

ABSTRACT NUMBER – 015-0480**QUALITY INDEX AND HOSPITAL ACCREDITATION: A CASE STUDY IN BRAZIL**

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Assessing the quality of services provided by hospitals has become increasingly important to the decision of its users, health plans and organizations that providing these services. For these, obtaining a seal of accreditation gives to the hospital a reputation in the market that sets it apart from others. However, the assessment of quality in hospitals is a complex task, requiring the analysis of many variables, making it expensive and time consuming for hospitals and difficult to understand for users. The objective of this study is to analyze the indicators used by the Program Commitment to Quality Hospital - PQHC, developed in the State of Sao Paulo, Brazil, in order to improve the assessment system which gives the seal of accreditation, making this information be more transparent to administrators and health service users.

Key-words: Hospital accreditation; Quality Index of Hospitals.

Introduction

The importance of the evaluation of the health services rendered by hospitals is more and more important now-a-days, mainly with views to the improvement of the quality of those services.

We comprehend that if there is a better understanding of the dynamics of the variables that induce the hospital's performance, the process of making decision for management and improvement the services in the health area would be more effective and efficient.

The variables that enter to compose a model of a hospital's quality evaluation are many, besides certain difficulty exists in the measurement of some variable that are intangible, in

other words, they are influenced by the emotional state of who evaluates them - users or employees of the hospitals.

Therefore, with the objective of understanding the complex dynamics of the variables that explain the performance of a hospital, and to propose a model and a methodology to be used in the administration of the hospital's quality, we chose to work with the information obtained through a network of 33 general hospitals that participate in the Commitment Hospital's Quality Program of the Sao Paulo State - Brazil, that aims at to stimulate the participant hospitals to look for the continuous quality improvement.

1. Theoretical Quality Mark in Hospital Services

In 1910 was created in the United States the Joint Commission on Accreditation of Health Care Organization (JCAHO), with the initial purpose of creating a system of standardization for hospitals. In accordance with Ernest Codman, M. D., first president of JCAHO, by this system a hospital should go along with each patient treaty, by a sufficient time, to determine whether the treatment was effective. If this was not observed, the hospital would examine the reasons in order to obtain success in next similar cases.

From its creation, JCAHO was improving continually the safety and quality of service to the public, initially, by means of the establishment of standards and procedures for health care provision and through the inspection visits. In 1953, published the first manual of standards for hospital accreditation. And in the following year, detailed the standards by medical specialty.

In 1993, the Hospital Accreditation Manual was reorganized on the importance of care with the patient, changing the focus from the assessment of the hospital capacity to the measure of its real performance.

In the following year the accreditation process starts in health networks, offering the services of training and advice, internationally. From 1998 is implemented the system ORYX, intended to integrate the use of result indicators and other performance measures in the accreditation process.

In the administration area, the concepts of quality management were developed in the industrial context, verifying its climax in Japanese industry of post-war, mainly from the work of Deming.

In addition, others authors like Crosby, Juran, Ishikawa and Taguchi had developed conceptions and models bringing new approaches to the goods and services production. These authors had created concepts; methods and techniques for initiate, maintain and evaluate the quality.

Thereafter, the principles on continuous improvement were transferred to other areas of action, such as: the conception of absence of defects; to make perfect at first time; compliance with the requirements and expectations of the customer and feel proud of make.

Berwick (2005) highlights that the adaptation of quality concepts used in the health sector, were made with certain ease although the development of quality in health services is recent.

The Concept of Quality

More recently, the Joint Commission on Accreditation of Health Care Organization (JCAHO) defines the medical-hospital quality as "the degree according to which the health care of the patient increase the possibility of its desired recovery and reduce the likelihood of emergence of events unwanted, given the current state of knowledge".

In 1980, Donabedian defines high quality services as "what is expected that maximizes a patient welfare measure after taking into account the balance of expected gains and losses that compete in the process of attention in all its parts".

In 1991, this author has referred to the many facets of the concept of quality: technical, interpersonal, individual and social, and has deepened this concept in relations between quantity and quality, and between benefits and risks. He believes that one definition of quality that covering all aspects is not possible, but that, in the handling of a specific problem of health, good quality can be summarized as "*the treatment that is capable of achieving a better balance between the benefits and risks*".

In this context, Luft and Hunt (1986) defined the quality as "*the degree to which the processes of medical care increase the likelihood of desired results by patients and reduces the likelihood of unwanted results, according to the state of medical knowledge*".

According with Zanon (2000), other generic definition of quality is considered as "*degree of appropriateness of a good or service to meet the needs of someone*".

De Geyndt (1994) suggests that the various definitions given to the quality are a reflection of the difficulty of reaching a consensus due to the fact that the concept of medical care or health care is multidimensional and this fact explains the existence of many definitions and forms of assessment.

Indicators

According to Joint Commission (1989), an indicator is a measure that can be used as a guide to monitor, assess the quality of activities related to health services and others services of support provided to the patient. The indicator is not a direct measure of quality, but it is usually a rate or factor that helps to detect, monitor and control the main aspects in a hospital accreditation process.

Silva (1997) defines indicator such as "a theoretical construction designed to be applied to a collective, which produces a number for quantify some concept or something associated with collective". Thus, the basic feature of an indicator is its potentiality to measure a concept indirectly.

