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# Quality Health Services and Innovation: A Brazilian Perspective

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Quality health services need to be re-thought, in order to attend a growing regional public. In Brazilian context, this article explores the possibility of integration between the themes of healthcare service and innovation through the analysis of the variables of quality in Primary Care. Innovation gives a differentiated response to the needs in global health, as it represents the change that encourages the development of organizations and leads to higher efficiency of their processes through the appropriate allocation of resources, and hence the improvement of epidemiological indicators. According to the literature, innovation can occur in any sector of the economy, including government services, such as health and education, and is a synonym for change. A multiple cases study was realized in 15 Basic Health Units that are part of the Health System of Caxias do Sul (Brazil) in the Family Health Strategy. The survey results demonstrate the existence of association and a significant influence of the type of innovations with the scores of the Primary Care Assessment Tool. The article highlights the debate about the quality of services, the health practices and the innovations implemented to stimulate quality in services and health practices. At the organizational level, such contribution presents a local diagnosis of innovation in the context of health care actions, demonstrated by the relationship of the variables to be implemented, for the proper development of local health resources and promoting quality of life for the local population.

**Key-words:** Primary Care, Quality Health Services, Innovation

## Introduction

The Brazilian Constitution of 1988 calls for the amplitude of the right to health in order to achieve the welfare and social good, by ensuring universal access to health services and actions, contextualized through the municipalization of services. Thus, according to Pereira (2004), from the First National Conference on Science and Technology in Health, in 1994, the administrative structure of government and public policy efforts are directed towards the understanding of innovation in this context in order to ensure legal assumptions.

Inserted in a municipalization context, those actions are organized in the form of integrated healthcare networks, presenting as a core manager to Primary Care (PC). Then the PC represents a form of organization of health services that responds to a specific health care structure with its own values, principles and elements that act as a regulator of an indiscriminate and marketing of health services, characterized as the "first gate" of the system health for the health actions (Starfield, 2002; Cooper, 2008).

Innovation is described by Tidd, Bessant and Pavitt (2005) as the key process associated with a renewal within the organization, which revives what it has to offer and, how it creates and distributes such offer.

Thus, the organizations are forced to innovate to gain a differential, suggesting a dynamic organization in a complex network of relationships, knowledge production; as essential elements for the economic and social development of a region (Tigre, 2006). Innovative organizations are the ones that offer new products and adopt or put in place new processes or services as a means to add value and reduce costs.

According to the Oslo Manual (OECD, 2005), innovation can occur in any sector of the economy, including government services, such as health and education and is a synonym for change. Thus, this paper explores the possibility of integration

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between the dimensions of innovation and the variables of the Primary Care Assessment Tool that characterize the quality of service.

## Theory

### *The concept of innovation*

For Dosi (1982), the concept of innovation refers to the search, discovery, experimentation and adoption of new products, processes and new organizational forms. Hesselbein (2002), asserts that innovation is identified as a change that creates a new dimension of performance. This change may come from a new idea, which may be the result of a recombination of old ideas, in a scheme that challenges the present order, or else, a formula or approach that is perceived as new by the actors involved.

Thus, innovation is a process of searching and learning that is socially determined and strongly influenced by specific organizational and institutional patterns, such as regional diversity, local conditions, and so on. Therefore, it is possible to identify differences between the innovation systems from one country to another, or from one region to another within the same country and even from one location to another within the same region (Cassiolato and Lastres, 2000).

For Miedzinski (2006), the processes of innovation are not confined to laboratories and universities, but involve business, the financial sector, public authorities, NGOs and the civil society, which presents far-reaching consequences for the economy's performance and quality of life.

In the area of health services, it is observed that innovations are also influenced by the actors that constitute their source of funding from either types: products or services, case management (organisational1- the mental process) and marketing (competitive position) (Bessant and Tidd, 2007). These categories are also corroborated by the Oslo Manual (OECD, 2005).

According to Gallouj (1997), the classification of the method of the Oslo Manual (OECD, 2005), brings results interpretation problems, by presenting restrictive settings to the industrial sector, and by turning itself to technological innovations. However, embracing the context performed on the dimensions of innovation and by representing the main guidelines for collecting and interpreting innovation data, this classification was selected for this study.

