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## Measuring environmental performance in hospitals: A practical approach

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### ABSTRACT

In hospitals, measuring environmental performance may lead to the reduction of environmental impact of their operations and improve the quality of processes and outcomes. Healthcare services employ a significant amount of hazardous and non-hazardous materials and produce polluting outputs. New frameworks are necessary to define relevant and meaningful indicators for monitoring and assessing environmental performance if healthcare systems and operations are to be improved. The literature review highlights concerns on the lack of strategic focus of performance indicators, relevance and robustness of metrics and difficulties for the deployment of measures within different hierarchical levels. Field studies conducted with 10 hospitals in the Southern region of Brazil underlined the scarcity of consistent frameworks applied in practice to measure, monitor, improve and report environmental performance. Considering this context, the study seeks to propose an alternative framework drawn from the review of literature, current legislation and feedback from field research. The proposed framework is operationalized through a 'process approach' and evaluated in terms of feasibility, usability and utility. Six case studies were conducted to test the applicability of the proposed approach. The framework was evaluated as 'Good' and 'Very Good'. Some of the advantages of the approach according to participants are: a) the framework and process make a significant contribution to practice, since they represent meaningful guidance for the formalization of strategies, goal setting and environmental assessment and monitoring; b) the approach is associated with a number of 'softer' outcomes related to the enhancement of communication and awareness of environmental issues, focus on environmental performance and continuous improvement initiatives; c) the framework facilitates the adjustment of hospitals to current legislation and quality requirements. Furthermore, the study contributes to a wider theoretical discussion on strategically focused public policy concerning the improvement of healthcare environmental performance. The framework and process also provide a systematic approach for hospitals performance monitoring and reporting.

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### 1. Introduction

Hospitals in the US produce approximately 6700 tons of waste per day; healthcare waste is the fourth largest contributor of mercury to the environment. "Pollution prevention not only improves a

facility's environmental performance, but can affect areas CEOs traditionally do care about" (Zimmer and McKinley, 2008). They spend substantial financial resources on waste disposal. This expenditure can range between 259 and 401 million dollars per year in US hospitals (Unger and Landis, 2016). According to Karlsson and Öhman (2005), one hospital in Sweden is capable of consuming 242,000 m<sup>3</sup> of water, 37 GWh of energy; it can produce 1330 tons of biodegradable waste, 127 tons of industrial waste, 123 tons of hazardous waste, 164 tons of paper waste and 14 tons of glass waste

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per year while caring for 150,000 patients. “The growth of environmental awareness and the development of stronger environmental regulations coupled with current needs to cut costs on public expenditure have brought the health sector’s environmental issues to the fore”. New regulations have forced hospitals to promote environmental performance through a more systematic manner. “Staff training and awareness underpin several of the short and medium/long term solutions suggested to reduce the waste at the source and recover value from that produced” (Tudor et al., 2005). Porter (2010) claims that enhanced performance depends on the existence of a common goal for different stakeholders. In healthcare, this goal relates to the definition of value represented by patients’ health outcomes by currency unit invested. If this value is improved, patients, managers and suppliers can benefit from it while sustainability is attained.

Quality improvements lead to less waste of resources, improvements in patient satisfaction and medical care effectiveness (Maki et al., 2008). “[...] the measure should be capable of indicating whether the process has been delivered with sufficient effectiveness to make improved outcomes likely” (The Joint Commission, 2015). “Interest in linking indicators to goals and targets enables their use in tracking performance and helps link them to policy priorities” (Pintér et al., 2005). Although efforts related to improving environmental performance in healthcare have been put in place, outcomes have been unsatisfactory (Phillips et al., 2002; Lifvergren et al., 2008). Furthermore, whereas indicators related to the economic/financial dimension of the triple bottom line framework (Elkington, 1994) can be measured in dollars, finding a common unit of measurement related to the social and environmental dimensions presents a challenge (Slaper and Hall, 2011). According to Moldan et al. (2012), these indicators should be linked to reference values, targets and appropriate scaling.

