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Performance of infection prevention and control programs in small hospitals*

Desempenho dos programas de prevenção e controle de infecções em pequenos hospitais

Desempeño de programas de prevención y control de infecciones en pequeños hospitales

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ABSTRACT

Objective: To evaluate the structure compliance and prevention and control processes of Healthcare-Associated Infections (HAIs). **Method:** A prospective and cross-sectional study conducted from 2015 to 2016 in small hospitals with up to 70 beds in a region of São Paulo state. Four previously validated indicators were evaluated and expressed as a compliance index (percentage in relation to the evaluated items). **Results:** Fourteen (14) among the 27 recruited hospitals consented to participate in the study. The average compliance values for each indicator were: Program structure (61.0%); Operational guidelines (84.5%); Epidemiological surveillance (57.9%); and Prevention activities (74.5%). Greater compliance was observed in private hospitals (73.9%) and with the presence of an intensive care unit (90.3%). The hospitals had nurses assigned to the program (92.9%), but only 23.1% of the private institutions worked exclusively for six hours. **Conclusion:** Only the indicator referring to the Operational Guidelines of the evaluated programs was above 90% compliance for the median of hospitals. The greatest dispersion of compliance results among the studied hospitals was related to the Epidemiological Surveillance indicator.

DESCRIPTORS

Cross Infection; Infection Control; Health Status Indicators; Health Evaluation.

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INTRODUCTION

Healthcare is challenged by preventable adverse events, including Healthcare-Associated Infections (HAIs) which constitute a serious worldwide public health problem that increase mortality and elevating hospital costs[1]. Conditions for HAIs prevention and control have been considered as a parameter for evaluating health services and reflect the quality of care provided[2]. Insufficiency in these conditions has been a special challenge for low and middle income countries in which HAI rates are even higher[3].

Small hospitals such as those with 70 beds or less have a particularly important role in locations with limited acute care settings, in addition to being predominant in many countries such as Brazil. This demonstrates the relevance of these institutions, which represent 62% of hospital units and 18% of existing beds in the Brazilian healthcare system, with more than half of these being the only care option in many locations[4].

Few studies have presented HAI data for small hospitals[5-7], and the magnitude of the problem is little-known in the country. A study with a national sample stratified according to hospital size showed a total HAI rate of 10.8%. The stratum considered for small hospitals was between 10 and 50 beds; this group included 412 patients, among whom 5.5% contracted HAI. In this study there was a predominance of urinary tract infections, representing 1.5% of cases. Moreover, a 4.3% surgical site infection rate was identified among patients who underwent any surgical procedure[8]. However, the authors emphasized that most surgical site infections were detected after discharge, and therefore prevalence studies tend to underestimate the rates of this type of infection.

The prevention and control practices of HAIs in these small institutions is still a little-known reality worldwide. Studies which have addressed the structural conditions for prevention and control of HAIs are rare[9-10].

Knowing the real situation of these small institutions is the first step to identify relevant aspects to drive public policies addressed to improve the quality of healthcare in developing countries. Thus, this study aimed to evaluate the compliance index of the structure and processes of HAI Prevention and Control Programs (HAIPCP) in small hospitals in a region in the state of São Paulo, Brazil, in order to contribute to recognizing the magnitude of this problem.

METHOD

Study design

A cross-sectional and prospective study evaluating the performance of small hospitals regarding the structure and processes of HAIPCP.

Scenario

The study was developed in small hospitals belonging to the region of Taubaté, located in the southeastern region of the state of São Paulo, Brazil, between September 2015 and March 2016. The choice of the study region was defined by convenience, but it has characteristics similar to other regions of the state. General and specialized, as well as public and private hospitals with up to 70 beds were established as inclusion criterion, and obtained through consultation in the National Registry of Health Establishments (*CNES*: http://cnes.datasus.gov.br) in 2015. Institutions which did not perform invasive therapeutic procedures were excluded, resulting in a total eligible population of 27 hospitals.