### *Primary Care*

According to Starfield (2002), Primary Care is a differentiated conception of Health System. In Brazil, it can be considered that the health system is in tune with the PC, from the moment that an institution has identified its values and principles, through the guidance of the national health priorities, according to the Federal Constitution of Brazil in 1988. In other words, it is a Unified Health System (UHS), aimed to emphasize social equity, universality and comprehensiveness of health (Mendes, 2007).

In a local context, the PC must meet, in the health care networks, three functions: the resolution function, the function of coordination and accountability function for the entire system to work efficiently (Conass, 2007). The relevance of PC, for the conformation of health sites has led some authors to classify it as a global megatrend (Rubinstein, 2001).

Thus, it emphasizes the fundamental aspect of optimization of health services under the framework of the PC as a guarantee of service depending on the trends identified in the setting of temporal evolution of health care in many countries, such as population growth, urbanization, population aging and increases in health spending.

As a result of the growing evidence that the PC concept is decisively contributing to improve health outcomes of populations, Starfield, Shi and Jiahong (2001) developed and validated an instrument called Primary Care Assessment Tool (PCATool), which constitutes an assessment of the structure and processes of the services provided in health care. This questionnaire assesses how health services are geared towards the defining attributes of PC, in four essential and three derived attributes that represent the working process of the structure of health care.

Mendes (2007) states that the Basic Health Units (BHU) represent the consolidation local for the PC communication, because it is understood that it corresponds to the first step in the health service process therefore, the first contact with the health problems of the population. In Brazil, since the organization of PC is delegated to Municipal Management and the transfers of Federal funds are automatic, its main strategy of revitalization is the Family Health Strategy (FHS), which was introduced in 1994, denominated under the term Family Health Program (FHP), which has received significant financial incentives aimed at expanding the population coverage and care reorganization.

Therefore, it is evident that the health sector is characterized by complex inter-sectorial relationships that foster innovations that are in conjunction with the economic dynamics, institutions and public policies; representing an area of great accumulation of knowledge to promote policies and local development (Gadelha, Azevedo, Ponte, Trindade, and Hamilton, 2007). Thus, it appears that the development of the structure of the health system can help improve the actions, in providing services to the population, and consequently aid for the economic and social development of the region.

Thus, from the theoretical framework, it was possible to highlight an approximation of the different dimensions of the variables that establish a list of studies about innovation and the score PCA Tool for PC in Caxias do Sul, as presented in Table 1.

**Table 1 - Research variables**

| | Research Variables | Highlighted Concepts | Source Consulted |
|---|---|---|---|
| PCATOOL | Access | Unit accessibility.<br>Access to care.<br>Use the unit as a place of first contact. | Starfield (2002),<br>Starfield et al., (2001),<br>Vuori (1992),<br>World Health Organization (2005),<br>Mendes (2007),<br>Macinko and Almeida (2004),<br>Gofin andGofin (2005),<br>Exter, Hermans, Dosljak, and Busse (2004) |
| | Longitudinality | Definition of elective population.<br>Knowledge of the patient and its social environment.<br>Extent and strength of the relationship with patients. | |
| | Coordination | Mechanisms for continuity.<br>Recognition of information and prior consultation and of referral. | |
| | Integrality | Spectrum of services available.<br>Primary and secondary preventive activities.<br>Recognition and management of health problems. | |
| | Family orientation | Knowledge of family members and health problems of the family. | |
| | Community orientação | Knowledge of the health needs of the community.<br>Participation in community activities. | |
| | Cultural Competence | Special needs treatment associated with the cultural characteristics.<br>Provision of special services to meet the cultural characteristics. | |
| INNOVATION | Product (Good or service) | Introduction of a new good or service or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, ease of use, or other functional characteristics. | Schumpeter (1912), OECD (2005),<br>Ahmed (2001),<br>Damanpour, Szabat and Evan (1989),<br>Hesselbein (2002), Higgins (1995),<br>Malerba (2001), Tidd et al. (2005) |
| | Process | Implementation of a new method of production or distribution or significantly improved. This includes significant changes in techniques and equipment. | |
| | Marketing | Implementation of a marketing method with significant changes in product design or packaging, product positioning in its promotion or pricing. | |
| | Organizational | Implementation of an organizational method in business practices of the institution, organizing the workplace and its external network. | |