According with Paneque (2004), the development of good indicators is not an easy task and must be carried out by an interdisciplinary approach covering not only Medicine, but also the Hospital Management, Epidemiology and Statistics. Thus, a good indicator shall have at least four characteristics:

- **Validity**: reflects the aspect of quality for which was created or established and not another;
- **Reliability**: should generate the same result in identical circumstances;
- **Comprehensibility**: must be easily understood which aspect of quality indicator want to focus on;
- **Simplicity**: must be easy to manage, implement and explain.

Most of the hospital service quality indicators, for instance, the mortality rate and the reentrance rate, among others, vary according to the attention of health service provided, but they also depend on the state of patient severity treated by that hospital that was used as the unit of analysis.

Donabedian (1986), analyzing the methods to assess the health care quality, proposed that the evaluation was applied to three basic elements of the system:

- **Structure** corresponds to the characteristics relatively stable and necessary to the care process, covering the physical area, human resources (number, type, distribution and qualification), financial and material resources, information systems and normative instruments (technical and administrative), political support and organizational conditions;
- **Process** corresponds to the provision of assistance in accordance with standards set out and accepted by the scientific community on a given matter and the use of resources in their quantitative and qualitative aspects. Includes the recognition of problems, methods, diagnosis and care;
- **Outcome** corresponds to the consequences of the activities carried out in the health services, in terms of changes in the patient health state, considering also the changes related to knowledge and behavior, as well as the user and worker satisfaction, linked to treatment and services provision, respectively.

Even if the results constitute an indicator of medical care quality, is necessary to conduct simultaneous assessments of the structure and procedures used to know the reasons for the differences found, in order to improve the quality of health services. This approach is still used today and is considered one of the main tools to solve problems of monitoring the hospital quality.

According with Tanaka (2001), the classification of health indicators proposed by Donabedian (1986) allows identifying which aspects of health management need greater attention to the decision making.

2. The Commitment with Hospital's Quality Program - CHQP

Created in 1990, the Commitment with Hospital's Quality Program – CHQP – was the result of discussion between entities of the health area and hospitals located in Sao Paulo State and inspired in the work of the Joint Commission Accreditation Health Organizations (JCAHO).

After an initial project in April 1991, the CHQP started its activities in July of the same year, with the routing of communication to all hospitals in the Sao Paulo State (approximately 800 at that time), reporting about the objectives of the program, its methodology and inviting them to join, through fulfilling the Accession Term.

From the 200 hospitals which responded to this initial appeal, 120 hospitals have started actively its participation. Years after this number dropped to 80 and in the last quarter of 2007 is set at around 125 participants, mostly, located in the Sao Paulo State.

Table 1 presents the main hospital characteristics that make up the network of the CHQP.

Table 1 – Characteristics of the Hospitals that Make Up the CHQP

Locality	Sao Paulo (city) and its Metropolitan Region – 40.8%; Sao Paulo State Inland – 47.2%; Others States – 12.0%.
Legal	Public – 22.4%; Private Profit – 42.4%; Private Profit not – 35.2%.
Type of Establishment	General Hospitals – 80.0%; Gineco-obstetric – 6.4%; Psychiatric – 6.4%; Others – 7.2%.
Size (*)	Small – 9.6%; Medium – 47.2%; Large – 42.4%; Special – 0.8%.

Source: 2nd Copybook of Indicators CHQP – 2007.

(*) According with the Cherubin's Classification (1997).

According with Cherubin (1997) the hospitals may be classified by size, in accordance with its number of beds:

- Small – capacity to operate up to 49 beds;
- Medium – capacity to operate from 50 to 199 beds;
- Large – capacity to operate from 200 to 499 beds; and
- Special – capacity to operate upper than 500 beds.

Kept by the *Paulista* Association of Medicine and by the Regional Council of Medicine of Sao Paulo State is a program whose accession is a voluntary basis. The CHQP seeks to stimulate the self-assessment and the change in attitudes and behavior, in addition to privilege the collective work – primarily the multidisciplinary teams – to improve the processes of medical care and promote the exchange of information between their members.

Periodically, the hospitals affiliated to this network shall receive evaluation visits of a technical team and participate in meetings with the other hospitals for exchange experiences. They also may receive the accreditation stamp of the Standard Quality CHQP.

However, they must send to the *Paulista* Association of Medicine quarterly reports providing the required information on the results obtained in each of the indicators used for evaluation.

In accordance with the Second Copybook of CHQP Indicators published in 2007, the system involves 30 quality indicators (for more details see Annex I) that are evaluated quarterly, they are:

- | | |
|--|--|
| 1. Hospital Occupation Rate; | 17. Nosocomial Infection Rate (%); |
| 2. Average Residence time (days); | 18. Distribution of Nosocomial Infection by clinic/service (%); |
| 3. Average Residence time by clinics (days); | 19. Distribution percentage of nosocomial infections caused by topographical location; |
| 4. Renewal Index (patients/bed); | 20. Microbial agents identified in the cases of nosocomial infection; |
| 5. Index of Substitution Interval (days); | 21. Percentage of doctors with specialization; |
| 6. Institutional Mortality Rate (%); | 22. Value nurse/bed; |
| 7. Surgery Mortality Rate (%); | 23. Value nursing/bed; |
| 8. Rate of Suspended Surgery (%); | 24. Value staff/bed; |
| 9. Re-hospitalization Unscheduled Rate (%); | 25. Absenteeism Rate (%); |
| 10. Rate of Reentrance in adult ICU – during the same hospitalization; | 26. Human Resources Rotation Rate (%); |
| 11. Index of Laboratory Examinations per patient-day; | 27. Rate of Accidents at Work (%); |
| 12. Index of Examinations of Image Diagnostic per patient-day; | 28. Index of Training; |
| 13. Rate of cesáreas; | 29. Training activities by sector; |
| 14. Rate of cesáreas in primipara; | 30. Rate of Completion of the evaluations by user. |
| 15. Apgar score at first minute; | |
| 16. Apgar score at 5 th minute; | |

The *Paulista* Association of Medicine makes the data, drawing up a graph of the results for each indicator with the median point. The participant hospitals receive these curves in the form of report, in which, in addition to the central tendency, is pointed out the location of hospitals identified by codes. These indicator consolidations are presented in quarterly meetings, allowing the exchange of information between the network hospitals.

