

Research article

## Management control levers in hospitals: the influence of accreditation on other management control systems

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### Abstract

The objective of this study is to identify the influence of accreditation on management control systems (MCS) before and after implementation. A survey was performed, with a sample of 92 respondents (professionals responsible for implementing accreditation) and a t-test was used to evaluate the difference between the two samples (before and after accreditation). The results show that after accreditation, management control systems (beliefs, boundary, diagnostic, and interactive control systems) had seen significant improvements, leading to better management and quality of the health services provided. In the face of growing demands from the health sector, analyzing the balanced use of management techniques that improve organizational control in companies is expected to contribute to better service delivery and maximization of generally scarce resources.

**Keywords:** accreditation; hospitals; management control system; control levers.

### Niveles de control de gestión en hospitales: la influencia de la acreditación en otros sistemas de control de gestión

#### Resumen

El objetivo del estudio es identificar la influencia de la acreditación en los sistemas de control de gestión (SCG) antes y después de la implementación de la acreditación. Para esto se realizó una encuesta, con una muestra de 92 encuestados (profesionales responsables de implementar la acreditación) y se utilizó la prueba t para evaluar la diferencia entre las dos muestras (antes y después de la implementación de la acreditación). Los resultados muestran que después de la implementación de la acreditación, los sistemas de control de gestión (creencias, frontera, diagnóstico e interactivos) tuvieron mejoras significativas en sus procesos, caracterizando una mejor gestión y calidad de los servicios de salud prestados. Al analizar el uso equilibrado de las herramientas de control de gestión que maximizan el control organizacional de las empresas, se espera contribuir a una mejor prestación de servicios y la maximización de los recursos organizacionales generalmente escasos ante las crecientes demandas del sector de la salud.

**Palabras clave:** acreditación; hospitales; sistema de control de gestión; palancas de control.

### Níveis de controle gerencial em hospitais: a influência da acreditação em outros sistemas de controle gerencial

#### Resumo

O objetivo do estudo é identificar a influência da acreditação nos Sistemas de Controle de Gestão (SCG) antes e após a implementação da acreditação. Para isso, foi realizada uma pesquisa, com uma amostra de 92 respondentes (profissionais responsáveis pela implementação da acreditação) e utilizou-se o teste t para avaliar a diferença entre as duas amostras (antes e após a implementação da acreditação). Os resultados mostram que, após a implantação da acreditação, os sistemas de controle gerencial (crenças, fronteiras, diagnóstico e interativo) apresentaram melhorias significativas em seus processos, caracterizando melhor gerenciamento e qualidade para o hospital acreditado. Ao analisar o uso equilibrado das ferramentas de controle gerencial que maximizam o controle organizacional das empresas, espera-se que contribua para uma melhor prestação de serviços e para a maximização de recursos organizacionais geralmente escassos, à luz das crescentes demandas do setor de saúde.

**Palavras-chave:** acreditação; hospitais; sistema de controle de gestão; alavancas de controle.

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## 1. Introduction

Hospitals face managerial challenges that raise concerns regarding management quality and the improvement of their management processes (Oliveira & Matsuda, 2016; Chopra & Kondapalli, 2015; Manzo, Brito, & dos Reis Corrêa, 2012). Inefficiency in these processes, inflation in the health costs and the increasing patient dissatisfaction with the services provided make it necessary to reduce costs and improve on those services (Araujo, Figueiredo, & Figueiredo, 2015). One of the strategies adopted by health organizations to improve quality and productivity is the creation of hospital accreditation programs (François & Pomey, 2005).

Hospital accreditation is an external evaluation methodology, contracted voluntarily by health organizations. According to Portela and Schmidt (2008) and Jaafaripooyan, Agrizzi and Akbari-haghighi (2011) the objective of accreditation is to improve the service delivery quality of health organizations. Accreditation allows the continuous improvement of healthcare, and guarantees effectiveness of care in all organizations providing health services.

Alonso, Droval, Ferneda and Emidio (2014) emphasize that hospital accreditation seeks to evaluate and validate the quality of care provided, by describing the practice developed and the use of accepted care standards. Bomfin, Trivellato and Hastenreiter (2013) show that the process cannot be disassociated from organizational change, a necessary condition for receiving certification. El-Jardali, Jamal, Dimassi, Ammar and Tchaghchaghian (2008) emphasize that the adaptation to quality standards advocated by accreditation obliges the hospital to review its working methods and institutional controls.