*Source: Prepared by the authors (2012)*

### *Method*

In the previous phase of this article, the data used for analysis was constructed from a case study, in two phases: qualitative and quantitative. The qualitative phase aimed to explore and compare the theory with practice, provided a greater familiarity with the problem. Based on Yin (2005), the following data collection instruments for the qualitative survey were used: literature search, registry files in the Municipal Health Secretariat of Caxias do Sul, semi-structured interviews with managers of BHU, observation and analysis of other documents such as meeting minutes and reports. Thus it was possible to identify a number of innovations in accordance with the classification of the Oslo Manual (OECD, 2005). The data was treated with content analysis according to Bickman and Rog (2009).

In the quantitative phase, a closed-ended questions questionnaire was used, which allowed a rigorous analysis from which measurements are free from random errors. Robson (2011) points out that a quantitative research is a social research method that uses statistical techniques that typically involves the construction of questionnaire surveys. This questionnaire called PCATool, validated internationally, contains 110 questions that enables the identification and quantification of the essential attributes and derivatives underlying the classification of PC. Based on the method theory, the scores for each attribute are constructed from the arithmetic mean of the responses and then standardized on a scale of 0 to 10. The mean score per attribute provides an overall score of the service orientation for PC. This score has been awarded the threshold of 6.6; where exceeding this value, it represents a higher score and, where being less than that amount, it is classified as a lower score (Starfield et al., 2001).

It is noteworthy that the data collection instrument, composed by semi-structured interviews and questionnaires, was first applied in a pre-trial pattern with specialists, and subsequently validated with the Municipal Health Service (MHS), in order to check for clarity information described, understanding and consistency of responses. Furthermore, the results regarding the classification of innovations also obtained validation with experts from the MHS of Caxias do Sul.

Thus, from a population of 41 BHU that comprise the whole Healthcare System of Caxias do Sul, a sample of 15 BHU was selected, all with an active FHS program; possibilitate to the conduction of this study. The general characteristics of the selected BHU are summarized in Table 2.

Thus, with the help of qualitative techniques, it was possible to do a rigorous result interpretation, screening them through quantitative techniques (Alves-Mazzotti and Gewandsznajder, 1999). Therefore, to consolidate the attributes identified in the qualitative phase for the identification of the variables for this research; were realized in this second phase, statistical analyzes based on the linear correlation coefficient of Pearson (r), to measure the strength and the direction of the linear relationship between both variables, and the coefficient of determination (r2) and linear regression, in order to identify the strength of the relationship between the variables selected for this study and the influence of one variable on another (Hair Jr. et al., 2006). The dependent variables refer to product innovation, process, organizational and marketing, and the independent variables refer to access, longitudinality, coordination, comprehensiveness, family counseling, community orientation and cultural competence. The tabulation and data processing of inferential statistics were performed from the computerized statistical package SPSS version 19. S.

## Analysis and Discussion

### *Characteristics of the PC of Caxias do Sul*

The city Caxias do Sul is the home of the headquarters of the administrative facilities of the 5th Regional Health Coordination (RHC), which is responsible for the activities in all the 48 municipalities of the State of Rio Grande do Sul, covering 28 hospitals that perform calls from UHS, for a total population of 1,513,884 inhabitants. It constitutes a reference center of in health care for the northeastern state of Rio Grande do Sul.