In developing countries such as Brazil, healthcare operations face major challenges including high costs of healthcare services, limited productive resources and infrastructure, lack of public investments and strategically focused governmental policies. Hospitals are divided according to their organizational structure and relationship with the Unified Health System (SUS) established by the Brazilian Government. Three main groups can be found: (a) private entities for profit, (b) private not for profit entities (predominantly philanthropic associations) and (c) public hospitals (BRASIL, 2002). They are also divided by size: a) small (1–49 beds); b) medium (50–150 beds); c) large (151–500 beds); d) special or extra (more than 500 beds). ‘Philanthropic’ hospitals correspond to 2/3 (two-thirds) of the medical assistance (CMB, 2015). The Unified Health System (SUS) ‘owns’ 348,548 beds, which account for 68.72% of the total of hospital beds (CNES, 2014). McNatt et al. (2015) could not find any implemented and sustained national systems composed by comprehensive sets of indicators to monitor hospital performance in low-income countries. As per the authors, “the literature on the development and implementation of systems for monitoring

hospital performance is largely dominated by case studies and reports from high-income countries with national health systems [...]”. Moreover, the loss of professionals in low and middle-income countries has represented a hurdle for healthcare systems (Willis-Shattuck et al., 2008). Improvements and new developments in conceptual, legal and methodological frameworks are necessary to incorporate sustainability thinking (Duić et al., 2015).

Considering this context, the study proposes a framework to be used in practice by managers to measure environmental performance. The paper is divided in seven sections. The research design is discussed in Section 2. Section 3 summarizes the literature review, current legislation and feedback from field studies. Section 4 describes the proposed framework and process. Section 5 encompasses the refinement and testing phases. Section 6 contains a discussion on the results. Section 7 summarizes study conclusions.

## 2. Research design

The study included a comprehensive literature review on healthcare operations, performance measurement frameworks, measurement of environmental performance and Brazilian regulations related to the topic. The review included a bibliometric analysis of main authors, publications, research centers/universities and emerging themes from 1988 up until 2015, using citation analysis. Aiming to achieve further insight into the performance measurement practice, field studies were conducted in 10 hospitals in the Southern region of Brazil. All 10 hospitals are private, including small and medium-sized; seven units were philanthropic. Field studies include one or more visits to the facilities of an organization without involving a lengthier period for interaction (Gupta et al., 2006). The general manager of each hospital was interviewed. The interviewing guide contained the G3 Environmental Dimensions proposed by the Global Reporting Initiative (GRI, 2006). A theoretical framework was developed, using the literature review findings, current legislation and feedback from field studies. As the existence of a framework does not guarantee its application (Gouvêa da Costa et al., 2006), a three-stage process based on the Cambridge approach (Platts, 1993) was developed. The process approach defines vital operationalization elements. Different steps, tasks and those responsible for their completion are defined. The approach was deemed appropriate to test the framework applicability, since it is represented by elements with a practical focus. It creates a systematic process to address a process problem, the environmental performance measurement. Fig. 1 represents the research design.

Case research with action research are prescribed within the process approach. Case studies allow researchers to study a phenomenon as an integrated whole if provided with a systematic process for data gathering (Pope et al., 2000). Action research creates an iterative process of collaboration between the researcher (facilitator) and hospital staff beginning with the identification of

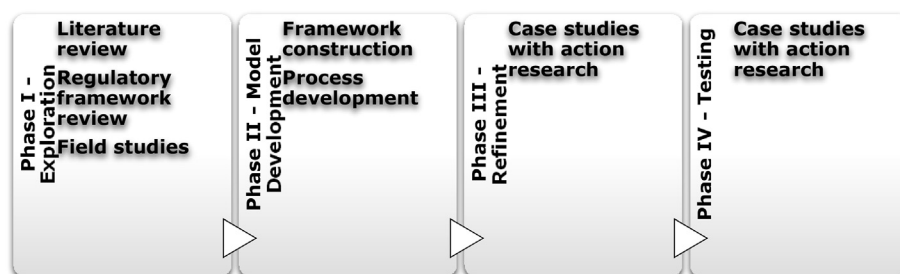


Fig. 1. The research design.

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