These controls, when deployed, are able to soften or eliminate bottlenecks that impede the achievement of strategic objectives (Imoniana & Nohara, 2005). For Tuomela (2005) and Canonico and Söderlund (2010) the joint use of controls from the perspective of levers of control, as proposed by Simons (1995), can minimize possible difficulties and managerial problems, contributing to the improvement of management quality and increased commitment to institutional goals and strategies.

For Kruis, Speklé and Widener (2016), the impact of levers of control (LOC) in accounting literature is relevant. The existing literature recognises the use of management control systems in implementing organisational strategies and to promote organisational change (Akroyd, Biswas, & Chuang, 2016; Wijethilake, Munir, & Appuhami, 2017). Our study therefore sheds light on one of the key concepts in the scope of control levers and their balanced use (Songini, Morelli, & Vola, 2018).

In the search for an understanding of how management control systems contribute to the improvement of performance, allied to strategy, Contingency Theory is used, among other theories (Chenhall, 2003). In Contingency Theory, the improvement of a structure depends on factors internal to the organization, which in turn are influenced by the environment (Donaldson, 2007).

In this context, and considering that hospital accreditation is a management tool used by health organizations to improve the quality of their internal processes and patient care (Jaafaripooyan et al., 2011; Alkhenizan & Shaw, 2011; Rooney & Van Ostenberg, 1999), it is assumed that accreditation is a management control tool that, when implemented, generates dynamic tensions between the other existing controls (Kruis et al., 2016; Alkhenizan & Shaw, 2011; Tuomela, 2005). In order to improve the quality of hospital accreditation, it is assumed that hospitals adopting accreditation modify the use of other management tools with the intention of adjusting their control levers in search of balanced use of LOC (Mundy, 2010). In this way, the research aims to identify the influence of accreditation on management control systems (MCS) before and after its implementation.

François and Pomey (2005) analyzed whether accreditation plays an important role in institutionalizing processes in hospital entities. In general, previous studies have contributed to the management control of health organizations (Viana & Fonseca, 2016). However, this study contributed to understanding the changes, especially the use of MCSs, after the implementation of the National Accreditation Organization (ONA) and Joint Commission International (JCI).

To this end, 276 questionnaires were sent to ONA and JCI accreditation officers in Brazilian hospitals. Of these 92 answered the survey instrument. To achieve the research objective, we used a t-test, assessing the impact of accreditation on management control systems (MCS) post-implementation. The research results demonstrate that accreditation has a significant effect on Simons' (1995) control levers, and belief, diagnostic, boundary and interactive control systems used by Brazilian hospital entities are positively altered after accreditation.

The contribution of the study derives from its focus on health institutions, essential for people's quality of life. By analyzing the balanced use of MCS's, one can contribute to better service delivery and maximize organizational resources, often scarce, in response to the growing demands of the health sector. It is also hoped that the study may guide hospital managers who are in the process of implementing accreditation, in view of the fact that, aware of the dynamic tensions that accreditation generates in other MCS's, they act proactively to ensure the adequate rearrangement of the tools and maximize the benefits generated by them.

With reference to the existing literature, the study expands on the findings of Mundy (2010) and Kruis et al. (2016) regarding the creation of dynamic tensions and the balanced use of MCS. It also builds on the work of authors such as François and Pomey (2005) and El-Jardali et al. (2008), dedicated to the understanding of the hospital accreditation process, its importance and associated organizational impacts.

Finally, it is important to analyze the implications of accreditation in hospital entities; according to Mendes & Mirandola (2015), more studies are needed to evaluate the real contribution of accreditation in the improvement of hospital organizations. The present study contributes by demonstrating the benefits of management controls after accreditation,

demonstrating to managers, investors and researchers the importance of accreditation for hospital entities.

The paper is structured in the following way: section 2 consists of a literature review, section 3 contains the methodology used, section 4 comprises the analysis of results and section 5 presents the conclusions.

## 2. Literature review

### 2.1. Management control systems

The first studies on managerial control were based on [Anthony \(1965\)](#), who presented it as a way to guarantee that the objectives of the organization are fulfilled. More recently, authors such as [Anthony and Govindarajan \(2008\)](#) have added that managerial control systems are defined as processes of influence exerted by managers, in order to implement organizational strategy and to verify how available resources can be maximized so that targets are achieved.