Since 1997, given the lack of offer in public health services, the low insertion of public health in relation to the private sector and weak management structures, were gradually implemented significant investment decision and the definition of a political-care proposal for the municipal UHS. According to Claus (2007), the main problems regarding public health raised in this period in the city of Caxias do Sul were: a) care attention focused on tasks and procedures, and not on the users' needs; b ) low effectiveness and efficiency of health actions, c)

**Table 2 - General characteristics of BHU surveyed**

| UNIT | Number of registered individuals (UHS Card) | Total attendances of BHU | Number of teams FHS | Number of Customer FHS | Total employees * | Total Expenses by BHU (U.S.$) ** |
|---|---|---|---|---|---|---|
| **BHU1** | 1.090 | 8.074 | 1 | 2.130 | 6 | 128.903 |
| **BHU2** | 745 | 7.123 | 1 | 2.439 | 5 | 84.546 |
| **BHU3** | 3.976 | 12.376 | 1 | 2.546 | 7 | 78.456 |
| **BHU4** | 3.653 | 10.345 | 1 | 4.862 | 8 | 131.342 |
| **BHU5** | 14.718 | 89.101 | 3 | 41.877 | 32 | 1.208.230 |
| **BHU6** | 3.586 | 22.118 | 2 | 10.395 | 11 | 334.123 |
| **BHU7** | 11.169 | 51.116 | 3 | 24.025 | 21 | 578.659 |
| **BHU8** | 7.678 | 34.453 | 2 | 16.193 | 19 | 432.729 |
| **BHU9** | 11.411 | 44.288 | 3 | 20.815 | 24 | 562.125 |
| **BHU10** | 4.152 | 9.092 | 1 | 4.273 | 7 | 120.467 |
| **BHU11** | 6.637 | 24.361 | 2 | 11.450 | 15 | 402.073 |
| **BHU12** | 7.220 | 27.278 | 2 | 12.821 | 15 | 430.758 |
| **BHU13** | 1.800 | 23.460 | 2 | 11.026 | 8 | 376.273 |
| **BHU14** | 5.667 | 30.458 | 2 | 14.315 | 13 | 468.523 |
| **BHU15** | 1.847 | 6.776 | 1 | 3.185 | 5 | 149.420 |

* Statutory and CLT.

** Expressed in thousands of Dollars (US$) Dec. 2012.

Source: Nodari et al. (2012)

**Table 3 - Study variables through PCATool and Innovation**

| | Variables Analysis | BHU 1 | BHU 2 | BHU 3 | BHU 4 | BHU 5 | BHU 6 | BHU 7 | BHU 8 | BHU 9 | BHU 10 | BHU 11 | BHU 12 | BHU 13 | BHU 14 | BHU 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARTIAL SCORE OF THE PCATOOL | Access | 2,33 | 1,89 | 2,33 | 2,44 | 3,11 | 2,78 | 2,11 | 2,44 | 3,67 | 3,11 | 2,11 | 2,33 | 3,00 | 3,56 | 2,56 |
| | Longitudinality | 2,38 | 2,62 | 2,38 | 2,62 | 3,00 | 2,85 | 2,46 | 3,38 | 3,38 | 3,23 | 2,46 | 3,00 | 3,23 | 4,00 | 2,54 |
| | Coordination | 2,86 | 2,62 | 2,54 | 2,93 | 3,54 | 2,93 | 2,79 | 3,35 | 3,10 | 2,62 | 2,60 | 3,03 | 3,22 | 3,15 | 2,94 |
| | Integrality | 3,32 | 2,71 | 3,18 | 3,32 | 3,63 | 3,31 | 2,98 | 3,70 | 3,33 | 2,71 | 3,16 | 3,53 | 3,25 | 3,19 | 3,25 |
| | Family Orientation | 3,43 | 2,21 | 2,64 | 2,86 | 2,93 | 3,07 | 3,07 | 3,79 | 3,21 | 2,21 | 2,79 | 3,71 | 3,07 | 3,50 | 3,07 |
| | Communitary orientation | 3,57 | 2,43 | 2,81 | 2,81 | 3,71 | 3,57 | 3,29 | 3,86 | 3,71 | 2,43 | 3,43 | 3,86 | 3,33 | 3,71 | 3,33 |
| QUANTITY OF INNOVATIONS | Cultural Competence | 2,57 | 2,14 | 2,14 | 2,57 | 3,43 | 3,43 | 3,71 | 3,71 | 3,57 | 2,14 | 3,71 | 3,29 | 3,14 | 3,00 | 3,14 |
| | Product (good or service) | 3 | 1 | 2 | 3 | 8 | 7 | 7 | 6 | 7 | 4 | 4 | 6 | 2 | 5 | 2 |
| | Process | 3 | 1 | 1 | 2 | 8 | 6 | 6 | 4 | 2 | 1 | 3 | 3 | 6 | 4 | 4 |
| | Marketing | 1 | 1 | 0 | 1 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 3 |
| | Organizational | 1 | 1 | 2 | 1 | 3 | 2 | 3 | 3 | 2 | 1 | 2 | 1 | 3 | 3 | 1 |