Data collection

Data were collected by one of the researchers with experience in HAIPCP through document inspection and interviews using two structured tools. The first tool was used to characterize hospitals and their HAIPCP. The second, previously built and validated regarding its content, theoretical concepts, discriminating function, and reliability[11], was used to evaluate the compliance of the HAIPCP, being composed of four process and structure indicators, namely: 1. HAIPCP Structure (PCST): evaluates its structure, including training and technical-operational support such as human resources, physical infrastructure and technical and administrative apparatus, with 10 evaluation components; 2. HAI Operational Guidelines (PCOG): evaluates the existence of operational guidelines for hospital areas or services regarding manuals, rules and operational procedures developed or incorporated into HAIPCP, with 15 evaluation components; 3. HAI Surveillance (PCES): evaluates whether the HAIPCP runs an epidemiological surveillance system through activities which include an active search, epidemiological indicators, identification and notification of HAI cases, with 10 evaluation components; and 4. HAI Prevention and Control activities (PCPC): evaluates HAI prevention and control activities in the various hospital services or sectors, including inspection, guidance and assessment of implemented guidelines, participation in sector meetings, holding routine and on-demand consultancy, with 14 evaluation components. Each indicator describes its theoretical basis of evidence and guides the evaluation process, as well as the formula for establishing the compliance index[11].

Data analysis and processing

The evaluated outcome was the Compliance Index (CI), composed of the proportion of items in compliance in relation to the number of items evaluated. The CI ≥ 70% was defined as a good level of quality for the HAIPCP structure and processes. Coding and data entry were performed with the aid of Microsoft Excel software (2015), and the Statistical Package for Social Sciences program (SPSS 22). The distribution percentiles of the scores achieved in the CIs were calculated. Associations between selected variables and the CI were analyzed using Fisher's exact test at a significance level of 5%.

Ethical aspects

The research respected the ethical and legal principles contained in Resolution No. 466/2012 of the National Health Council and was previously approved by the Research Ethics Committee of the Universidade de São Paulo School of Nursing on 07/02/2015 under the opinion no. 1.212.774.

The Informed Consent Form (ICF) was previously signed by the participants involved.

RESULTS

There were 14 of the 27 recruited hospitals which consented to participate, corresponding to 52% of the total accessed sample. The reasons for sample loss were: no response from the hospital for participation after five attempts (n = 5), refusal to participate (n = 7) and absence of an active HAIPCP (n = 1).

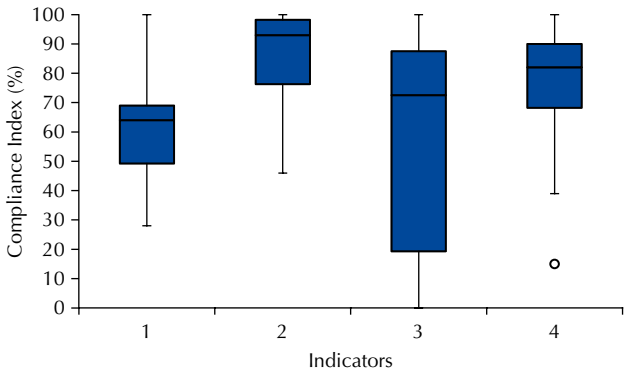
Hospitals had an average of 30.7 beds (SD 14.1; median 30.0 beds). The sample consisted of 11 private (78.6%) and 3 public hospitals (21.4%). Most of these hospitals had provided general care (71.4%) and those specialized (28.6%) attended geriatrics, pediatrics and repair/plastic surgery.

Only 42.9% had their own analysis laboratory. This service was outsourced in most hospitals; however, the three participating public institutions had their own laboratory. The safe surgery program was in line with national guidelines[12], and was implemented in seven hospitals (50.0%).

Epidemiological indicators were used by nine (64.3%) of the studied hospitals. These indicators were most often infection rates in clean surgeries (n = 9) and cesarean deliveries (n = 8). Just over half (n = 9) used the active method to search for infections. Most surveillance results resulted in reports with only descriptive statistical information (71.4%), without analysis and interpretation (64.3%) or recommendations (57.1%). The dissemination of epidemiological information to the hospital community or communication to health authorities was not carried out in 7 (50.0%) hospitals.

Hospitals with surgical services had an average of two operating rooms (SD 1.0). The monthly average of surgeries performed in the institutions was 115. Hospital Infection Control Commissions (HICC) were implemented in the hospitals in this study as of 2007.