Organizations face challenges on a daily basis and for these to be overcome, they require differentiated and effective control by managers ([Speklé, 2001](#)). Differentiated controls contribute to generating information that makes managers' choices more assertive, and are usually provided by management control systems (MCS).

In this context, [Simons \(1995\)](#) proposes a methodology for strategic control and organizational practices, which meets the company's evolving requirements. [Simons \(1995\)](#) outlines core values, risks to be avoided, strategic uncertainties and critical aspects of performance, giving rise to four systems called control levers: belief systems, boundaries, diagnostics and interactive control.

Belief systems for [Simons \(1995, p.34\)](#) are "the explicit set of organizational definitions that senior managers communicate formally and reinforce systematically to provide basic values, purpose, and direction for the organisation". Belief systems communicate core values of the company ([Tessier & Otley, 2012](#)) and aim at innovation and guided creativity ([Simons, 1995](#)). [Widener \(2007\)](#) describes them as the interlocutor of essential values, stimulating and encouraging employees to investigate and innovate.

The boundary system delineates the region possible for organizational activities ([Simons, 1995](#)). This lever defines the actions to be avoided by workers. It establishes limits, based on fixed risks and the search for opportunities ([Simons, 1995](#)).

The diagnostic system is designed to guarantee the achievement of organizational objectives ([Simons, 1995](#)). It is the formal information system, which is used by those responsible for the measurement of outputs, monitoring of results and possibility of correcting deviations. Diagnostic controls guide and motivate employees in their roles and behaviors, so that they are in accordance with the organization's goals ([Widener, 2007](#)). For [Widener \(2007\)](#) this lever reports critical information on performance, allowing managers to better monitor the company's strategy.

The interactive system is the essence of managerial control because it focuses the tension between creativity and the achievement of organizational goals ([Simons, 1995](#))

providing for the emergence of new strategies ([Simons, 1995](#)). This lever is characterized by bringing perspective and having active and constant communication among the managers of the various levels of the organization. It contributes to the search for better strategic settings in dynamic markets and is used by managers as a mechanism to involve themselves in the decisions of subordinates ([Simons, 1995](#)).

[Tuomela \(2005\)](#) points out that belief systems and systems of interactive control are used to motivate, encourage and give opportunities to employees. On the other hand, boundary control systems and diagnostic control systems are used to delineate where growth and innovation are prioritized, and to ensure the achievement of organizational goals and objectives.

### 2.2. Hospital accreditation

Accreditation in Brazil began in the late 1980s, when the Pan-American Health Organization (PAHO) determined a series of models for hospital services in Latin America that, if reached, would give the hospital accreditation status ([Agência Nacional de Vigilância Sanitária-Anvisa, 2004](#)). Currently, in Brazil, a range of entities promotes hospital accreditation. Among them are the National Accreditation Organization (ONA), Joint Commission International (JCI) and Accreditation Canada International (Qmentum).

The ONA in particular is a government organization characterized as a noneconomic private legal entity with collective rights, with national scope ([Bomfin et al., 2013](#)), and is recognized as a competent entity for the development of the hospital accreditation process ([ONA, 2006](#)). It aims to certify the quality of an agency, service or operational group, evaluating the set of facilities, objectivity, integrity, qualifications, and competence in providing specific services of the health organization ([ONA, 2006; Alonso et al., 2014](#)).

Although JCI has more than 80 years of experience as a certifying agent in the United States, only in the last 15 years has it certified health organizations in Latin American countries. To be certified by JCI, the hospital entity must pass through three distinct phases, namely: I) dissemination of the method, training of internal teams, diagnostic evaluation, report of nonconformities and preparation of a plan of action; II) implementation of the action plan to address nonconformities; III) certification audit ([Franciscatto, Bessow, Ruzczyk, Oliveira & Kluck, 2011](#)). According to [Bonato \(2011\)](#), one of the factors that contributes to the selection of an international accreditation entity stems from the strategic positioning of recognition of care quality by the rest of the world.

According to [Jorge, de Carvalho and Medeiros \(2013\)](#) hospital accreditation programs aim to draw the attention of managers to possible effects, especially negative ones. These effects are present in daily life in the relationships between patients, health professionals and the hospital administration, directly affecting the organizational environment.