*Source: Prepared by the authors (2012)*

action plan and centralized resources with no local health plans; d) difficulties in linking users to basic reference e) difficulty of access for service users; f) little accountability of health professionals regarding the health of the population of its administrative area, and g) fuzzy concepts on the mission of BHU and other support services.

From the 41 BHU distributed in the municipality, the current network allows access to medium and high complexity, which previously was not available to UHS users, and carries an average of 15,000 visits / month. The client population in health services is registered in accordance with the guidelines of UHS through the use of a UHS card and must receive care at the nearest BHU and FHS, according to the location of residence. In October 2009, the UHS database of the city of Caxias do Sul had 340,102 registered users.

Thus, the health network of Caxias do Sul, with its communication centre located and managed by BHU, constitutes an organization that corresponds to the reference and cross-reference flows governed by a demand originating from the local population, with specific reference centres such as: a) a management system that performs the care regulation and management through the Municipal Health Service; b) a support system that performs the additional services at the BHU, such as hospitals, pharmacy specialists, haemodialysis, and so on; c) a logistics system that performs a compilation of the population information through Information systems, Card user, Ambulance Central, and so on.

The population requiring health services is registered in accordance to the guidelines of Health System in Brazil, maintained by a health system card, and may have consultations in their closest BHU and according to the FHS, based on their address of residence.

## *Analysis of Basic Health Units*

Each BHU has a physical structure of 350m² to 500m² and operation activities of 12 hours per day. From the 15 participating PCUs, five are located in rural areas and 10 units are located in the city of Caxias do Sul.

To a BHU leader fits the mission of leading technical, political and administrative work processes to ensure the implementation of the strategic changes listed for the needs of their local coverage area, or else, the BHU and their organizing teams FHS.

The innovations introduced by the 15 BHU, between the period of January 2007 and October 2009, reached 52 in total. This includes 24 product innovations (goods or services), which represents 46% of all innovations; 15 process innovations, which represents 29% of all innovations; 5 innovations in marketing and 8 organizational innovations, representing respectively 10% and 15% of all innovations.

Some of the major product innovations include the introduction of tests and services from other areas of health such as nutrition and physiotherapy, as well as programs aimed at increasing the supply of services to the population, with encouragement in association with the State, Federal and Municipal spheres.

In regard to process innovations, significant changes were identified in specific techniques, like the examinations collection instituted in place at the BHU. Another innovation was about the reception of all users seeking care, ensuring the principles of fairness and integrity of health actions. These changes allowed the development of new means of processes that allowed greater readiness in customer service procedures and service delivery, as in sample collection.

There were less Marketing innovations than other, since the nature of the service is associated with community programs or orientation in MHS management. For example, the Vigimama program, developed for the screening of breast cancer, reached new markets in the community. Still, these innovations represent a change of the organization in behavior toward its market, and as well, the implementation of an ombudsman for the population of the BHU, with the objective of allowing public awareness of the prevention and treatment of diseases.

Finally, the organizational innovations that corresponded to the implementation of organizational methods to improve the conditions of the workplace, such as the host-specific changes of pediatrics and a new layout promoting the absorption of the population; bringing satisfaction in caring for their health problems. Moreover, there was also the introduction of new management processes, with the computerization of the Information System - Primary Care (SIS. SAP) movement, which started in 2009 and, according to the MHS managers, should be totally deployed within the BHU by 2010, facilitating and enabling

agility and information exchange in the Health Care System.