There was a large variation in the CI of the HAIPCP (Figure 1). The lowest CIs were observed in the HAIPCP structure and epidemiological surveillance indicators. There was greater dispersion of the observed data regarding the HAI epidemiological surveillance indicator. It was found that the median of hospitals did not reach the CI of 70% regarding the HAIPCP structure.



1 = HAIPC structure; 2 = HAIPC organizational guidelines; 3 = HAI surveillance; 4 = HAI prevention and control activities

Figure 1 – Compliance Index in the hospitals according to the evaluation of indicators of the Healthcare-Associated Infection Prevention and Control Programs (HAIPCP) – Taubaté Region, SP, Brazil, 2015-2016.

Private institutions showed higher CI compared to public ones (Table 1), but this difference was not significant (p>0.05). The institutions which have an Intensive Care Unit (ICU) presented better CI when compared to those without an ICU (Table 2).

Table 1 – Distribution of the compliance index for the HAIPCP indicators in public and private hospitals – Taubaté Region, SP, Brazil, 2015-2016.

Indicators	Public hospitals (N=3)				Private hospitals (N=11)			
	Mean (SD)	Min.	Med.	Max.	Mean (SD)	Min.	Med.	Max.
HAIPCP Structure	48.7 (17.8)	28.2	59.0	59.0	64.3 (20.4)	28.2	69.2	100.0
HAIPCP Operational Guidelines	81.3 (19.9)	58.3	92.3	93.3	85.4 (19.3)	46.2	93.3	100.0
HAI Surveillance	26.7 (46.2)	0.0	0.0	80.0	66.4 (35.0)	0.0	77.8	100.0
HAI Prevention and Control Activities	56.6 (36.9)	15.4	67.7	86.7	79.4 (19.0)	38.9	85.2	100.0

HAIPCP: Hospital-Associated Infection Prevention and Control Program; SD: Standard Deviation; Min: Minimum; Med: Median; Max: Maximum. HAI – Hospital-Associated Infections.

Table 2 – Descriptive statistics of the compliance of the HAIPCP indicators according to the presence of the ICU – Taubaté Region, SP, Brazil, 2015-2016.

Indicators	Hospitals with ICU (N=3)					Hospitails with no ICU (N=11)				
	M	Min.	Med	Max.	95%CI§	M	Min.	Med	Max.	95%CI§
HAIPCP Structure*	83.0	69.2	79.5	100.0	81.8 - 84.0	55.0	28.2	59.0	79.5	54.6 - 55.4
HAIPCP Operational Guidelines	95.6	93.3	93.3	100.0	94.5 - 96.6	81.5	46.2	92.3	100.0	81.1 - 81.9
HAI Surveillance**	93.3	80.0	100.0	100.0	91.1 - 95.5	48.2	0.0	60.0	100.0	47.4 - 49.0
HAI Prevention and Control Activities	89.1	76.0	91.3	100.0	87.8 - 90.4	70.5	15.4	79.0	100.0	70.0 - 71.0

HAIPCP: Hospital-Associated Infection Prevention and Control Program; M: Mean; Min: Minimum; Med: Median; Max: Maximum. HAI – Hospital-Associated Infections. CI§: Confidence Interval. * p=0.03. ** p=0.04.

Although hospitals have nurses assigned to HAIPCP (n = 13), only three of the institutions had these nurses working with exclusive dedication of at least six hours a day. The exclusive daily dedication time to the Hospital Infection Control Service (HICS) was an average of 3.3 hours. Most (n = 9) nurses had experience in HAIPCP of less than 2 years; however, doctors were generally more experienced, with two or more (n = 6). Only 2 of the HICS nurses had specialization in HAI prevention and 3 had taken short courses (i.e. 30 hours).

Operational guidelines containing recommendations for HAI prevention and control were present in all hospitals (n = 14), apart from laundry washing recommendations, which were only present in 8 hospitals. However, it was observed that most institutions (n = 7) used an outsourced laundry service.