The hospital accreditation process is a method of consensus, rationalization, and ordering of hospital institutions and the permanent education of its professionals

(ONA, 2006). The hospital accreditation model has four organizational dimensions as factors associated with the achievement of hospital environment management objectives: I) health professional training, II) participatory management with governance, III) information provided by the service provider and IV) the promotion of the user (Jorge et al., 2013; Manzo et al., 2012). Hospital accreditation considers quality which adds the themes of safety, professional ethics, responsibility, and quality of care (ONA, 2006). For Rooney and Van Ostenberg (1999) accreditation is a system to meet the need for quality and performance information.

Among the several advantages of introducing this new methodology, are the improvement of both unit management and the quality of patient care, which is now more safely and efficiently performed (ONA, 2006). According to Souza, Guerra, Oliveira, Gomide, Pereira and Freitas (2009) in order to have quality in the provision of health services, it is necessary for managers to be knowledgeable about organizational performance, in order to measure management efficiency.

It is important to highlight that accreditation targets the inputs, processes, and results that an organization must achieve. In this sense, the level of accreditation is measured by organizational performance (Smits, Champagne, Contandriopoulos, Sicotte, & Prével, 2008).

### 2.3. Hypotheses

Widener (2007) rated the existing relationship between beliefs, boundaries, diagnostics and interactive control systems and then grouped them to influence organizational performance. Evidence suggests that there are several interdependent and complementary relationships between MCS. Diagnostic and beliefs systems facilitate management attention, while the interactive system consumes management attention. Organizational learning is enhanced by an emphasis on belief systems as well as the use of diagnostic systems.

Belief systems are used to lead and direct the search for opportunities. They are a set of organizational definitions, formally communicated by managers, designed to provide basic values, purposes, and direction to the members of the organization (Simons, 1995). Accreditation impacts the strategic posture of prioritizing patient quality and safety, thereby effecting MCS and organizational beliefs. In view of this, the first research hypothesis was elaborated: *H1 - The implementation of accreditation positively influences the belief system.*

Hospitals tend to present difficulties in the process of managing their activities, mainly when trying to achieve excellence in service delivery. This is due to the complexity of the organizational structure, in addition to the financial, human and technological constraints they face (Souza et al., 2009). Accreditation contributes to the understanding of the company as a whole, helping it to face the existing organizational limitations.

The systems of restrictions help managers, as they define the level of risk that the organization is willing to assume (Tessier & Otley, 2012; Simons, 1995). This is based on the

premise that hospital accreditation has positive impacts on changes in health professionals' posture (Mendes & Mirandola, 2015), and that in order to guarantee quality healthcare it is necessary to constantly monitor the controls, a fact that triggers processes dynamics such as the analysis of cause and effect (Silva, Dani, & Santos, 2016). Consequently, it has been hypothesized as: *H2 - The implementation of accreditation positively influences the boundary control system.*

For Simons (1995) diagnostic control systems are adopted by managers to monitor results against planned performance. Diagnostic systems are characterized by their ability to set out measures for a process, provide comparative parameters for the actual versus planned and also deviations enabling its correction (Simons, 1994).

Hospital accreditation is a permanent process of evaluation that certifies the quality of health services, allows continuous improvement of health care and guarantees effectiveness in care. Its adoption may result from the need to use specific management tools able to meet the complex context of health organization's needs (Chopra & Kondapalli, 2015). This leads to our third research hypothesis: *H3 - the implementation of accreditation positively influences the diagnostic control system.*

Interactive control systems are characterized by generating relevant information to guide senior management, requiring frequent attention from operational managers and for their data to be interpreted and discussed in face-to-face meetings between bosses and subordinates (Tessier & Otley, 2012). Interactive systems are stimuli for continuous challenges and debates regarding underlying data, assumptions and action plans (Simons, 1995).

On the other hand, one of the advantages attributed to accreditation is the improvement of unit management, especially concerning the relationship between patients, health professionals and hospital administration (Mendes & Mirandola, 2015; Oliveira & Matsuda, 2016). Accordingly, we hypothesize that: *H4 - Accreditation implementation positively influences the interactive control system.*

## 3. Methodology

In order to identify the influence of accreditation on management control systems (MCS) before and after implementation, the research is defined as a descriptive survey, carried out via a quantitative electronic questionnaire. The study population consisted of 249 Brazilian hospitals reported on the ONA website, and 276 JCI-accredited hospitals. Subsequently, questionnaires were sent to 276 hospitals, of which 92 were returned (33%).