This information exchange results in an improvement for network and for all hospitals affiliated to the Program. In this sense the CHQP shows a concern with the transmission of knowledge between their affiliated. The network integration is one of the main advantages

offered by the program to their members. It reduces the uncertainty of participants adopting new procedures to achieve the desired quality in the services provision.

The CHQP offers a series of services and advantages for their members such as: management model for the quality; "benchmarking" with at least 100 hospitals in the Sao Paulo State; regular meetings of orientation and exchange of experiences; participation in events on quality; specific advice on control of hospital infection; search with the users; periodic evaluation visits by technical team; recognition of conformity (Seal of Accreditation); and the prize of National Health Management - PNGS.

About the "Accreditation", it is worth highlighting that this represents a certification carried out by an entity recognized, which involves aspects such as: facilities; training; objectivity; competence and organization integrity. It differs from the ISO 9000 certification because it goes beyond the recognition of the organization quality system. The accreditation evaluates the qualification and competence of both professionals and organization itself, in accordance with the standards.

Periodically, CHQP also realizes international events and courses based on its methodology that are open to the hospitals which participate of the program and to the others interested participants. CHQP also created the NAGEH - nucleus of support for the hospital management in the areas of: hospital infection; nursing; nutrition; pharmacy; customers; pediatric hospitals etc.

In agreement with Schiesari and Kisil (2003) the CHQP participated in 1998 at the Technical Group of Accreditation and adopted its roadmap to visit, by doing small changes. More recently its manual was adapted in order to incorporate the criteria recommended by the Foundation for the Prize National Quality.

Finally, we should highlight that in Brazil there are some other initiatives that have developed the health services quality, as well as the accreditation in the area, but the number of hospitals in Brazil that had their quality evaluated using the Brazilian Hospital Manual of Accreditation is still little significant, because in a universe of 7,543 hospitals, only 84 have the certificate of National Accreditation Organization (NAO) and there are few institutions certified by Joint Commission International.

3. Methodology

This article is a part of an exploratory-descriptive research type that is being developed at *Paulista* University - UNIP, based on a quantitative study carried out through the data collection of indicators from 33 general hospitals comprising the network of the “*Commitment with Hospital’s Quality Program*” – CHQP. These hospitals are being monitored quarterly by the *Paulista* Association of Medicine – APL and by the Regional Council of Medicine of the Sao Paulo State – CREMESP since last quarter of 2003.

It shall be adopted in this work a methodological model that uses theoretical-empirical analysis. Regarding the procedure methods it shall be used: quantitative and statistic methods.

Regarding the objective of this study is to analyze the indicators used by the Program “*Commitment with Hospital’s Quality Program*” – CHQP, developed in the State of Sao Paulo, Brazil, in order to improve the assessment system which gives the seal of accreditation, making this information be more transparent to administrators and health service users.

We used two quantitative methods. The first was based on the indicators used by CHQP and, obeying the classification proposed by Donabedian (1986), separated them on indicators of structure, process and outcome. From this classification was used a methodology similar to that of calculating the HDI - Human Development Index from UNDP - United Nations Development Program, created in 1990 by Mahbub ul-Haq (ex Minister of the Planning, Pakistan) based on the work of Prof. Amartya Sen, Nobel Prize in Economics in 1998.

Similarly to the calculation of the HDI, the HQI - Hospital Quality Index was obtained by simple arithmetic average of three sub-indices, referring to the dimensions Structure (HQI-E), Process (HQI-P) and Output (HQI-O). For the construction of each sub-indicators were classified the indicators used by the Program CHQP and each of the original data sets were normalized to a range that varies from zero to one, using the formula used to calculate the HDI, that is:

$$(\text{OV} - \text{WR}) / (\text{BR} - \text{WR})$$

Where:

OV – is the observed value of variable from a hospital;

WR – is the value of the worst result representing the worst situation of a variable;

BR – is the value of the best result representing the best situation of a variable;

The value of each sub-index for a hospital is obtained through the arithmetic average of the variables that compose it.

Remember that some of the indicators have a direct relation to quality because the higher value observed the higher quality standard of services provided by the hospital, while others follow an indirect relation to quality, that is, the lower value observed the lower quality standard of services provided by the hospital, so the hospital that gets the best results in one variable will receive the value 1.0000, while the one with the worst outcome will assign the value 0.0000. The construction of this quality index will provide a rank of the hospital position, easily understandable to the general public, evaluating also the consistency in terms of granting accreditation seal.

Instruments

Following the proposal of Donabedian (1986) which classifies the health indicators in three modalities: structure, process and outcome, this work tried to classify the indicators used by the CHQP for the assessment of affiliated hospitals to its network.