It was observed that the activities developed for HAI prevention and control were addressed to the units of higher risk such as the ICU, the sterilization center and the surgical center. Few HAIPCP had documented activities in relation to outsourced services such as laboratories (n = 7) or dialysis units (n=0).

DISCUSSION

Well-structured HAIPCP can reduce infection rates, and thereby the economic and social burden generated by these events[13]. Although HAIPCP has been mandatory in Brazil since 1997[14], it is still far from desirable, especially for small hospitals[15] which deal with a lack of human, financial and structural resources to establish HAI prevention in a systematic way. Therefore, this study contributes to recognizing the scenario of HAIPCP in small hospitals in the country. These HAIPCPs were still incipient in the studied region.

Small hospitals in Brazil are characterized by a predominance of surgical and obstetric activity. This fact points to a probable high incidence of surgical site infection considering the data available for this group of hospitals to date[8]. This fact was also highlighted by a study conducted in the interior of São Paulo which identified a monthly average of 5 of these infections for each small hospital[16]. Considering the proportion of small hospitals in the country and then extrapolating these estimates, it can be assumed that a large number of people in Brazil are affected, therefore justifying the need for studies focused on this group of institutions.

Outsourcing of microbiology services in many institutions has also been observed in other national studies[15,17]. This fact alerts to the possibility of obstacles to HICC actions, which depend on qualified and timely action regarding the results of microbiological tests. Studies carried out in other locations in the country[2,18] also pointed out deficiencies in HAI prevention and control practices in outsourced services such as laundry and laboratory.

In the present study, one observed activities related to patient safety in part of the institutions, mainly regarding safe surgery. However, there was a certain weakness in the scope of the HAIPCP around several aspects. Notably, it would be expected that an active surveillance for HAI cases would be implemented in all institutions as recommended by the World Health Organization (WHO)[19], which was not observed.

Effective feedback on the epidemiological data to the stakeholders is one of the essential components considered by the WHO[19]. However, there was a lack of adequate analysis and limited dissemination of epidemiological information as mechanisms for improving prevention processes in these hospitals. This fact may be related to the low number of dedicated working hours to the HAIPCP or a lack of professionals specialized to work in this field. As already noted by other authors, many professionals act as mere data collectors and have no proactivity and leadership required for improvement interventions[20].

On the other hand, nurses in small institutions most often need to split their working hours into other several activities, including direct care or administrative functions. Other studies have also shown this problem: a Canadian study found a deficit in workload in 77.4% of the activities dedicated to HAIPCP[21]; in addition, a study carried out in Brazil showed inadequate human resources in 83% of the HAIPCP[22]. Professionals who work with HAI prevention and control in small rural hospitals are more likely to have several jobs, responsibilities and spend less daily time doing this work[9], as well as inadequate provision of human resources can also occur in urban hospitals for HAIPCP in relation to the minimum workload[23]. The relationship between bed capacity and dedicated working time in HAIPCP is still a controversial topic in several countries, especially for small hospitals[7,9,23-25].

The turnover of human resources, the time spent in training new employees, the limitations in language competence and the short workload permeate the existing barriers to the implementation of an effective HAIPCP[26]. However, well-structured, targeted teams with an institutional climate which prioritizes the prevention are facilitators for mapping tasks and human resources allocation in the institution[26]. This is particularly important in institutions with limited resources to implement efficient interventions for HAI prevention.

The same assessment tool used in our study was applied in several regions of Brazil, with great variations in results[2,11,15,18,27]. A study carried out in the city of São Paulo found better results, with CI greater than 80%, in particular on the indicators of HAIPCP structure and epidemiological surveillance, which achieved CI very close to 99%[11]. Another similar study in the city of Ribeirão Preto showed the CI for the indicators: HAIPCP structure (75.4%), operational guidelines (59.4%), epidemiological surveillance (83.7%) and HAI prevention and control activities (56.8%)[18]. This highlights that the performance of the HAIPCP in Ribeirão Preto with the majority of small hospitals differed from the present study, since the highest CIs were in the HAIPCP structure and epidemiological surveillance. In contrast, the observed CIs in the state of Paraná were lower: the HAIPCP structure indicator presented a CI equal to 79.4%, followed by an epidemiological surveillance indicator of 76.0%[2]. The other indicators obtained CIs below 70%, with 65.5% for the operational guidelines indicator and 63.2% for HAI prevention and control activities[2]. A

study carried out in Campo Grande showed CI greater than 80.0% for the HAIPCP structure and epidemiological surveillance indicators, but CIs were close to 60.0% for the operational guidelines and for the HAI prevention and control activities[27].