The data collection instrument is a questionnaire with a Likert scale divided into three blocks (table 1). The first contains the characterization of the respondents and information about the type of accreditation. The second block, containing 37 statements, is dedicated to collecting information regarding Simons' control levers (1995), using the questions contained in the study by Cruz, Frezatti and Bido (2015). Finally, the third block of the questionnaire,



composed of 41 statements, was adapted from the study by Cruz et al. (2015) and is intended to capture information on the influence exerted by accreditation on the other management control tools, based on an analysis of the control levers in Simons (1995).

Blocks two and three have similar questions, which aim to capture the same management controls in their respective questions, with the difference however that block two reports only the existence of such controls and block three reports changes that occurred after accreditation. In this third block were also questions for general purposes and the confirmation of responses.

The online questionnaire (on Google docs) was sent by email to those responsible for the accreditation sector, along with a cover letter. This data collection phase comprised a period of 60 days and was conducted in the first half of 2016. With this procedure 23 questionnaires were obtained. Following the period between July and December 2016, we moved the data collection strategy, and those responsible for the accreditation of 253 remaining hospitals were contacted by email or phone, and again invited to participate in the study. At this stage, it was decided to collect data verbally, and so the questions were read to respondents and responses recorded in the online form. This procedure resulted in 69 other responses.

Principal Component Analysis (PCA) was used, originating the components of the first factor, which was later used for the development of indicators related to each lever. With indicators related to the levers, a *t* test was performed for independent samples, which shows that the two sets (previous and after accreditation) are significantly different.

Cronbach's alpha test was performed to verify reliability of the variables used (Yu, 2001). The coefficient takes values between 0 and 1, in this interval values above 0,6 are

considered acceptable (Churchill, 2003). For all statistical tests, we used the software SPSS 21.

Based on the PCA, we seek to verify a market for each control system (beliefs, boundary, diagnostic and interactive control systems) that represents your set of questions with the greatest possible explanation. As of the *t* test, the difference between groups is considered statistically significant, indicating that there was a statistical change in the analyzed data of disparate groups.

#### 4. Description and data analysis

In this section, the description presents the results and proceeds with an analysis. It is observed that 93.5% (86) of hospitals in the sample are accredited by ONA (national accreditation) and 6.5% (6) are certified by the JCI (international).

Among 86 hospitals accredited by ONA, 38.8% have Level 1 accreditation (Accredited), 32.9% Level 2 (Fully Accredited) and 28.3% Level 3 (Accredited with Excellence). The greater amount of certification by ONA is noticeable compared to JCI, indicating that there is a greater interest in hospitals for the implementation of national rather than international certification. However, it is not possible to determine whether this preference stems from the demands of the market and customers, the scope of services (domestic) or from differences in cost or demand patterns between accreditation bodies.

To verify the reliability of the data we calculated Cronbach's alpha, which is the internal consistency of the variable groups (belief systems, boundary systems; diagnosis and control interactive system) before and after the accreditation that generated the PCA factors as shown in Table 2.

Table 2 shows that all levers before and after accreditation reached the factor load determined by the literature. Thus, it is clear that the instrument used to measure Simons' control levers (1995) is reliable. Descriptive analysis is shown in Table 3.

When analyzing the data in table 3, the belief system lever was observed to feature the highest frequency of remaining responses, demonstrating that hospitals have formalized and discussed with their subordinates the fundamental values related to organizational strategies, such as mission and values.

**Table 1.** Control levers

Block	Variables	Question	Unit of measures
Belief System	Mission and vision; credos, organizational purpose; core values related to business strategy.	Q1 to Q5 After accreditation Q37 to Q41	Likert scale of 5 points (Never – Always)
Boundary Systems	Code of conduct.	Q6 to Q13 After accreditation Q42 to Q49	Likert scale of 5 points (Never – Always)
Diagnostic Systems	Ethical code; rules; inadequate strategic behaviors.	Q14 to Q24 After accreditation Q50 to Q60	Likert scale of 5 points (Never – Always)
Interactive Systems	Goals and objective systems; business plans; profit plans and budgets; project monitoring systems.	Q25 to Q36 After accreditation Q61 to Q72	Likert scale of 5 points (Totally disagree - Totally agree)

Source: own elaboration.