The PCATool analysis first evaluated the quality of guidance by PC of Caxias do Sul, by calculating a mean for all 15 BHU of 6.81, which represents a high PC score with a Coefficient of Variation of 14.68%. It was found that 5 BHU did not reach the center value of 6.6, which represents the minimum score for a PC, as proposed by Starfield et al. (2001), more specifically with 4 BHU in rural areas and one in an urban area. Table 3 presents a summary of the information regarding the partial scores of PCATool and the number of innovations for each BHU that served as the basis for the statistical analysis.

## *Statistical Analysis of Data Collection*

The Pearson correlation coefficient (r) is a measure of linear relationship between two random variables that examines the strength of association. Considering the analysis of the variable "number of innovations" and the variable "PCATool partial score" for the 15 BHU, it was possible to identify that from a level of significance of 5% (ρ-value <0.05), it was observed that the number of innovations have a strong positive relationship with the PCATool score, at r = 0.769 with a ρ-value = 0.0008. The coefficient of determination, which measures the mode of association between the variables presented in $r^2$= 0.5915, which indicates that for each unit of change of the variables contained in the PCATool score, it takes a change of 0.5915 (59.15%) in the number of innovations.

Given the results of association and strength between variables, an evaluation of the influence of a variable on the other was done, establishing a relationship of cause and effect through simple linear regression, which explains how the variables contained in PCATool influenced the number of innovations. A simple linear regression is an attempt to establish a mathematical equation that describes the linear relationship between two variables (Hair Jr, Joseph, Babin, Money and Samouel, 2006). The method used for the evaluation of simple linear regression is the least squares.

Table 4 summarizes the values of r, $r^2$ and adjusted $r^2$ of the intersection of the 11 variables. The correlation coefficient (r) is a measure of linear relationship between two or more variables that indicates the proximity of the points from the regression line, the closer the result is from number 1, the closer the points are from the regression line. The closer the result is from number zero, the poorer is the possible adjustment of the linear regression of points (Hair Jr. et al., 2006). Thus, it is possible to identify in Table 4, that the dependent variables on the number of product, process, marketing and organization innovations have a relationship and association strength with the independent variables of the score PCATool coordination, integrality, community orientation and cultural orientation.

The coefficient of determination ($r^2$) of the regression indicates how an independent variables can explain the variation of a dependent variable, which measure seeks to reflect how much dependent values are related to independent ones (Hair Jr. et al., 2006). It can be noted from Table 4 that for the dependent variable "product innovation", the highest coefficient of determination performed is $r^2$ = 0.466, which refers to the independent variable cultural competence. It means that for each unit of change in cultural competence occurs one unit of change of 0.466 (46.60%) in product innovation.

**Table 4 - Simple Linear Regression Variables for Innovation and PCATool**

| Dependent variable | Product | | | Process | | | Marketing | | | Organization | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Independent variable | r | $r^2$ | $r^2$ Adjusted | r | $r^2$ | $r^2$ Adjusted | r | $r^2$ | $r^2$ Adjusted | r | $r^2$ | $r^2$ Adjusted |
| Access | 0,453 | 0,205 | 0,144 | 0,197 | 0,393 | -0,35 | 0,390 | 0,152 | 0,082 | 0,335 | 0,112 | 0,045 |
| Longitudinality | 0,400 | 0,160 | 0,095 | 0,138 | 0,191 | -0,56 | 0,365 | 0,134 | 0,065 | 0,444 | 0,197 | 0,135 |
| Coordination | 0,557 | 0,310 | 0,257 | 0,673 | 0,453 | 0,411 | 0,752 | 0,565 | 0,531 | 0,559 | 0,313 | 0,260 |
| Integrality | 0,570 | 0,325 | 0,273 | 0,780 | 0,608 | 0,578 | 0,733 | 0,537 | 0,501 | 0,540 | 0,292 | 0,237 |
| Family Orientation | 0,412 | 0,170 | 0,106 | 0,366 | 0,134 | 0,674 | 0,452 | 0,204 | 0,143 | 0,329 | 0,108 | 0,032 |
| Communitary Orientation | 0,636 | 0,405 | 0,359 | 0,572 | 0,327 | 0,275 | 0,610 | 0,372 | 0,324 | 0,467 | 0,218 | 0,158 |
| Cultural Competence | 0,682 | 0,466 | 0,425 | 0,649 | 0,421 | 0,376 | 0,649 | 0,422 | 0,377 | 0,574 | 0,329 | 0,277 |