A Brazilian randomized nationwide study which used the same assessment tool found that hospitals with less than 50 beds had significantly lower CI values when compared to larger hospitals, such as those with more than 200 beds[15]. The same study also showed that many HAIPCP do not base their prevention efforts on surveillance data and prioritize preventive activities to intensive care units[15]. This corroborates the findings of the present study which point to the fact that the existence of ICUs seems to favor better CIs. However, this data must be interpreted with caution due to the sample size of ICU services in our study.

The variability observed in the different cited studies is somewhat expected, since the country is quite heterogeneous in terms of social, economic and cultural characteristics. It is important to highlight that only one[15] of the identified studies presented individualized results according to hospital size. This aspect becomes important, since results of HAIPCP compliance evaluations obtained in large hospitals may not reflect the reality of small hospitals. There are several reasons which may have a positive or negative impact on these differences, among which one can mention some characteristics: the limited capacity of human and material resources, the predominance of surgical care, a lower number of intensive care cases, and the lower frequency of using invasive devices and procedures[8].

Furthermore, discrepant CIs were highlighted among institutions in the study carried out in Campo Grande, which also reinforces the existence of great heterogeneity between the realities of HAI prevention and control in hospitals within the same region in the country[27], corroborating the findings of the present research.

It was not possible to identify significant differences between private and public financing of the evaluated institutions in the present study with regard to the HAIPCP CI. A Brazilian study carried out in Rio Grande do Norte state sought to assess and compare adherence to HAI prevention practices according to the type of hospital administration (private, public with direct administration, public with indirect administration), but did not find conclusive results regarding the differences[28]. This is an important aspect, which has still been little studied, and which should receive attention from researchers in the future.

Failure to comply with preventive actions points to the need for educational measures and for auditing processes, which in turn require a minimum structure. It is understandable that large and teaching hospitals lead research for HAI prevention and control in the developing world. However, one needs health policies to be reviewed in order to improve the quality and safety of care, taking into consideration the available resources, and the priorities actions for small hospitals, whether rural or urban.

However, the concern with HAI prevention in small hospitals does not only affect developing countries. For example, in Australia it has been found that there are a large number of small hospitals in the state of Victoria. There are 90 small public acute care hospitals compared to just 28 larger hospitals. Considering this scenario, the Victorian Hospital-Acquired Infection Surveillance System (VICNISS) was elaborated which aims to develop, implement, support and evaluate surveillance programs across the state in order to optimize performance in reducing HAI[29]. This program deals with process and results indicators and has studies focused on small hospitals[10,29].

The amount of effort required to maintain a cost-effective and efficient program for small hospitals is a matter of discussion. The absence of comparable HAI indexes among small hospitals is a major obstacle for analyzing the quality of care. As a result, there are false assumptions that their rates are low when compared to reference data from larger hospitals. Thus, some authors have suggested increasing the data collection period for analysis or reporting only sentinel events in order to circumvent this difficulty[7,29]. However, there is no consensus on the best surveillance system to be adopted for these types of hospitals.

Many small hospitals spend reasonable resources to develop their HAIPCP, most often based on models of larger hospitals and following recommendations and expert consensus. Even current WHO recommendations are based on evidence, mostly produced in developed countries and in larger hospitals[19]. However, there is a wide diversity among the reality of small hospitals around the world, so it is difficult to define what are the best cost-effective recommendations for this group of institutions.

The findings of the present study reinforce that HAI prevention and control is still far behind in these institutions in Brazil. Such results contribute to recognizing the current scenario in which nurses are engaged in HAI prevention and control in small hospitals, and the challenges to be overcome by them when leading their teams. A better knowledge of the context may open paths for nursing achievements to improve the care quality and patient safety, acting as protagonists in the political process[30].