**Table 2.** Cronbach's alpha coefficient obtained by factor

Factor	Factor Name	Cronbach's alpha
Before accreditation		
1	Belief Systems	0.746
2	Boundary Systems	0.860
3	Diagnostic Systems	0.781
4	Interactive Systems	0.638
After accreditation		
1	Belief Systems	0.810
2	Boundary Systems	0.894
3	Diagnostic Systems	0.903
4	Interactive Systems	0.845

Source: own elaboration.

Regarding the boundary lever, majority of respondents said that the organization maintains and follows a code of ethics and rules of the institution, as well as analyzing the inappropriate behavior of their subordinates. In the diagnostic control lever, great part of the respondents showed that the organization there is the use of monitoring systems, systems goals, and objectives, as well as profit plans and budgets. A large part of the interviewees also demonstrated that in their institutions there is an interaction between subordinates and managers.

The Table 4 shows the method of analysis of the main components in order to highlight the factors that explain the overall variability of the data, thus, a small number of linear combinations from a set of variables can be seen, which have the maximum information contained in the original variables.

Regarding the belief system, in the period prior to accreditation, two factors are perceived that explains 67.97% of the accumulated data. After accreditation, this variability

increased to 73.38%, a variation of 5.41 percentage points. Turning to the boundary lever before accreditation, two of the factors presented explain 66.33% of the cumulative variability, and the accreditation after implementation registers an increase of 70.92% of variability, 4.59 percentage points.

With regard to the diagnostic control lever, for the period prior to accreditation it appears that it took three factors to explain 67.47% of the accumulated variation, and after accreditation there was an increase of variability to 68.38%, indicating an increase of 0.91 percentage points. To note that, compared with the results obtained for the boundary control system, a greater burden was required, three and not two main factors to explain the average variance usually presented in two factors.

Finally, the analysis of interactive control lever for the previous accreditation period, although it has been required a load of four factors, they explain 74.77% of the total variability,

**Table 3.** Descriptive analysis

Levers	Before accreditation				After accreditation			
	Mean	Standard Deviation	Minimum	Maximum	Mean	Standard Deviation	Minimum	Maximum
Belief Systems	4.276	0.781	1	5	4.280	0.812	1	5
Boundary Systems	4.005	1.021	1	5	4.190	0.814	1	5
Diagnostic Systems	4.166	0.850	1	5	4.220	0.791	1	5
Interactive Systems	4.248	0.634	2	5	4.430	0.663	2	5

Source: own elaboration.

**Table 4.** Explained variance of the eigenvalues from the principal component analysis

Component	Factor	Self-worth	Variant %	accumulated Self-worth	accumulated Variant %
Implementation of prior accreditation					
Belief System	1	2.379	47.580	2.379	47.580
	2	1.020	20.393	3.399	67.973
Boundary System	1	4.245	53.061	3.514	43.927
	2	1.062	13.275	5.307	66.336
Diagnostic System	1	3.659	33.263	2.696	24.510
	2	2.634	23.943	6.293	57.205
	3	1.130	10.272	7.423	67.477
Interactive System	1	3.748	31.233	3.748	31.233
	2	2.441	20.342	6.189	51.574
	3	1.765	14.706	7.954	66.280
	4	1.019	8.491	8.973	74.771
After accreditation					
Belief System	1	2.582	51.646	2.573	51.468
	2	1.087	21.735	3.669	73.381
Boundary System	1	4.655	58.184	3.962	49.525
	2	1.019	12.736	5.674	70.920
Diagnostic System	1	5.728	52.069	3.773	34.301
	2	1.794	16.312	7.522	68.382
Interactive System	1	5.357	44.645	3.972	44.645
	2	2.485	20.706	7.842	65.352
	3	2.366	19.719	10.208	85.071

Source: own elaboration.

however, following implantation of accreditation was increased to 85.07% - 10.3 percentage points.

A t-test was held, in which a comparison was made of the averages of the issues for the period before and after accreditation that had greater factor loading according to principal component analysis. Further, Table 5 shows the results for the mean differences, standard deviation, t-test, and an indication of the significance, comparing the period before and after accreditation.