Also, we used the 2nd Copybook of Indicators CHQP, published in 2007, a system that uses 30 indicators (already mentioned in part 2 of this article), collected daily and consolidated quarterly, to be submitted during the meeting of program evaluation.

In Annex I is submitted a table showing the definitions of each of the indicators used by CHQP, which helps understanding how these were classified according to the proposal of Donabedian (1986).

The database was obtained from the CHQP, however, without identifying the participants, since the secrecy of identity is a value guaranteed to the hospitals at the time of membership.

The sample

We highlight that for the purposes of this article, it was selected only the last quarter of 2007.

From this set were deducted the "specialized hospitals", in order to standardize the sample. By this way, the sample consists solely of "general hospitals", since the specialized hospitals may submit a large variation in some indicators by its own characteristics, in relation to general hospitals.

Even with a sample composed only by "general hospitals", we consider that there will be differences between them due to its location, their operational procedures and even to issues of its institutional profile and delivery charges, which lead us to suggest that there will be differences in the results of their indicators.

In this way, the sample used in information processing meets 33 general hospitals (40.8%) of the total of hospitals (general and specialized) which have remained in the program during the period 2003/2007.

Table 2 presents the main characteristics of the sample such as the size of hospital, legal nature of the venture, its geographical localization and the stage of accreditation.

Table 2 - Characteristics of General Hospitals in the Sample

CHARACTERISTICS		NUMBER OF HOSPITALS			
SIZE	ACCREDITATION	PUBLIC	PRIVATE NON PROFITABLE	PRIVATE PROFITABLE	TOTAL
SMALL	With	1			1
	Without		1		1
	Subtotal	1	1	0	2
MEDIUM	With		3	2	5
	Without	3	1	4	8
	Subtotal	3	4	6	13
LARGE	With	2	3	3	8
	Without	3	3	4	10
	Subtotal	5	6	7	18
LEGAL NATURE		9	11	13	33
ACCREDITATION	With	3	6	5	14
	Without	6	5	8	19
LOCALIZATION	Metropolitan Region of Sao Paulo	8	5	6	19
	Interior of São Paulo State	1	4	6	11
	Others States	0	2	1	3

Source: the authors.

Analysis and selection of used indicators

Several reasons led us to use only 17 of the 32 indicators used by the CHQP to construct the Hospital Quality Index. Initially we discarded two indicators – the cost of clothes washed per kilogram and the average cost of the meal – since both constitute indicators of administrative efficiency and are not directly related to hospital quality.

About the indicators linked with Maternity (#15 and #16) – Apgar Score at the first minute and Apgar Score at 5th minute – were withdrawn of sample by the following reasons: The Apgar Scores are important to measure the quality of infant health, but these are more dependent on a series of external factors the hospital, for instance, the socio-economic level, the parent health that generated the child and the often of pre-natal care, rather than the hospital quality that met the parturient.

Five other indicators were also withdrawn from the sample since they are sector related or specific indicators, despite their importance for internal evaluation of hospital services, they are:

- #03 - Average Residence Time by Clinic (the indicator number 02 - Average Residence Time sums up the information contained in the analyzed model);
- #18 - Distribution of Nosocomial Infection by Clinic/Service (the indicator “Hospital Infection Rate” shall be used in the model);

- #19 - Percentage Distribution of Nosocomial Infections Caused by Topographical Location (idem the previous);
- #20 - Microbial Agents Identified in the Cases of Nosocomial Infection (idem);
- #29 - Training Activities by Sector (in the model it will be used the index of training, which is general).

More five very important indicators were not listed in the table due to the lack of information by several hospitals belonging to the sample, they are:

- #09 – Rate of Rehospitalization Unscheduled;
- #10 - Rate of Reentrance in Adult ICU – during the same internment;
- #13 - The Rate of Cesáreas;
- #14 - The Rate of Cesáreas in Primipars;
- #21 – Percentage of Doctors with Specialist Titles;
- #30 – Rate of Evaluation Forms filled by users that constitute an internal evaluation of the hospital in order to control if the information given by customers about its satisfaction was collected.

The results of the quality evaluation conducted by the customer hospital/patient, which would be a fundamental construct in the model - *Customer Satisfaction* - is not passed along by hospitals of the network to the *Paulista* Association of Medicine being used only internally by the hospitals.

We emphasize that the absence of indicators # 09 and # 10 of this last relation will inevitably bring a substantial loss of information for the developed model, because both indicators demonstrate the occurrence of common failures that need to be eliminated in order to hospitals have a good quality standard.

Table 3 presents the indicators that will be object of this research, in accordance with the classification proposed by Donabedian (1986). This classification was validated by Prof. Dr. Oswaldo Y. Tanaka, of Faculty Public Health – FSP/USP, Brazil.

Table 3 – Classification of the Indicators in Accordance to the Model

Structure	<ul style="list-style-type: none"> – # 22 [RNB] Rate nurse/bed (d) – # 23 [RNG] Rate nursing/bed (d) – # 24 [RSB] Rate staff/bed (d) – # 28 [ITR] Index of Training (d)
Process	<ul style="list-style-type: none"> – # 01 [HOR] Hospital Occupation Rate (d) – # 02 [ART] Average Residence time (i) – # 04 [RNW] Renewal Index (d) – # 05 [IIS] Index of Interval of Substitution (i) – # 08 [RSS] Rate of Suspended Surgeries (i) – # 11 [ILE] Index of Laboratory Examinations per patient-day (d) – # 12 [IID] Index of Image Diagnostic Examinations per patient-day (d) – # 27 [RAW] Rate of Accidents at Work (i)
Outcome	<ul style="list-style-type: none"> – # 06 [IMR] Institutional Mortality Rate (i) – # 07 [SMR] Surgery Mortality Rate (i) – # 17 [NIR] Nosocomial Infection Rate (i) – # 25 [ABR] Absenteeism Rate (i) – # 26 [HRR] Human Resources Rotation Rate (i)

Source: the authors.