Source: Prepared by the authors (2012)

For the dependent variable "process innovation", the highest percentage of variation found is explained by the independent variable integrality with $r^2 = 0.608$ (60.80%). For the dependent variable "innovation in marketing", the highest coefficient of determination performed is $r^2 = 0.565$, which indicates that for each unit of change in coordination is produced a unit of change of 0.565 (56.50%) of innovation in marketing. Finally, for the dependent variable "organization", the highest percentage of variation found is explained by the independent variable "cultural competence", with a $r^2 = 0.329$ (32.90%). For this evaluation, it is observed more homogeneous conditions of participation of the independent variables over the dependent variables.

The correlation coefficient squared adjusted (Adjusted $r^2$) of the number of independent variables used to estimate, evaluate if there is a gain or loss from the inclusion of a new variable in the model, or else, if the present value, which is decreasing or negative has little explanatory force, or even represents an inverse explanation from the proposed model (Hair Jr. et al., 2006). From Table 4, the study highlights the inverse relationship of the dependent variable "innovation process" in relation to the independent variable scores and partial access "longitudinality (continuing care)", demonstrating that these independent variables have an inverse explanatory value on the dependent variable "process innovation".

It is also observed that for the analysis of the correlation coefficient squared adjusted (adjusted $r^2$), there is a confirmation of the analysis of the coefficient of determination ($r^2$), which indicates that the independent variable "cultural competence" has the greatest explanatory value in the dependent variable "product innovation" and is therefore relevant to their inclusion and participation in this analysis segregated. The same phenomenon can be observed for the independent variable "integrality" on the dependent variable "process innovation", for the independent variable "coordination" on the independent variable on the dependent variable "innovation in marketing" and for the independent variable "cultural competence" on the dependent variable "organizational innovation".

With the objective to understand how much the contribution of the independent variables on the dependent variables is, it was sought to evaluate the slope of regression (B), which determines the variation in the dependent variable of a unit for each variation of the independent variable. Concomitantly, was established the significance of F, by testing the significance of the independent variable on the dependent variable, in order to demonstrate the behavior of the association and influence between them (Pestana and Gageiro, 2005).

The data are shown in Table 5 with highlights on the significant results of correlation found previously.

With the dependent variable "product innovation", it can be observed that when incremented a unit of the independent variable "cultural competence", an increase of 0.312 units in "product innovation" occur (F = 0.005).

With the dependent variable "process innovation", it can be observed that when incremented a unit of the independent variable "integrity", an increase of 0.726 units in "process innovation" occur (F = 0.001).

With the dependent variable "innovation in marketing", it can be observed that when incremented a unit of the independent variable "coordination", an increase of 0.702 units in "innovation in marketing" occur (F = 0.001).

**Table 5 - Regression Coefficient and Significance of the variables "Innovation" and "PCATool"**

| Dependent variable | Product | | Process | | Marketing | | Organization | |
|---|---|---|---|---|---|---|---|---|
| Independent variable | Coefficient B | Significance F | Coefficient B | Significance F | Coefficient B | Significance F | Coefficient B | Significance F |
| Access | 0,230 | 0,900 | 0,099 | 0,481 | 0,199 | 0,151 | 0,185 | 0,222 |
| Longitudinality | 0,228 | 0,140 | 0,078 | 0,623 | 0,210 | 0,180 | 0,277 | 0,098 |
| Coordination | 0,516 | 0,310 | 0,615 | 0,006 | 0,702 | 0,001 | 0,566 | 0,030 |
| Integrality | 0,538 | 0,270 | 0,726 | 0,001 | 0,697 | 0,002 | 0,556 | 0,380 |
| Family orientation | 0,239 | 0,127 | 0,209 | 0,180 | 0,264 | 0,091 | 0,208 | 0,232 |
| Communitary orientation | 0,354 | 0,011 | 0,314 | 0,026 | 0,343 | 0,016 | 0,284 | 0,079 |
| Cultural competence | 0,312 | 0,005 | 0,293 | 0,009 | 0,299 | 0,009 | 0,286 | 0,025 |

Source: Prepared by the authors (2012)

With the dependent variable "organizational innovation", it can be observed that when incremented a unit of the independent variable "cultural competence", an increase of 0.286 units in "organizational innovation" occur (F = 0.025).