A strong point of the present study was the data collection performed in the locations by a professional with experience in infection control, minimizing data collection bias. Among its limitations, half of the eligible institutions refused to participate in the evaluation. However, as the reasons for the refusal are unknown, it is not possible to more precisely estimate whether these reasons may have produced a favorable or unfavorable bias in relation to the observed CIs. Another potential limitation would be the inadvertent exclusion of hospitals eventually not registered by CNES due to periodic updates. The selection of region was a relevant pragmatic decision, taking into account the operational difficulties to carry out this study, and given that Brazil has large geographical dimensions and limited resources.

The results obtained in the present study suggest that there is still insufficient attention from health authorities and managers to ensure the homogeneity of HAIPCP in hospitals and to minimize inequalities in the healthcare quality in the region.

CONCLUSION

The present study showed an important variation in the CI of HAIPCP in a sample of hospitals in a region of the state of São Paulo. Among the four indicators assessed in the present study, only the indicator referring to the HAIPCP operational guidelines was above 90% in the median of the evaluated hospitals. The indicator which showed the greatest dispersion of CI results among the hospitals studied was related to the epidemiological surveillance of HAIs.

These data point to the need for other studies which evaluate the effectiveness of programs in order to identify the best models for HAI prevention and control that are compatible with the characteristics of small hospitals.

RESUMO

Objetivo: Avaliar a conformidade de estrutura e processo dos programas de prevenção e controle de infecções relacionadas à assistência à saúde. **Método:** Estudo prospectivo, transversal, realizado de 2015 a 2016, em pequenos hospitais de até 70 leitos de uma região do estado de São Paulo. Foram avaliados 4 indicadores previamente validados, expressos em índice de conformidade (porcentagem em relação aos itens avaliados). **Resultados:** Dentre os 27 hospitais recrutados, 14 consentiram em participar. Os valores médios de conformidade para cada indicador foram: Estrutura dos programas 61,0%; Diretrizes operacionais 84,5%; Vigilância epidemiológica 57,9%; Atividades de prevenção 74,5%. Maior conformidade foi observada em hospitais privados (73,9%) e com presença de unidade de terapia intensiva (90,3%). Os hospitais possuíam enfermeiros designados para o programa (92,9%), mas somente 23,1% das instituições privadas atuavam com dedicação exclusiva de seis horas. **Conclusão:** Apenas o indicador referente às Diretrizes Operacionais dos programas avaliados esteve acima de 90% de conformidade na mediana dos hospitais. A maior dispersão dos resultados de conformidade entre os hospitais estudados foi referente ao indicador de Vigilância Epidemiológica.

DESCRITORES

Infecção Hospitalar; Controle de Infecções; Indicadores Básicos de Saúde; Avaliação em Saúde.

RESUMEN

Objetivo: Evaluar la conformidad de estructura y proceso de los programas de prevención y control de infecciones relacionados a la asistencia a la salud. **Método:** Estudio prospectivo, transversal, realizado de 2015 a 2016, en pequeños hospitales de hasta 70 camas de una región del estado de São Paulo. Fueran evaluados 4 indicadores previamente validados, expresos en índice de conformidad (porcentaje en relación a los ítems evaluados). **Resultados:** Dentro los 27 hospitales reclutados, 14 consentirán en participar. Los valores medios de conformidad para cada indicador fueran: Estructura de los programas 61,0%; Directrices operacionales 84,5%; Vigilancia epidemiológica 57,9%; Actividades de prevención 74,5%. Mayor conformidad fue observada en hospitales privados (73,9%) y con presencia de la unidad de terapia intensiva (90,3%). Los hospitales poseían enfermeros designados para o programa (92,9%), mas solamente 23,1% de las instituciones privadas actuaban con dedicación exclusiva de seis horas. **Conclusión:** Apenas el indicador referente a las Directrices Operacionales de los programas evaluados estuvo arriba de 90% de conformidad en la media de los hospitales. La mayoría de la dispersión de los resultados de conformidad entre los hospitales estudiados fue referente al indicador de Vigilancia Epidemiológica.

DESCRIPTORES

Infección Hospitalaria; Control de Infecciones; Indicadores de Salud; Evalución en Salud.

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