Notes: (d) directly related with hospital quality

(i) indirectly related with hospital quality

5. Results

This section presents the results obtained by the methodology of the IHC Construction - Index of Hospital's Quality. Despite the limitations raised so far, the construction of this index will use information from the final quarter of 2007 from 33 hospitals affiliated with CHQP, participating in this network since late 2004.

After collection and data consistency, we examined each variable on the type of relationship it keeps with the hospital quality, the direct or indirect, and we applied the typology proposed by Donabedian (1986). Building the following expressions:

$$\text{HQI-S} = (\text{RNB} + \text{RNG} + \text{RSB} + \text{ITR}) / 4$$

$$\text{HQI-P} = (\text{HOR} + \text{ART} + \text{RNW} + \text{IIS} + \text{RSS} + \text{ILE} + \text{IID} + \text{RAW}) / 8$$

$$\text{HQI-O} = (\text{IMR} + \text{SMR} + \text{NIR} + \text{ABR} + \text{HRR}) / 5$$

$$\text{HQI} = (\text{HQI-S} + \text{HQI-P} + \text{HQI-O}) / 3$$

Table 4 – Observed Values for each variable

	VARIABLES	RELATION	Observed Values	
			BEST	WORST
Structure	[RNB] Rate nurse/bed	Directly	0.82	0.08
	[RNG] Rate nursing/bed	Directly	2.90	0.83
	[RSB] Rate staff/bed	Directly	10.70	2.68
	[ITR] Index of Training	Directly	42.71	0.00
Process	[HOR] Hospital Occupation Rate	Directly	100.00	18.65
	[ART] Average Residence time	Indirectly	2.26	10.73
	[RNW] Renewal Index	Directly	9.07	0.46
	[IIS] Index of Interval of Substitution	Indirectly	0.00	1.66
	[RSS] Rate of Suspended Surgeries	Indirectly	0.00	22.97
	[ILE] Index of Laboratory Examinations per patient-day	Directly	32.91	1.11
	[IID] Index of Image Diagnostic Examinations per patient-day	Directly	7.80	0.15
	[RAW] Rate of Accidents at Work	Indirectly	0.00	1.43
Output	[IMR] Institutional Mortality Rate	Indirectly	0.01	0.07
	[SMR] Surgery Mortality Rate	Indirectly	0.00	2.05
	[NIR] Nosocomial Infection Rate	Indirectly	0.17	9.47
	[ABR] Absenteeism Rate	Indirectly	0.00	8.00
	[HRR] Human Resources Rotation Rate	Indirectly	0.19	7.69

Source: the authors.

Calculating the indices and the index of hospital quality (HQI) arrives at the result shown in Table 6. This table provides a ranking of hospitals in the sample, from best to worst of HQI, and also details the situation of HQI-S, HQI-P and HQI-O.

As the HQI and its sub-indices range between 0.0000 and 1.0000, we used the following scale to evaluate the situation of each hospital:

- “Excellent quality” – from 0.8001 to 1.0000;
- “Good quality” – from 0.6001 to 0.8000;

- “Regular quality” – from 0.4001 to 0.6000;
- “Low quality” – from 0.2001 to 0.4000;
- “Bad quality” – from 0.0000 to 0.2000.

From the results of Table 6 shows that none of the hospitals participating in the network CHQP achieved an excellent standard of its services. Among the 8 hospitals that had the best results, 2 had not received the seal of accreditation. Of these, 3 were public hospitals, 3 were private profit hospitals and the 2 others are private non-profit. About the hospital's size only 1 is small and 3 are great. Most of them (62.5%) are located in the Metropolitan area of Sao Paulo.

The second group consists of 24 hospitals (72.7% of the sample) that show medium pattern of hospital quality, even though 8 hospitals had received the seal of accreditation. Finally, the last hospital is public, sited in the Metropolitan Region of Sao Paulo and presents a low level of hospital services, not being a hospital with accreditation.