Accreditation showed significant influence on the belief system of the analyzed hospitals, so it is not possible to reject H1: "the implementation of accreditation positively influences the belief system". Thus, it is apparent that the implementation of accreditation in hospital entities has a significant influence on the creed, organizational purpose and values related to the organization's strategy. Corroborating this, Oliveira and Matsuda (2016) found that accreditation produces improvements in quality of service to the user and requires interdisciplinary work with professionals making employees follow the company's beliefs.

With regard to the boundary system, there is a significant relationship between accreditation and the boundary system, and for this reason H2: "the implementation of the accreditation system influences positively the limits", was not rejected. It appears that after accreditation managers begin to use the code of ethics and code of conduct with greater discipline, and in addition there are new sets of rules governing the behavior of individuals in line with the precepts of the adopted accreditation system.

Diagnostic controls have a significant relation to the implementation of accreditation, leading us to not reject H3: "deployment of accreditation positively influences the diagnosis control system". After accreditation, the hospital authorities demonstrate and follow goals and objectives; business plans; profit plans and budgets with greater rigidity; as well as the deployment and use of project monitoring systems. To Oliveira and Matsuda (2016) despite the barriers related to the organizational culture, and the turnover of employees in health institutions, managers as beneficial to the quality of management confirm accreditation, because it standardizes processes.

Finally, the interactive control tool also showed significance, thus demonstrating that accreditation has an influence on

interactive controls in the hospital entities considered in the study, therefore, H4: "deployment of accreditation positively influences the control system interactive", was not rejected. This suggests that the implementation of accreditation influences frequent and regular attention from managers in the organization, the vertical meetings of the organization; in catalyzing challenges and debates and orientation of new strategies. Supporting this finding, Mendes and Mirandola (2015) found that accreditation has generated greater interaction between managers and their subordinates.

## 5. Conclusion

This study aimed to identify the influence of accreditation on management control systems (MCS) before and after implementation. We used the model of Simons (1990, 1995), considering the four control levers (belief systems, boundary systems, diagnostic control and interactive control) for MCS.

The results demonstrated a significant relation between beliefs systems and hospital entities, thus H1 was accepted. Accreditation has a significant relationship with the boundary system (H2). Further, the diagnostic control tool showed a significant relation after the implementation of accreditation and therefore H3 was not rejected. The interactive control tool demonstrated a significant relationship with the implementation of accreditation, therefore, H4 of the study was likewise not rejected.

It can be concluded that there is an influence of accreditation on Simons' belief systems, boundary systems, diagnostic controls and interactive controls (1995). In this context, it is relevant to note that the accreditation process affects the entire control set of a hospital.

This study concludes that accreditation has a significant influence on the creeds, organizational purpose, and values of organizational strategies. Therefore, accreditation influences the code of ethics, code of conduct, rules, goals and objectives, business plans, profit plans and budgets as well as the deployment and use of monitoring systems. It is inferred that the implementation of accreditation in hospitals influences entities through the frequent and regular attention from managers in the organization, in meetings, observations and realization of challenges and debates, and the orientation of new strategies.

The results of this study contribute to the users of management accounting as well as quality management in hospital organizations, to examine the influence of accreditation in management control Simons (1995), the results provide evidence of improvements in belief systems, boundary systems, diagnostic controls and interactive controls after accreditation. Thus, this study shows a difference in analyzing Simons' four levers (1995), whereas most studies are applied to diagnostic and interactive controls only (Cruz et al., 2015).

Regarding future research other methodologies could be used, such as case studies. The influence of different accreditation certificates on control levers could be analyzed. Also noteworthy would be new studies that could verify the influence of accreditation in the perception of managers of health institutions. Finally, studies could be carried out to examine the influence on other forms of health entities, not only in hospitals.

**Table 5.** T-Test to the mean differences between the sample before and after deployment of accreditation.

Lever	Average	Standard deviation	Test t	Sig.
Belief Control Systems	-1.518	1.937	-7.518	0.000 ***
Boundary Control Systems	-1.114	5.643	-1.894	0.061 *
Diagnostic Control Systems	-7.187	6.833	-10.089	0.000 ***
Interactive Control System	-13.136	6.291	-20.028	0.000 ***

Notes: levels of significance: \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01  
Source: own elaboration.

## Conflict of interest

The authors declare no conflict of interest.

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