It is noteworthy that other relations and significant influences were evident, but to establish a joint analysis of simple linear regression, it was decided to approach the influence of greater significance between the crossings of the 11 variables.

## Conclusion

The overall objective of this research was to identify an approximation of the elements that qualify a health service-oriented at PC through the use of the PCATool and the typology of innovations evidenced from several references. The study was conducted in the city of Caxias do Sul, as it constitutes itself as a benchmark of health services in the northeastern state of Rio Grande do Sul, featuring the special importance about the commitment and the efforts of the organisation in improving health services for the population since 1997.

Through a Pearson correlation analysis, the study of the 15 evaluated BHU established that the higher the score of the PCATool in developing the quality of services provided to the population due to the essential attributes and derivatives, the largest number of innovations were found. This relation allowed to show that there is an evidence of association, in respect to the characteristics of each BHU; more specifically about the accessibility of services, continuing care for individuals, products and services offer to the population, the coordination at other levels of the health system, the FHS, the intervention of health services in the community and training team of BHU with the number of innovations highlighted.

Consequently, the analysis of the influence and specific relationship of the independent variable on the dependent variable led to a simple linear regression analysis; confirming the relationship of such variables: "cultural competence" and "product innovation", "process innovation" and "integrality", "coordination" and "innovation in marketing", "cultural competence" and "organizational innovation".

It was demonstrated that for "product innovations", there is a significant influence of the derivate attribute "cultural competence", of the PCATool. In other words, the increase of managerial training in the organization of the BHU and also the ability to offer special services to the enrolled population stimulate the increase of "product innovations". Although there is a relationship with the essential attribute of "integrality", which involves a variety of products and services available, it is with the "cultural competence" attribute where is found a significant influence for the introduction of "product innovations".

Regarding the variable "process innovation", it was established that significant influence occurs through an essential attribute of the variable "integrality". In other words, an increase in the variety of services available for greater equality between the BHU that have the appropriate recognition pattern of the biological, psychological and social problems that cause diseases, responds strongly to the most common needs of the population for each BHU, and it demonstrates a strong organization that stimulates process innovations.

Noteworthy to highlight the inverse relationship of the variable "process innovation", demonstrated by the analysis of the squared adjusted correlation coefficient, with the independent variable of "access to care" at the BHU and the "continued primary care" over the years. Thus, the stimulus of the variables "access and longitudinality" do not result in the increase of the variable "process innovation". In other words, the development of initiatives such as the extension of hours of service to the population or the changes that enable agility in customer service, in view to accommodate all individuals, does not presuppose a larger increase in "process innovation".

For the variable "marketing innovation", it was observed that a significant influence on the essential attribute of the variable "coordination", which means the integration capacity of the working team with the population, associated with a punctual system of information that leads the individuals to other steps of health care, presupposes an increase in innovations in marketing.

In regard to the variable "organizational innovation", there was a significant influence on the derived attribute of the variable "cultural competence". In other words, the increase in the provision for special services and the recognition of the needs of the population due to these special features, which involves a differentiated organizational arrangement for service delivery by the BHU assumes an increase in the variable "organizational innovation".

Thus, this research reaches the proposal to highlight the association between the selected variables on the quality of the orientation of health services for the PC and the innovations. Based on the theory, it aggregates the quality and the number of data available on innovation and PC, as a strategy within the public administration of health actions. Moreover, at the organizational level, the study contributes to stimulate the understanding of the opportunities for change that help to manage more efficiently the local health resources, the quality of services provided to the population.

Those evidences allow to corroborate the dynamic health care approach in the study of innovation, being fundamental to understand health promotion policies, and consequently local development.

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