Table 6 – Quality Hospital Index from CHQP

ID	HQI-S	HQI-P	HQI-O	HQI	Rank position	HQI-S	HQI-P	HQI-O	HQI
27	0.8319	0.6582	0.6384	0.7095	1	EXCELLENT	GOOD	GOOD	GOOD
11	0.5465	0.6877	0.7039	0.6460	2	REGULAR	GOOD	GOOD	GOOD
21	0.6464	0.6118	0.6414	0.6332	3	GOOD	GOOD	GOOD	GOOD
23	0.5398	0.5307	0.8258	0.6321	4	REGULAR	REGULAR	EXCELLENT	GOOD
20	0.5472	0.6939	0.6152	0.6188	5	REGULAR	GOOD	GOOD	GOOD
5	0.4452	0.6834	0.7062	0.6116	6	REGULAR	GOOD	GOOD	GOOD
12	0.4976	0.6799	0.6543	0.6106	7	REGULAR	GOOD	GOOD	GOOD
17	0.4469	0.4879	0.8758	0.6035	8	REGULAR	REGULAR	EXCELLENT	GOOD
28	0.5039	0.4707	0.8096	0.5947	9	REGULAR	REGULAR	EXCELLENT	REGULAR
18	0.4325	0.5681	0.7471	0.5826	10	REGULAR	REGULAR	GOOD	REGULAR
2	0.4294	0.5599	0.7361	0.5752	11	REGULAR	REGULAR	GOOD	REGULAR
14	0.4966	0.6238	0.5862	0.5689	12	REGULAR	GOOD	REGULAR	REGULAR
30	0.3762	0.5165	0.7566	0.5498	13	LOW	REGULAR	GOOD	REGULAR
19	0.3576	0.593	0.6987	0.5498	14	LOW	REGULAR	GOOD	REGULAR
1	0.3146	0.6108	0.7031	0.5428	15	LOW	GOOD	GOOD	REGULAR
4	0.3664	0.6776	0.5790	0.5410	16	LOW	GOOD	REGULAR	REGULAR
16	0.4017	0.6002	0.6068	0.5362	17	REGULAR	GOOD	GOOD	REGULAR
32	0.3042	0.6237	0.6658	0.5312	18	LOW	GOOD	GOOD	REGULAR
33	0.2915	0.5183	0.7811	0.5303	19	LOW	REGULAR	GOOD	REGULAR
3	0.4552	0.5495	0.5664	0.5237	20	REGULAR	REGULAR	REGULAR	REGULAR
6	0.2687	0.5806	0.6984	0.5159	21	LOW	REGULAR	GOOD	REGULAR
7	0.2055	0.6003	0.7071	0.5043	22	LOW	GOOD	GOOD	REGULAR
22	0.2236	0.5412	0.7249	0.4966	23	LOW	REGULAR	GOOD	REGULAR
24	0.2529	0.5958	0.6168	0.4885	24	LOW	REGULAR	GOOD	REGULAR
26	0.1906	0.5602	0.7086	0.4865	25	BAD	REGULAR	GOOD	REGULAR
31	0.2828	0.6202	0.5542	0.4857	26	LOW	GOOD	REGULAR	REGULAR
8	0.1437	0.5962	0.6849	0.4749	27	BAD	REGULAR	GOOD	REGULAR
29	0.2988	0.5327	0.5781	0.4699	28	LOW	REGULAR	REGULAR	REGULAR
15	0.3531	0.372	0.6319	0.4523	29	LOW	LOW	GOOD	REGULAR
10	0.2438	0.4993	0.5970	0.4467	30	LOW	REGULAR	REGULAR	REGULAR
13	0.0596	0.608	0.6075	0.4250	31	BAD	GOOD	GOOD	REGULAR
9	0.1275	0.5098	0.5758	0.4044	32	BAD	REGULAR	REGULAR	REGULAR
25	0.0923	0.3253	0.6462	0.3546	33	BAD	LOW	GOOD	LOW

Source: The authors

More information can be extracted from Table 6. Analyzing the sub-indices becomes clear that hospital administrators should pay more attention to the issue of structure, since only one hospital (No. 27) presents an excellent standard of HQI-S, and another one presents a good standard of HQI-S. Among the 21 hospitals with Hospital Quality Index "good" or "regular", 19 have problems to be solved related with structure.

About the HQI-P is observed that no hospital presents standard of excellence with regards to their procedures. 42.4% of hospitals participating in the sample have a good standard in quality of its processes and only 2 hospitals need improve because they show a low pattern of procedures.

Finally, with respect to the HQI-O there is a better situation. There aren't Hospitals with patterns low or bad in this index. 23 hospitals (69.7%) have a good standard of results, whereas 3 have reached the standard of excellence.

6. Final Remarks

The search for hospital quality has used a series of indicators, which are interconnected forming a complex set of variables that may assist the business management and the process of decision making.

This article was organized to answer if the relationships between indicators of structure, process and outcome proposed by Donabedian could be an easy way to detect the main problems that a hospital manager should be aware to solve and reach the hospital quality services. Moreover, the idea of building an index of hospital quality easy to understand for customers, aids hospitals to provide transparency about quality of services extremely complex that they do.

Several problems occurred with the data bank, which prevented the full exploitation of the indicators used by the CHQP. As we have seen in sections 4 and 5, from 30 indicators raised by the Program, it was remaining only 17. The final result suggests a series of problems and possible suggestions to circumvent this situation.

Among the problems found which effectively corroborated for these poor results, we highlight:

- The fact that the sample being small, covering only 33 general hospitals. If all the general hospitals that belonged to the network in the 4th quarter of 2007 had sent their indicators to the Association *Paulista* of Medicine, this problem, probably, would be solved;
- At least three very important indicators had to be retired of the indicator set that composes the model due to the lack of information on the part of several hospitals belonging to the sample. One of these are structure indicators: # 21 -

Percentage of Doctors with Specialization. The others are process indicators and they indicate flaws relative to the hospital adopted process, they are: # 09 - Re-hospitalization Unscheduled Rate and #10 - Rate of Reentrance in Adult ICU - during the same hospital.

We highlight that although the four indicators that form the construct Structure show high significance, it would be desirable that these covered other aspects besides the relative ones to human resources, for instance, linked subjects to the readiness or use of equipments, facilities, ambulances etc.

It was found that the biggest problem presented by the hospitals that make up this network CHQP is located on issues relating to the structure. In developing countries like Brazil, there is lack of financial resources for investment to a more appropriate structure of services, at least in public hospitals. But this article shows that even private hospitals (profit and nonprofit) have shortcomings regarding the factors which form the backbone of its services.

