, which have seen a significant revenue reduction, impacting eligibility and monitoring some care effectiveness indicators (H1, H3). H2 exposed the difficulty of following the targets agreed in the annual planning, given the drastic and rapid changes imposed: [...] *a pandemic comes, everything that was planned, in the budget part, couldn't be done, a contract was signed, a budget plan [...]* (E.P23.H2).

The pandemic has made it difficult to monitor indicators due to the reduction in consultations, exams, and elective procedures (V.P10.H1), overcrowding, work overload, and restructuring of the organizational model (FG.H1, FG.H3). There was a loss of [...] *the patient satisfaction survey because the work was directed to screening COVID-19 patients (E.P5.H1; E.P10.H1); [...] some audit indicators were suspended [...] the most important thing was that people attended to patients [...]* (FG.H3).

In preparing a hospital for an accreditation assessment, **Accreditation Agencies** recommend the adoption of indicators such as those relating to safety protocols (Q.P2.H1). But [...] *ONA and JCI don't oblige you to monitor indicators [...] they say you have to measure the targets. The hospital says which indicator to monitor [...]* (FG.H3). The accreditation process has an educational character that fosters organizational maturity, critical thinking, integration between sectors, and a paradigm shift in patient safety (V.P10.H1). Hospitals H1 and H3 corroborate that accrediting agencies improve sustainability, processes, and results, reduce costs, waste, and rework, and encourage benchmarking and competitiveness.

A specific feature of the external operating environment was observed in H2; this, by integrating a hospital management network, is directed towards the adoption of strategic planning that prioritizes a quality management model and management of care and technological risks, a cash management program that suggests to hospitals the eligibility of certain indicators, monitored in a corporate information system.

## DISCUSSION

The hospitals surveyed are in south Brazil and have different sizes, installed capacities, and production processes. They offer services in many medical specialties, and more than one of them is a reference for the SUS. They are highly complex, have an adult ICU, and only H2 performs transplants. They have a hospital infection control service, a patient safety center (PSC), and a quality management and risk management sector, and they monitor indicators of care effectiveness in patient safety and patient-centered care. H1 and H3 are private hospitals accredited at the level of excellence, and H2 is a federal public teaching hospital.

The influence of environmental factors on the eligibility and monitoring of care effectiveness indicators in the quality dimensions surveyed are discussed in categories: internal environment and external operational environment.

Regarding the **actors and factors of the internal environment**, each hospital's institutional strategic planning (SP) includes a decision on monitoring care effectiveness indicators as part of guidelines for quality, effectiveness, and patient value.

It is indisputable that effective senior management involvement is necessary to give planning a strategic character<sup>11</sup>. The hospital's management is responsible for proposing and implementing policies and guidelines and enabling, influencing, and involving employees to achieve the desired objectives.

In the quest for effective monitoring, **Information Systems (IS)** help with information, support decision-making processes, actions, and dissemination in real-time for assertive decision-making and action plans, and allow formulas and parameters to be defined in software and applications. IS makes it possible to know variables in the environment that enable the planning, organization, coordination, and evaluation of protocols and goals for safety and patient-centered care, as well as the mitigation of failures.

However, robust IS is needed to enable decision-making with less uncertainty and action on critical points in hospital systems. The use of apps in healthcare offers benefits over traditional methods, such as providing real-time, portable access to health information services and collecting and storing a wealth of data.

In theory, information systems should be unified. In the SUS example, the same systems, sources of information, and planning are not used. As a result, the system does not fully reflect results and actions, management is fragmented, and inefficiency is generated. Other weaknesses include the poor quality of administrative and partially computerized medical records<sup>12</sup>.

In addition to the IS, institutionalized strategies, methods, and procedures were pointed out by the hospitals as contributing factors to the monitoring of indicators according to their internal conditions, resources, processes, client conditions (epidemiological profile, frequency of incidents), and the influences of the external operational environment.

The fact that the technical sheet for each indicator is included in the IS does not guarantee accessibility for all professionals. Disclosure is essential, as it contains information relevant to correctly monitoring and interpreting the indicator regarding its construction (formula, targets), data collection, and results analysis.

In addition to reporting, hospitals are looking for other methods and procedures to identify safety incidents, expanding the possibility of feeding in data to obtain reliable indicators. Due to the accessibility of the data, the review of clinical files in medical records has been the basis of studies. However, the disadvantages are incomplete documentation, high cost, and retrospective<sup>13</sup>.

Hospitals that adopt reports and demands from studies of Ombudsman indicators for decision-making can optimize results with apparently simple and obvious actions to the customer, but not visible to management<sup>14</sup>. In terms of effectiveness indicators, the work of the Ombudsman's Office has gained ground. However, there is no data on surgeries canceled on the scheduled day for institutional reasons or on the patient's hospital recommendation.

Hospitals should measure and report what matters to people, such as competent care, valuing the user experience, results, and trust<sup>15</sup>. In the private sector, the influence of the political and social context is clear, given the dependence on the resources contracted in health plans, which make it possible for clients to make choices and increase their level of satisfaction and loyalty<sup>16</sup>. Thus, quality and trust are key elements in market competition. The greater the external pressure and competition, the greater the investment in communication strategies and patient-centered care approaches<sup>17</sup>.