Finally, it can be suggested that the model is enlarged with one more construct regarding the Customer Satisfaction, built from the evaluation done by the customers, involving: structural aspects of the hospital; the aspects linked to the procedures adopted by doctors, nursing and support personal, not just the linked ones to the acting of their functions, attributions and professionals, but also involving the human relationship with patients and their relatives.

7. Bibliography

Adler, P. S. and Kwon, S. W. 2002. Social Capital: Prospects for a New Concept. **Academy of Management Review**, v. 27, n. 1, pp. 17-40.

Arbuckle, J. L. 1997. *AMOS users' guide: version 3.6*. Chicago: SPSS.

Berwick, D. M. 1995. *Melhorando a qualidade dos serviços médicos, hospitalares e da saúde*. São Paulo (SP): Makron Books.

Brito, J. 2005. *Cooperação Tecnológica e Aprendizado Coletivo em Redes de Firms: sistematização de conceitos e evidências empíricas*. Departamento de Economia – UFF.

Cherubin, N. A. and Santos, N. A. 1997. *Administração Hospitalar – Fundamentos*. São Paulo: CEDAS.

Chin, W. W. and Gopal, A. 1995. Adoption Intention in GSS: relative importance of beliefs. **Data Base Advances**, v. 26, n. 2-3, pp. 42-64, may/aug.

De Geyndt, W. 1994. Managing the Quality of Health Care in Developing Countries. **World Bank Technical Papers**, n. 258.

- Donabedian, A. 1980. *Explorations in quality assessment and monitoring. The definition of quality and approaches to its assessment*. Ann Arbor Mich.
- Donabedian, A. 1986. Approaches to assessment: What to assess in evaluating the quality of medical care? **Milbank Mem. Fund. Quart.**, 44, pp.167-170
- Donabedian, A. 1991. Una aproximación a la monitorización de la calidad asistencial. **Control Calidad Asist.**, pp. 31-39.
- Figueiredo, S. P. 2005. *Gestão do conhecimento: estratégias competitivas para a criação e mobilização do conhecimento na empresa*. Rio de Janeiro: Qualitymark.
- Gonzales, C. 2008. *Cooperação e Transferência de Conhecimentos em uma Rede de Serviços de Saúde: O caso da rede de hospitais filiados ao Programa CQH – Compromisso com a Qualidade Hospitalar. Relatório de Qualificação de Mestrado em Administração apresentado a UNIP – Universidade Paulista. São Paulo. Mimeo.*
- Hair, Joseph F. Jr. et al. 1998. *Multivariate Data Analysis*. (Fifth Edition). New Jersey: Prentice Hall.
- Inkpen, A. C. and Tsang, E. W. K. 2005. Social Capital, Networks, and Knowledge Transfer. **Academy of Management Review**, v. 30, n. 1, pp. 146–165.
- Joint Commission (1989). Agenda for Change – Characteristics of Clinical Indicators, **QOR – Quality Review Bulletin**, v. 15, n. 11.
- Lara, C. R. D. 2004. *A atual gestão do conhecimento*. São Paulo: Nobel.
- Luft, H. S. and Hunt, S. S. 1986. Evaluating individual hospital quality through outcome statistics. **JAMA**, pp. 255-278.
- Mackenzie, S. B.; Podsakoff, P. M.; Jarvis, C. B. 2005. The Problem of Measurement Model Misspecification in Behavioral and Organizational Research and Some Recommended Solutions. **Journal of Applied Psychology**, v. 90, n. 4, pp. 710–730.
- Paneque, R. E. J. 2004. Indicadores de calidad y eficiencia de los servicios hospitalarios. Una mirada actual. **Rev Cubana Salud Pública**, v. 30, n.1, Ciudad de La Habana, jan-mar.
- Schiesari and Kisil. 2003. A avaliação da qualidade nos hospitais brasileiros. **Revista de Administração de Saúde**, v. 5, n. 18 – jan-mar.
- Silva, L. C. Escalas e indicadores. 1997. In: Silva, L. C. *Cultura estadística e investigação científica en el campo de la salud. Una mirada crítica*. Chap.3. Madrid, Díaz de Santos, pp.43-58.
- Tanaka, O.Y. and Melo, C. 2001. *Avaliação de Programas de Saúde do Adolescente - um modo de fazer*. São Paulo: Edusp.
- Zanon, U. 2000. Qualidade da Assistência Médico-hospitalar: conceito e avaliação de indicadores. **Revista de Administração de Saúde – RAS**, v. 2, n. 8 – jul-sep.

ANNEX I – Definition of the indicators used by CHQ Program

1. Hospital Occupation Rate Percentage - Ratio between the number of patient-days¹ and number of bed-days² in a given period.
2. Average Residence time (days) - Relationship between the number of patient-days and total output³ in a given period.
3. Average Residence time by clinics (days) - Relationship between the number of patient-days for clinic /service and the total output for clinical service in a given period.
4. Renewal Index (patients/bed) - Relationship between the total output and number of beds⁴ in the period. Indicates how many patients took the same bed in the period.
5. Index of Substitution Interval (days) - Relationship between one least the hospital occupancy rate multiplied by the average time of stay; divided by hospital occupancy rate. Indicates the days of idleness beds.
6. Institutional Mortality Rate (%) - Percentage ratio between the number of deaths after 24 hours of hospitalization and total output in a given period.
7. Surgery Mortality Rate (%) - Percentage ratio between the number of deaths in surgery⁵ and the number of surgeries performed⁶ in a given period.
8. Rate of Suspended Surgery (%) - Percentage ratio between the number of surgeries and number of suspended surgeries scheduled in the month. Accompanying surgeries suspended for reasons that do not depend on the patient.
9. Re-hospitalization Unscheduled Rate (%) - Percentage ratio between the number of unscheduled readmissions for the same cause, or causes associated with up to 15 days of hospital discharge and the total output.
10. Rate of Reentrance in adult ICU – during the same internment - Percentage ratio between the number of returns in the ICU - Adult during the same hospitalization and number of exits from the ICU - Adult in the same period.
11. Index of Laboratory Examinations per patient day - Relationship between the number of laboratory tests for patients and the number of exits. Monitors the amount of tests by hospitalized patients.
12. Index of Examinations of Image Diagnostic per patient day - Relationship between the number of tests for diagnosis by imaging and the number of exits.
13. Rate of Cesáreas Percentage ratio between the number of cesarean sections and the number of births⁷.

14. Rate of Cesáreas in primiparous - Percentage ratio between the number of cesarean sections in primiparous⁸ and number of births in primiparous. Tracks the number of cesarean sections performed in the first birth.
15. Apgar score at first minute - Percentage ratio between the number of babies with Apgar score greater or equal to 7 in the first minute of life and the number of liveborn⁹.
16. Apgar score at 5th minute Percentage ratio between the number of births with Apgar score greater or equal to 7 at 5 minutes of life and the number of live-born.
17. Nosocomial Infection Rate (%) - Percentage ratio between the number of episodes of nosocomial¹⁰ infections and the number of exits in the period.
18. Distribution of Nosocomial Infection by clinic/service (%) - Percentage ratio between the number of episodes of nosocomial infections by clinical / service and the number of exits by clinical service.
19. Distribution percentage of nosocomial infections caused by topographical location¹¹ - Percentage ratio between the number of nosocomial infections by geographical location and the number of infection episodes in the hospital.
20. Microbial agents identified in the cases of nosocomial infection - Percentage ratio between the number of cases by the microbial¹² agent and the number of episodes of nosocomial infections in the period.
21. Percentage of doctors with specialization - Relationship between the percentage of specialist physicians with title and number of doctors.
22. Value nurse/bed - Relationship between the number of nurses and the number of beds.
23. Value nursing/bed - Relationship between the number of nursing staff¹³ and the number of beds.
24. Value staff/bed - Relation between total number of active employees and outsourced and the number of beds in the hospital.
25. Absenteeism Rate (%) - Percentage ratio between the number of hours / man missing and the number of man / hours worked.
26. Human Resources Rotation Rate (%) - Relationship between the percentage of total admissions and disconnections divided by two, and number of employees active in the hospital register system.
27. Rate of Accidents at Work (%) - Percentage ratio between the number of accidents at work and the number of active employees in the hospital register system.

28. Index of Training - Relationship between the number of hours of staff in courses and the number of hours worked.
29. Training activities by sector - Relationship between the number of hours of staff trained by sector over a given period and the total number of hours per man trained in the period.
30. Rate of Completion of the evaluations by user - Percentage ratio between the number of assessments forms filled and the total output in the month.

Source: Adapted by the authors from the indicators in the second book of Terms of indicators of CHQ Program.

OBS: In the list of indicators collected by the CHQ Program, two indicators of administrative efficiency do not appear in this table, these are the cost of clothes washed per kg and average cost of meal.

Notes:

- 1 Number of patient-days: the number that represents the care given to a patient hospitalized for a day in the hospital.
- 2 Number of bed-days: number representing the amount of beds available for admission in a day at the hospital.
- 3 Number of outputs: total number of patients from the unit of hospitalization that left the hospital due to release, evasion, external transfer or death.
- 4 Number of beds: total number of beds numbered and identified for the hospitalization of a patient within the hospital, which is the unique address of a patient during their stay. Beds for observation, post anesthetic recovery or postoperative, cradles of healthy newborn babies, pre-delivery and delivery beds blocked because of transient reasons are not considered.
- 5 Operative deaths: total number of deaths in the month, during surgery or post-operatively up to seven days.
- 6 Surgeries performed: surgeries performed in surgical environment (surgical center, obstetric-center, outpatient surgery unit). Not include surgical procedures performed in the PS, ICU and practice offices.
- 7 Number of births: sum of normal deliveries, cesarean sections and forceps, including stillbirths. Abortions (born less than 500 grams or less than 20 weeks of gestation) are not considered.
- 8 Primiparous: first delivery.
- 9 Number of live births, is the number of live births over the complete expulsion or extraction from inside the body of the mother, regardless of the duration of pregnancy, a product of conception which, after separation, breathe or provide any other sign of life.
- 10 Number of nosocomial infection episodes: total number of infections acquired after 72 hours of admission of patients in hospitals and that manifests itself during hospitalization or after discharge.
- 11 Number of episodes of nosocomial infections by topographic location: number of nosocomial infections in different locations: systemic, vascular access, skin, gastrointestinal tract, surgical wound, pneumonia, urinary tract and others.
- 12 Number of cases per agent microbial: total number of microorganisms identified in cases of nosocomial infections.
- 13 Nursing staff: nursing auxiliaries and technicians registered with COREN - Regional Council of Nursing.