The centrality of the patient in care is often emphasized but from a subjective and limited perspective. The proposals for measurements do not go beyond the traditional satisfaction survey<sup>9,15</sup> and the incipient national production related to this topic<sup>9</sup>, as well as on patient engagement in improving hospital effectiveness<sup>18</sup>.

The applicability of care effectiveness indicators is highlighted by the knowledge gained from monitoring them, shared with employees and external clients, as a strategic priority for maturing, growing, and learning. In addition, publicizing these indicators encourages accountability, transparency, quality, and safety at the hospital<sup>19</sup>.

At all three hospitals, the relevance of information on time series relating to monitoring results is highlighted. This is made possible by various reports, graphs, or infographics fixed to units, accessible on information systems, or sent by e-mail and discussed at meetings with members at various levels (strategic, tactical, and operational).

The results of hospital effectiveness indicators can be used by patients, doctors, health professionals, purchasers (e.g., government health departments, private health insurance funders), and the media<sup>20</sup>. Although the three hospitals did not disclose their results to patients, the results obtained must be widely disseminated, encouraging the development of continuous quality improvement cycles.

Factors in the external operational environment, public policies, and, in particular, Anvisa's resolutions on patient safety and patient-centered care do not depend on hospital management's discretion. They must be understood and visible in hospital practices, revealing compliance.

In the hospitals surveyed, the Anvisa resolutions, including the protocols related to patient safety targets, are in place<sup>21</sup>; there is training on risk management and patient safety, as well as using methodologies for planning, monitoring, incident communication, and safety risks.

Another relevant external operational factor was the changes in the **epidemiological profile** of patients treated due to the COVID-19 pandemic, which implied changes in the production mix, eligibility, and monitoring of some indicators of care effectiveness. This put pressure on quality in an attempt to optimize the use of resources. A period of uncertainty and challenges has required management to make dynamic decisions.

Hospital environments are characterized by dynamism and complexity. They face unpredictability and uncertainty because they have little room for error and diverse elements to monitor. In this context, factors that impact the safety and quality of care processes must be considered, such as environmental factors, structure, risks, organizational culture, and national regulations and policies. Therefore, in the face of the COVID-19 pandemic, safety actions have been mobilized to promote the dissemination of strategies and make health systems more resilient to the impact of damage<sup>2</sup>.

The pandemic has primarily affected finances in private hospitals, jeopardizing the business's sustainability and requiring a review of planning<sup>22</sup>; in public hospitals, it has catalyzed the impossibility of following planning.

However, despite the difficulties imposed by the pandemic, short-term benefits in key safety attributes have been adopted, such as transparency, active communication, collaboration, and rapid adoption of patient safety practices.

The work of **Accreditation Agencies** contributes to the monitoring of care effectiveness indicators, providing positive suggestions for practices with good results, as it is a methodology for the external evaluation of hospital quality that determines compliance



according to technical and legal standards<sup>23</sup>. The accreditation process proposes activities such as observations, *feedback*, and self-reflection<sup>24</sup>, and encourages professionals and patients to reduce risks and prevent incidents through process improvement cycles. In addition, the accreditation process can contribute to broad and positive management changes in the hospital. Although it represents an operational external environmental factor that influences the internal environment, the commitment of the hospital's management and staff to improving its structure and processes is noteworthy.

From the same perspective, there are favorable influences when the hospital belongs to a **hospital management network** that prioritizes quality management, a factor in H2's external operating environment. It should be noted that the purposes of federal public hospitals include care (generally of medium and high complexity, with extensive use of technology), teaching, and research. Therefore, improving its management, fostered by a network model that seeks results, achieves goals, controls decisions about work<sup>25</sup>, and encourages the adoption of current and effective management practices, can contribute to the quality of care, patient safety, and the rational use of resources.

The public nature of a **university teaching hospital** brings specificities such as contractualization, through which managers agree on quantitative and qualitative targets for health care and hospital management, controlled by a Monitoring Committee - a process that is a management tool that favors improving the quality of care as it directs the hospital's production mix, the services offered, the clientele served, the resources used and the monitoring of certain quality indicators.

Although it is impossible to generalize results from qualitative research, suggesting a limitation to the study, the results reflect environmental factors common to many Brazilian hospitals. Based on the perspectives, experiences, strategies, methods, and procedures used in the hospitals participating in the research, it can shed light on how hospitals with similar environments manage to choose and monitor indicators.

## FINAL CONSIDERATIONS

Internal factors that influence the monitoring of care effectiveness indicators were identified: institutional strategic planning and management support for quality management; information systems; strategies, methods, and procedures; and the public nature of a university hospital. In the external operating environment, public policies, especially Anvisa, epidemiological factors, accrediting agencies, and integration into the network of hospitals that prioritize quality management were also identified.

The results reveal possibilities for improving quality management and patient safety in monitoring and disseminating hospital indicators. Further studies with a larger number of hospitals are recommended to explore in depth each of the categories identified in this study and explain the influence of the environment on the monitoring of care effectiveness indicators.

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